**Lesson Report 1: Decision Support with GIS**

**by Diana Jo Lau**

Lesson Objectives:
- To perform atribute queries using logical operators and spatial queries predefined in ArcGIS .
- To use ArcCatalog to manage all ArcGIS files and create folder connections to access the datasets.
- To use ArcMap to visualize the GIS data in layers and perform the site analysis.

Lesson Criteria:
The site analysis consisted on finding the best location for an ice cream business in the state of Wisconsin. The following were the criteria for the new business location:

Criteria 1:
- A population of less than 150 habitants per square mile.
- A population of at least 25,000 habitants between the ages of 16 and 64 years.
- A location of at least 500 cows for milk production.
- A low crime index of less than or equal to 0.1.
- A location where at least one recreational area within 10 miles of the business.
- A location close to an airport.
- A major road within 20 miles.

The owners of the business decided to narrow the selection by the following criteria:

Criteria 2 (from Try This!)
- A location within 10 miles of a lake or shoreline
- A location within 40 miles of landmark

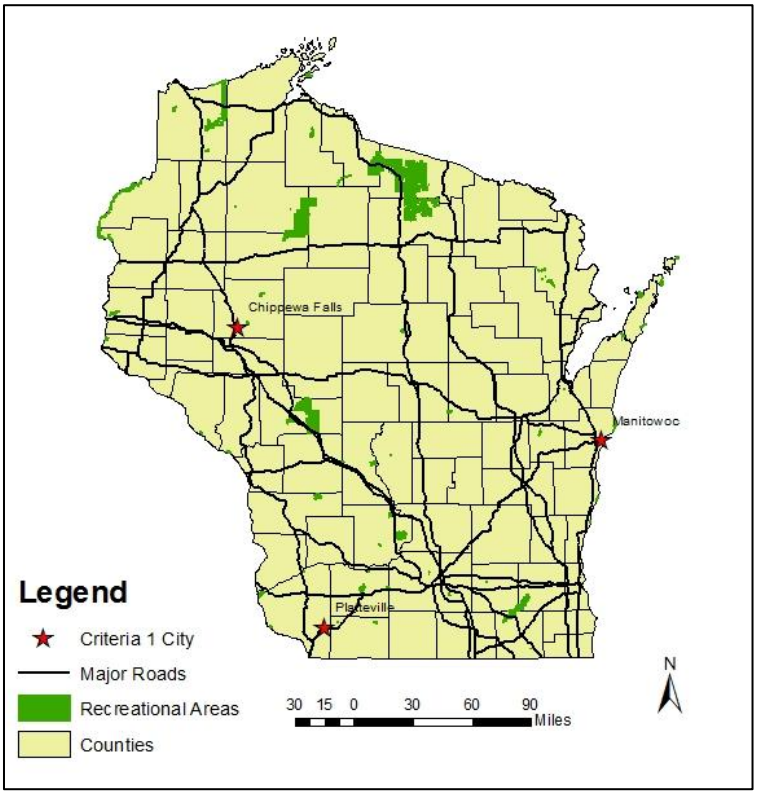


**Figure 1 Map showing results of site analysis under criteria 1. Projection: NAD 1983 StatePlane Pennsylvania North FIPS 3701. Map produced using ESRI ArcMap with data provided by Penn State University, January, 2013.**

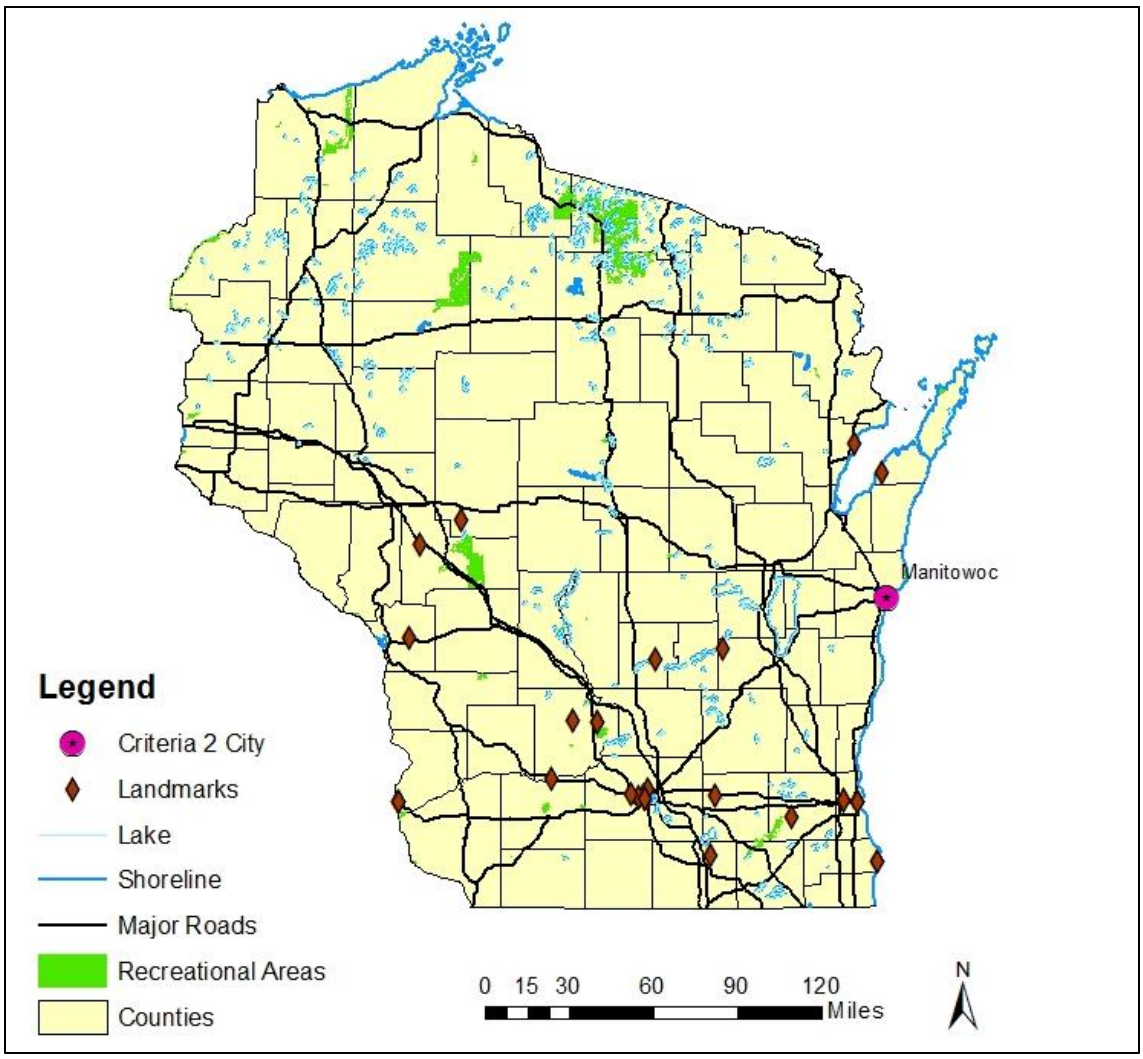


**Figure 2 Map showing results of narrowed site analysis criteria 2. Projection: NAD 1983 StatePlane Pennsylvania North FIPS 3701. Map produced using ESRI ArcMap with data provided by Penn State University, January, 2013.**

Results and Discussion:

The GIS data downloaded from the link given in lecture 1 was originally unprojected data. In ArcMap, unprojected data is displayed as Plate Carree projection and the coordinates are shown in decimal degrees but stored in latitude and longitude (King, Walrath, & Zeiders, 1999-2013). The layers added to create the map in Figure 1 were cities, counties, major roads, and recreational areas. All layers were projected to Wisconsin State System projection which is a Transverse Mercator projection and NAD 83 horizontal datum. As discussed in GEOG 482, projected data facilitates the user perform spatial analysis by relating plane coordinates and its length units (DiBiase & others, 2012). To obtain the candidate cities in Figure 1, a series of attribute and spatial queries were performed. The results of a series of queries were each exported in layers and added to the Table of Contents. The candidate cities for Criteria 1 are Chippewa Falls, Manitowoc, and Platteville.

Figure 2 shows the results of the narrowed selection of locations. From the map on Figure 1, the hydrologic and landmark layers were added and automatically projected to the current projection, these data were downloaded from a link given in Lecture 1 "Try This!" section. The hydrologic layer included features such as streams, lakes, shorelines, dams and other hydrological features. The most efficient approach is to perform an attribute query using the logical operator "OR" to select the lake and shoreline features from the hydrological layer and then perform an spatial query to identify cities within 10 miles of a lake or shoreline. For the purpose of depicting in the map, I created two different layers one for lakes and another for shorelines. Another restriction was to locate a city within 40 miles of a

landmark, a spatial query was performed. The narrowed results show only one city called Manitowoc, this city meets criteria 1 and 2.

Conclusion:

Using the ArcGIS applications to create and analyze a site location is very useful for a business, as this lesson refers. Other spatial considerations for the business location would be the land type (preferably plain areas), flood zone (preferably low risk flood zone area), groundwater and soil contamination areas (preferably uncontaminated areas). When creating maps the user has to make sure all layers are in the same projection type, different projection types in the same map will result of inaccurate results.

References:

DiBiase, D. and others. (2012). *Nature of Geographic Information.* The Pennsylvania State University. Retrieved February 27, 2013 from http://natureofgeoinfo.org.

King, E., Walrath, D & Zeiders, M (1999-2013). *Problem-Solving with GIS, Lesson 1, /Part 1, Section c*. The Pennsylvania State University World Campus Certificate/MGIS Programs in GIS. Retrieved February 27, 2013.