Orthorectification and Classification of a SPOT Image, Nova Scotia

Land Cover

- No Data
- Unclassified
- Cloud
- Shadow
- Water
- Snow/Ice
- Exposed Land
- Developed
- Shrubland
- Wetland
- Herbaceous
- Coniferous
- Deciduous
- Mixed Wood

N

km
0   5   10   20   30
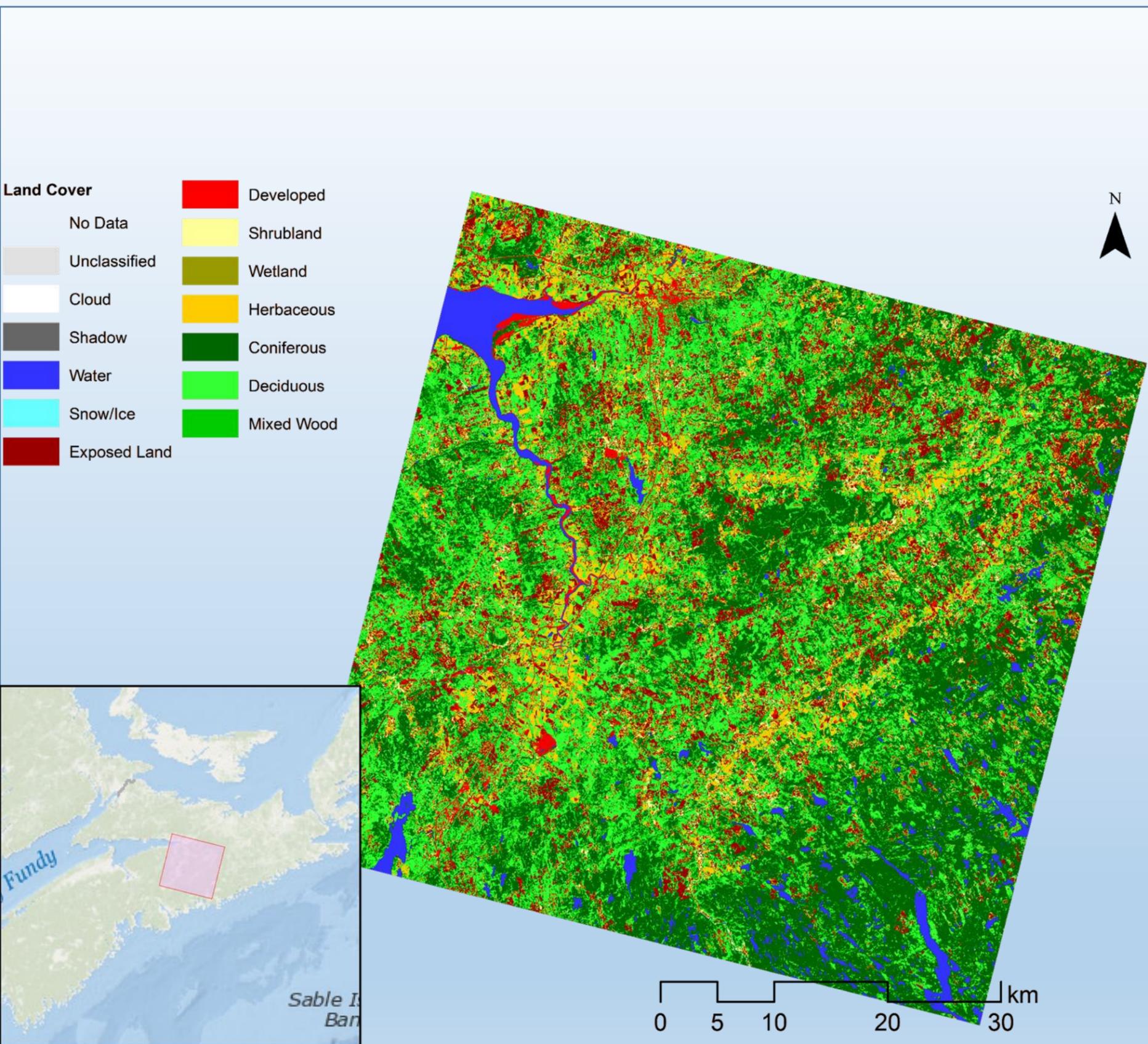
Goals and Tasks

The purpose of this project was to use SPOT satellite imagery in an unsupervised classification. The SPOT satellite image was first orthorectified using secondary sources (national road and hydro vector files). The unsupervised classification was run on the orthorectified data, and then grouped into appropriate land cover categories. Validation files were provided to the students to assess their classification and to enable a quantitative analysis of the performance of various classification, grouping and filtering methods. After a satisfactory classification was complete, the image was transformed into a vector image for use within the ESRI ArcMap software package. Each student in the class selected a different 'scene' and the combined class covered almost all of Nova Scotia. An important part of this assignment was keeping data organized and cohesive so that all the classified images could be combined for a final project. The DEM and SPOT imagery was accessed through the GeoBase website http://geobase.com, an excellent source for free imagery.

Study Area

The study area selected for this analysis was titled 564625906100071509061 in the instructor provided SPOT footprints vector file. A map showing the location of all the SPOT scenes and the one selected for this analysis is shown in Figure 1. The area is approximately 60 km x 60 km and it is centered on 45.12o N and 63.23o W (trending 15o east of north). The north west corner contains Cobequid Bay, the north east corner is near Upper Stewiacke, the south west corner is near Shubenacadie Grand Lake and the south east corner is near Lake Charlotte. The area is in central Nova Scotia and the land use is predominantly forest cover, lakes and agricultural.

Data Set

For this project multiple datasets were collected from the GeoBase website. The main image used in this project was an unrectified SPOT satellite image '56462590610071509061'. A DEM of the area covering the selected spot image was downloaded and combined into a single image using the raster mosaic tool in ArcMap. Both the DEM and the SPOT image were brought into the ESRI Imagine software for orthorectification. The SPOT image was orthorectified to the NAD 1983 CSRS projection using vector data for hydrographic (streams and lakes) and road network features. This had the disadvantage of passing along any errors in the vector files, however it did provide features to orthorectify to in a remote area with very little urban development.

Unsupervised Classification

The orthorectified image was then used in an unsupervised classification. The SPOT image was orthorectified using the combined DEM, and the isodata method was used with 75 classes were created over 12 iterations. Different filters were applied to the data in order to simplify the data set. The clump and eliminate filters were found to provide improvements to the data smoothness. The accuracy of the classification was compared to a validation data set to get empirical data to compare the filtering methods. It was determined that while the filtered data looked smoother it did not provide a large improvement to the accuracy.

Vector Data Set

The data set was then imported into ArcMap. Once in ArcMap the raster layer was converted to a polygon dataset. Both unsmoothed and smoothed polygons were created, with the latter found to be more visually pleasing. An ArcMap portal was then created in order to facilitate access to the data.

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