

# Visualization and Quantitative Analysis of Historical Trends in Land Use Change and Tidal Creek Emergent and Submerged Habitats

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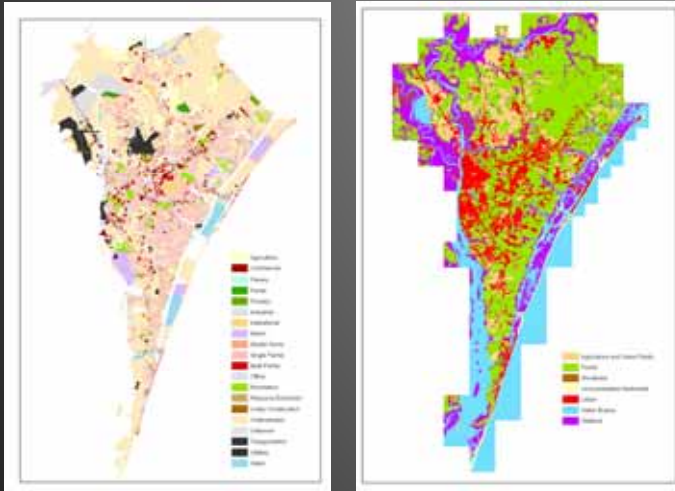


## Abstract

Geographic Information Systems (GIS) are commonly used to map, monitor, and analyze landscape changes through time. The purpose for this project is to compile a GIS database, compute change analysis, and test methodologies for creating benthic habitat maps in small tidal creek watersheds. The database development consists of both historical records as well as new data collected with up-to-date technology. An historical archive of aerial photography (dating back to the 1930s), thematic maps (e.g. land cover), and a variety of field samples collected through time have been assembled. These data are organized in an ArcGIS geodatabase and disseminated via the UNCW Wilmington GIS website. New satellite images from DigitalGlobe's WorldView-2 sensor and Landsat 5 have been obtained and are being analyzed to capture new upland land cover and intertidal and sub-tidal habitat types. The two tidal creek watersheds, Howe and Paces, in New Hanover County, North Carolina, are investigated and compared. Howe is an urbanized watershed consisting of a large mixture of mostly residential and commercial development and a high level of impervious surfaces. Paces creek is less developed, mostly single family residential, although the density of development is increasing rapidly and large tracts of apartments and commercial areas are under construction in the headwaters of the creek. Data analysis through image processing and spatial analysis have documented this growth in development and procedures for documenting change have been tested. A new technique for randomly identifying field sites has also been developed. The approach uses a spatially balanced GIS procedure for collecting creek habitat data. These data are then used for classifying the WorldView-2 imagery into the various emergent and submerged habitat classes. Lastly, a comparison is made between upland land use development and tidal creek habitats in order to develop a comprehensive management plan for the tidal creek watersheds.

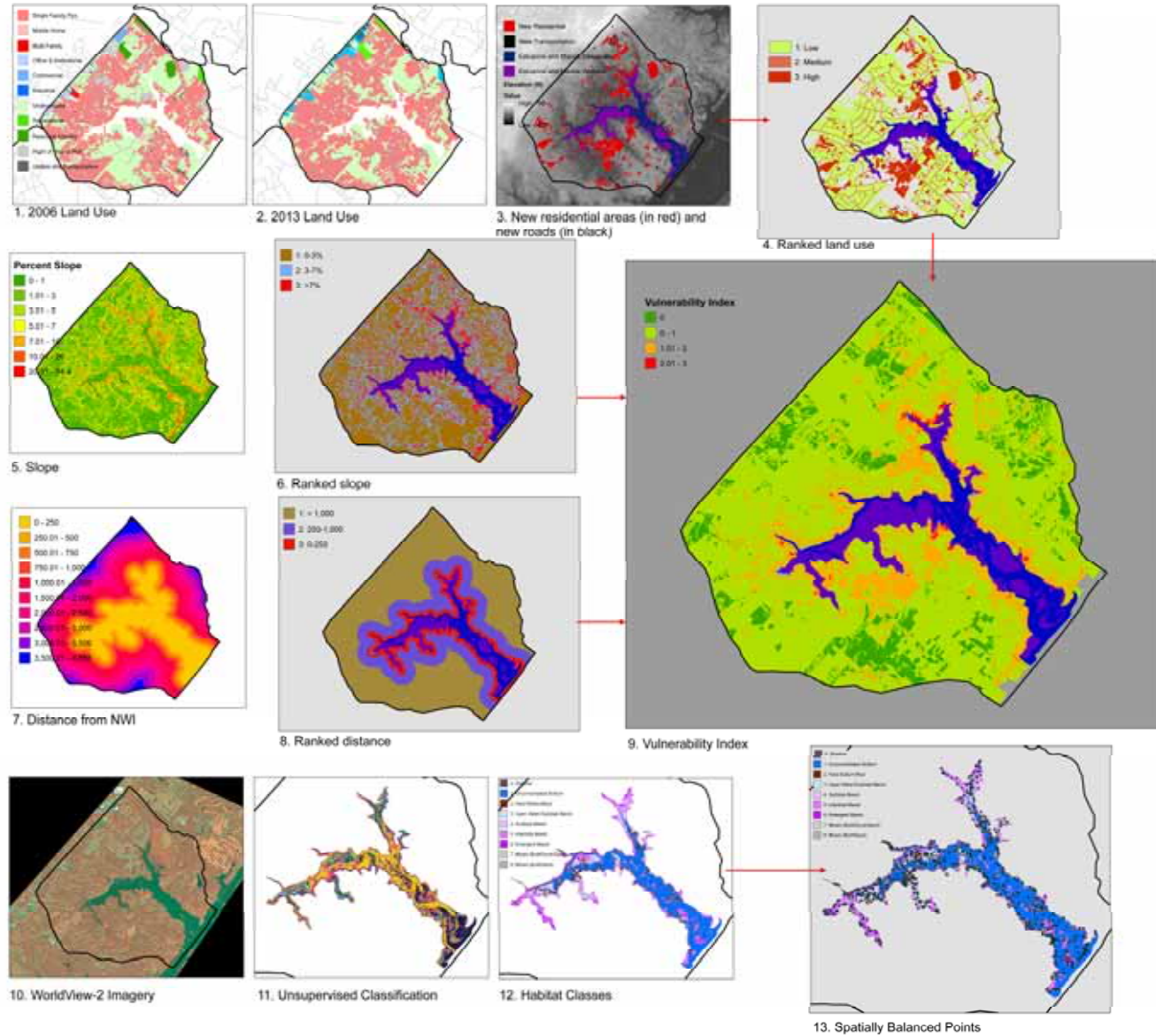
## Study Area: New Hanover County, North Carolina

The southeastern United States is one of the fastest growing regions of the country with increasingly large urban and suburban areas. What used to be considered largely a rural population with an economy centered on agriculture and textiles, many parts of North Carolina are now urban centers with varied economies such as banking, pharmaceuticals, and computer technologies. The population growth within the coastal counties is largely due to increasing retirement communities. Wilmington (New Hanover county) is an example of a growing coastal city, reminiscent of other coastal cities that are experiencing large population growth (Figure 1). In comparing 1987 to 1996, the largest land cover changes were new urban and loss in agriculture and forest (Table 1).



		1996 Land Cover							Total '87	Loss
		Agriculture	Forest	Sand	Shrubland	Urban	Water	Wetland		
1997 Land Cover	Agriculture	6.50	3.17	0.14	0.44	3.66	0.08	0.60	14.59	8.09
	Forest	1.27	29.35	0.02	0.81	2.03	0.08	2.78	36.35	7.06
	Sand	0.19	0.04	0.54	0.03	0.18	0.05	0.04	1.06	0.55
	Shrubland	0.28	1.99	0.01	0.10	0.35	0.02	0.37	3.11	2.02
	Urban	1.39	0.00	0.03	0.13	4.57	0.02	0.11	6.25	1.68
	Water	0.06	0.32	0.51	0.04	0.23	22.38	4.55	28.08	5.70
	Wetland	0.26	1.55	0.04	0.53	0.26	0.17	7.75	10.56	2.30
Total '96		9.95	36.41	1.28	2.07	11.29	22.80	16.20		
	Gain	3.45	7.07	0.74	1.97	6.72	0.42	8.44		

Table 1. Land cover change in New Hanover county from 1987 to 1996.



13. Spatially Balanced Points