

Metadata

Identification Information and Citation:

Title: 1998 land cover map of Georgia

Source: Natural Resource Spatial Analysis Laboratory, Institute of Ecology, University of Georgia

Date: 1998

Feature: Raster image

Projection: UTM 17, NAD83, GRS80

Scale: 30 X 30 m pixels, 1:24,000

Abstract:

This land cover map was produced from Landsat TM imagery with a spatial resolution of 30x30m. The classification process used six of the original seven bands of the imagery; the 120x120m thermal infrared band was removed from the data sets before processing. Additional ancillary geospatial and non-geospatial statistical data were incorporated in the mapping process. Information regarding the types of data used will be found in the following text. Image interpretation and analysis were performed on blocks, which were clipped by either county or multi-county units constrained by ecoregion.

An accuracy assessment was performed using aerial videography, digital ortho quarter quads (DOQQ) and other ground information. The overall statewide accuracy is 85%. Although the data are available at a 30 m pixel resolution, accuracy was not assessed on patches of less than 4 pixels. A further description of the accuracy information will be found in the data quality statement.

Cautionary use statement:

These data can be used in a Geographic Information System (GIS) for any number of purposes including water quality modeling, wildlife habitat assessment, land use change detection, green space planning, etc. The University of Georgia assumes no liability for the use of these data.

It is important to note the mapping was performed at the scale of one county and users should exercise caution regarding reliability of the data at finer scales. In addition accuracy of the data is reported at the scale of the state. For this reason, it is recommended that additional field reconnaissance be used before performing analysis with the data at higher resolutions. Images used in the production of the land cover range

from 1996-1998 and therefore do not reflect change that has occurred beyond these dates. We do intend to periodically update these maps if funding is available.

Description:

Data source information:

Row	Path	Date	Date	Date
20	36	August 2, 1997	July 17, 1997	March 30, 1998*
19	36	September 25, 1996	October 17, 1998	January 2, 1998*
19	37	September 25, 1996	June 27, 1998	January 2, 1998*
19	38	April 2, 1996	June 27, 1998	January 2, 1998*
19	39	April 2, 1996	June 27, 1998	January 2, 1998*
18	36	April 27, 1996	June 20, 1998	November 24, 1997*
18	37	April 27, 1996	May 19, 1998	January 11, 1998*
18	38	April 27, 1996	May 19, 1998	January 11, 1998*
18	39	April 27, 1996	May 19, 1998	January 11, 1998*
17	37	June 23, 1996	May 12, 1998	November 17, 1997*
17	38	June 23, 1996	May 12, 1998	December 19, 1997*
17	39	April 20, 1996	May 12, 1998	December 19, 1997*
16	38	March 12, 1996	March 2, 1998	January 26, 1997*
16	39	March 12, 1996	May 5, 1998	January 26, 1997*

* Primary scene for mapping

Process overview:

The first step of the process involved creating subsets of the leaf-off (winter) Landsat TM images by county. Linear features such as transportation infrastructure, utility swaths, and water bodies were then identified and classified using datasets obtained by the GA GIS Clearinghouses. These included transportation infrastructure; roads, railroads, and airports; utility lines; mining sites; wetlands; and linear and polygonal hydrographic features. Feature data incorporated into the land cover map were visually assessed with 1993 Digital Ortho Quarter Quads (DOQQ) and corrected if necessary. This was especially true for utility line data. County DOQQ mosaics were created and used as reference sources for the mapping process.

Urban and agricultural areas selected from the National Land Cover Dataset (USGS 1999) and used to subset the raw 6-band images into areas of potential urban and agriculture. The subsets of raw imagery were then clustered using the Iterative Self-Organizing Data Analysis Technique (ISODATA). This clustering method, referred to as an unsupervised classification, uses spectral patterns to assign groupings of pixels into classes. The number of classes in each ISODATA image varied depending on the size of the subset and the complexity of the category and county. ISODATA images usually fell within a range of 25 to 100 classes. Classes from the initial ISODATA image that were difficult to classify were run through a second round of ISODATA processing (cluster bust).

Each of the clustered images resulting from the unsupervised classifications were interpreted using visual inspection of multiple dates of the raw TM images guided by a combination of ancillary data including; the black and white 1993 DOQQs, National Wetlands Inventory, digital elevation models, and polygonal hydrology features.

While leaf-off images were the primary data source for most unsupervised classifications, the spring images (leaf-on) were useful for separating clear-cut areas from agriculture/pasture, for reducing topographic effects in mountainous areas, and for identifying clear-cut areas from deciduous forest along the fall line and in sandhills.

The identification of low intensity residential areas was enhanced using road data provided by the Georgia Department of Transportation in conjunction with visual assessment of the DOQQ's. The methods associated with mapping the extent of low intensity residential are reported in Epstein et al., in press.

All of the data layers were combined into a single county map and then all county maps were combined into a single statewide land cover. Corrections to the statewide map were then performed on a regional or statewide basis.

Data Quality Statement:

For the accuracy assessment, the land cover map was stratified by ecoregion and by land cover class. The metropolitan Atlanta area was also assessed as a separate entity. The eco-regions included Coast, Coastal Plain, Fall Line, Piedmont, Mountains (including Blue Ridge, Ridge and Valley and Cumberland Plateau), and Atlanta regions (Figure 1). The number of random patches to be selected by eco-region was calculated from the

formula $n = \frac{p(1-p)}{s^2}$, where p is the presumed accuracy and s is the standard error (Cochran 1977). GAP requires a standard error of 8%, therefore with a presumed accuracy of 50%, 40 patches per cover class (as an average) were necessary in each ecoregion. The total number of points was calculated by multiplying 40 by the number of cover classes. Aerial extent per class was calculated, and the final number of patches assessed per class was based on the percent of aerial extent for that class in the region. A minimum of 5 points in a region was selected for any given class. Only patches of four or more pixels were randomly selected for interpretation.

In all of Georgia except the Atlanta area, the assessment was conducted by means of aerial videography. A flight plan was designed to maximize coverage of each eco-region. Video acquisition was conducted over four days: October 31, November 1, 2, and 3, 2000. During fall color change, this time period allowed individual tree species to be more easily distinguished. The setup of aircraft, video equipment, GPS, and dual cameras followed that of Slaymaker (1996).

The equipment used for the assessment consisted of a Canon GL1 Digital Video Camcorder, a Horita FP-50/TR GPC GPS3 SMPTE Time Code Reader, a 13" television, and a computer using ArcView. The videocassettes were viewed on the television using the Horita Time Code Reader to display the time code on the television screen.

For each point, the interpreter identified a first and second choice of land cover classes, and entered a location confidence variable. This location information was used to compensate for changes in location due to the movement of the airplane during video filming. Interpreters assigned a one (1) for an interpretation where they could reasonably identify the location of the clump on the video and a zero (0) if the interpreter had very little confidence in the location.

In the Atlanta area, verification was accomplished using 1999 color-infrared DOQQ's, which cover the thirteen county metropolitan area. As with the video, a blind interpretation of the DOQQ point locations was conducted with only the land cover polygons overlaying the photographs and the interpreter having no knowledge of the corresponding land cover. The formula for selecting points was the same as that employed for the areas assessed with videography. 807 points were accuracy assessed in the Atlanta area.

A total of 4240 points were used for the accuracy assessment. The table below represents the combined accuracy assessment for the State of Georgia. The combined overall accuracy for the statewide land cover map is 85%. For additional information regarding the accuracy assessment refer to Payne, et al.(in prep).

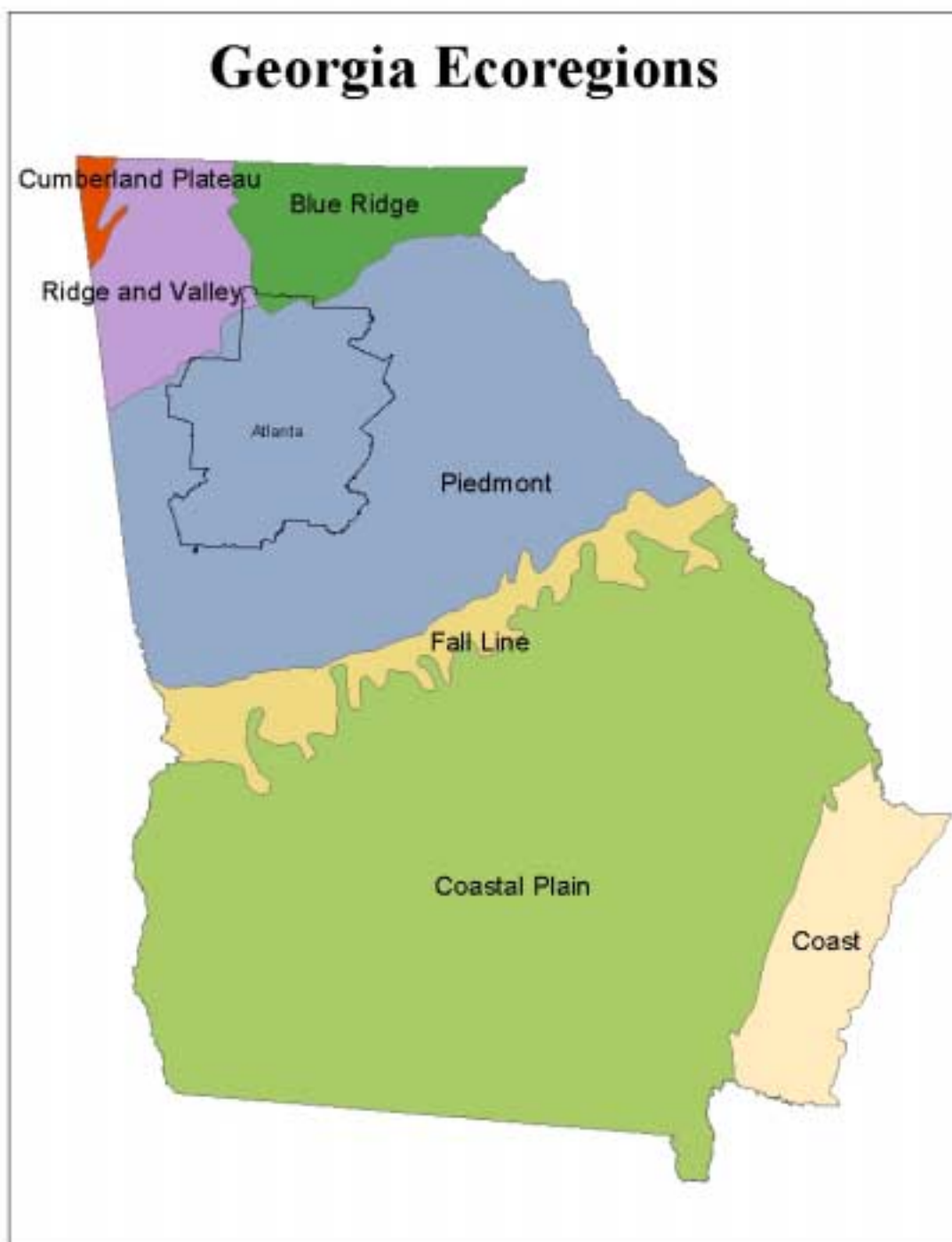


Figure 1. Ecoregion map of Georgia used for classification and accuracy assessment work. Based upon Keyes et al.

Final Statewide Accuracy Assessment

CLASS	V7	V11	V18	V20	V22	V23	V31	V33	V34	V41	V42	V43	V73	V80	V83	V91	V92	V93	TOTAL	USER_ACCUR	CLASS_2	K_HAT
7	14	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	17	82.35	7	
11	0	115	0	0	0	0	3	0	0	0	1	0	0	0	0	1	0	0	120	95.83	11	
18	0	0	402	1	0	1	1	0	0	0	0	0	0	2	0	0	0	0	407	98.77	18	
20	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	100.00	20	
22	0	0	1	0	136	6	0	0	0	5	5	4	0	5	1	0	0	0	163	83.44	22	
23	0	0	2	0	8	88	3	0	0	1	2	2	0	2	1	1	0	0	110	80.00	23	
31	0	1	0	1	6	5	193	1	0	12	7	7	0	20	4	6	0	0	263	73.38	31	
33	0	0	0	0	0	2	0	18	0	0	0	0	0	0	0	0	0	0	20	90.00	33	
34	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5	100.00	34	
41	0	0	0	0	1	2	18	0	0	457	42	28	1	8	1	11	3	3	575	79.48	41	
42	1	7	0	1	3	0	18	0	0	24	861	21	0	6	0	20	0	0	962	89.50	42	
43	2	0	0	0	2	2	17	0	0	23	34	228	0	5	2	11	5	0	331	68.88	43	
73	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	11	100.00	73	
80	0	0	0	1	5	1	9	0	0	6	14	1	1	317	1	4	0	0	360	88.06	80	
83	0	0	0	0	1	6	16	0	0	4	7	3	0	27	269	0	0	0	333	80.78	83	
91	1	2	0	0	1	1	16	0	0	8	21	15	0	4	1	365	0	0	435	83.91	91	
92	6	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	61	0	72	84.72	92	
93	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	7	11	63.64	93	
Total	24	128	405	49	163	114	295	19	5	543	996	310	13	396	280	421	69	10	4240			
Producers	58	90	99	92	83	77	65	95	100	84	86	74	85	80	96	87	88	70			85	0.826988

Attribute Information:

Code	Class Name	Description
07	Beaches/Dunes/Mud	This class includes the following categories of information; beaches, exposed sandbars, sand dunes, mud, dredge materials, and exposed lakeshore.
11	Open Water	This class includes all types of waterbodies: lakes, rivers, ponds, ocean, industrial water, and aquaculture, which contained water at the time of image acquisition.
18	Transportation	This class includes roads, railroads, airports, and runways.
20	Utility Swaths	This class includes vegetated linear features, which are maintained for transmission lines and gas pipelines.
22	Low Intensity Urban	This class includes; single family residential areas, urban recreational areas, cemeteries, playing fields, campus-like institutions, parks, and schools.
24	High Intensity Urban	This class includes central business districts, multi-family dwellings, commercial facilities, industrial facilities, and high impervious surface areas of institutional facilities.

31	Clearcut/Sparse	This class includes areas that had been clearcut within the past 5 years, as well as areas of sparse vegetation.
33	Quarries/Strip Mines	This class includes; mines and exposed rock and soil from industrial uses, gravel pits.
34	Rock Outcrop	This class includes geological features such as rock outcrops, and exposed mountaintops.
41	Deciduous Forest	This class is composed of forests, which contain at least 75% deciduous trees in the canopy, deciduous mountain shrub/scrub areas, and deciduous woodlands.
42	Evergreen Forest	This class is composed of forests, which contain at least 75% evergreen trees, pine plantations, and evergreen woodlands.
43	Mixed Forest	This class includes forests with mixed deciduous/coniferous canopies, natural vegetation within the fall line and coastal plain ecoregions, mixed shrub/scrub vegetation, and mixed woodlands.
73	Golf Courses	Golf courses.
80	Pasture	This class includes pastures, and non-tilled grasses.
83	Row Crop	This class includes row crops agriculture, orchards, vineyards, groves, and horticultural businesses.
91	Forested Wetland	This class includes all types of forested and shrub wetlands.
92	Coastal Marsh	Coastal freshwater and brackish marsh.
93	Non-forested Wetland	This class includes all freshwater emergent wetlands.

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