2000

Land Cover Trends Dataset, 1973–2000

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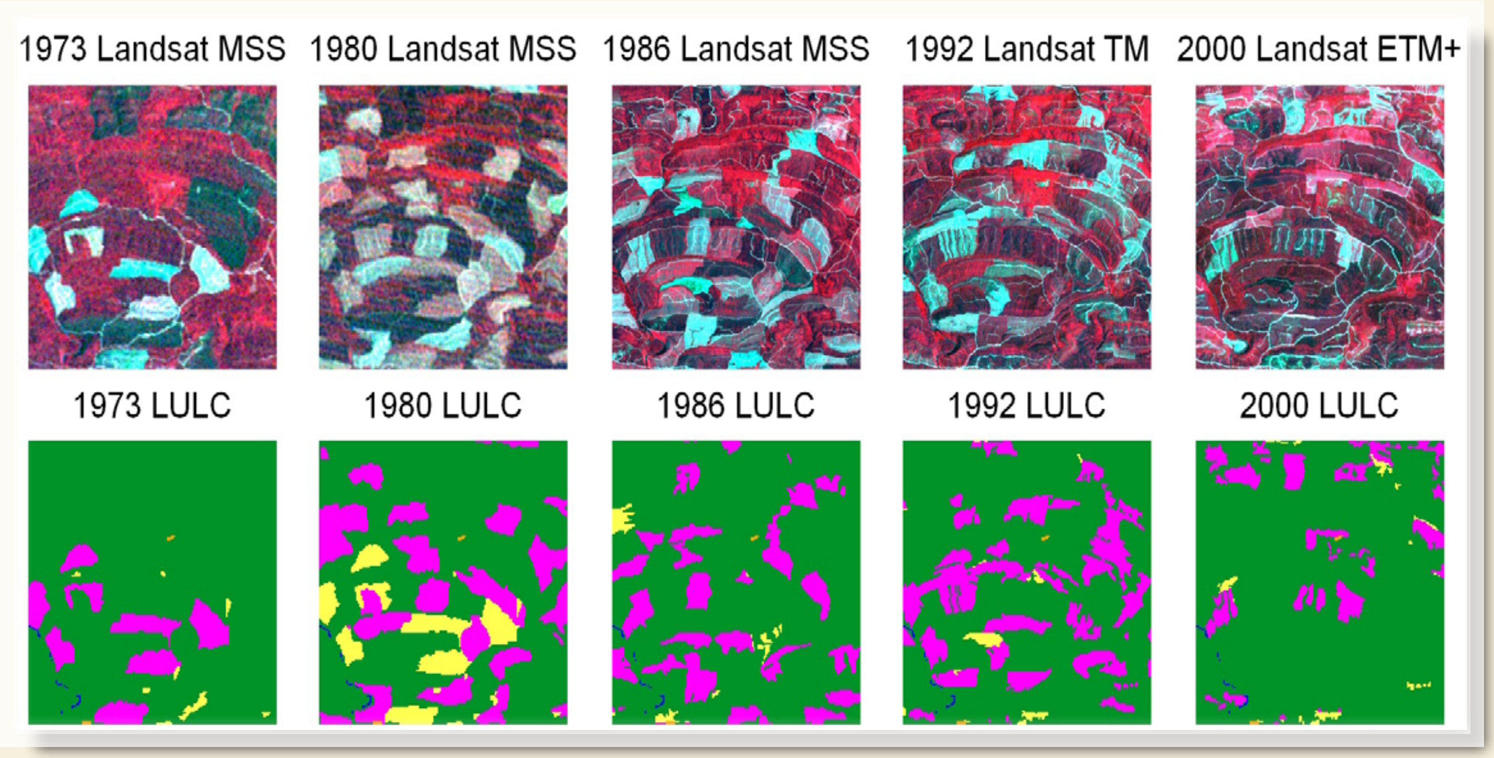
Land Cover Trends Dataset, 1973–2000



Data Series 844

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COVER
An example of the five dates of Landsat imagery and corresponding land-use/land-cover data available for each sample block. The example sample block is located in the Ouachita Mountains Ecoregion (samp36_0180), and shows forest cutting from 1973 to 2000 (green, forest/woodland; yellow, grassland/shrubland; magenta, mechanical disturbance; blue, water).

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Conversion Factors

SI to Inch/Pound

Multiply	By	To obtain
	Length	
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Acronyms and Abbreviations

EPA	U.S. Environmental Protection Agency
ETM+	Enhanced Thematic Mapper Plus
LULC	land-use/land-cover
MRLC	Multi-Resolution Land Characteristics Consortium
MSS	Multispectral Scanner
NALC	North American Landscape Characterization
NLCD	National Land Cover Dataset
TM	Thematic Mapper
USGS	U.S. Geological Survey

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Abstract

The U.S. Geological Survey Land Cover Trends Project is releasing a 1973–2000 time-series land-use/land-cover dataset for the conterminous United States. The dataset contains 5 dates of land-use/land-cover data for 2,688 sample blocks randomly selected within 84 ecological regions. The nominal dates of the land-use/land-cover maps are 1973, 1980, 1986, 1992, and 2000. The land-use/land-cover maps were classified manually from Landsat Multispectral Scanner, Thematic Mapper, and Enhanced Thematic Mapper Plus imagery using a modified Anderson Level I classification scheme. The resulting land-use/land-cover data has a 60-meter resolution and the projection is set to Albers Equal-Area Conic, North American Datum of 1983. The files are labeled using a standard file naming convention that contains the number of the ecoregion, sample block, and Landsat year. The downloadable files are organized by ecoregion, and are available in the ERDAS IMAGINE™ (.img) raster file format.

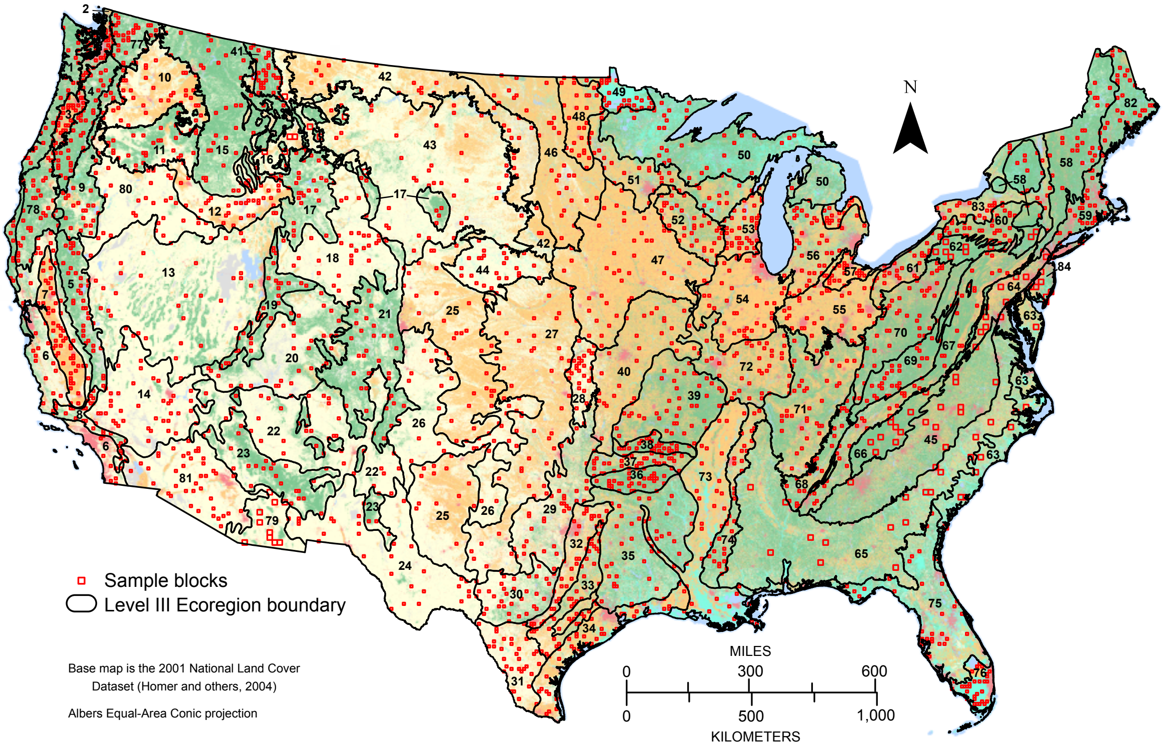
Introduction

Researchers with the U.S. Geological Survey (USGS) Land Cover Trends Project created a dataset for the conterminous United States designed to characterize the historical state of the nation's land surface from 1973 to 2000. The dataset allows one to analyze patterns, rates, and trends in land-use/land-cover (LULC) change and to assess the causes and potential consequences of LULC change across the country (Loveland and others, 2002). The dataset documents the geographic variability and characteristics of national landscape change from 1973 to 2000, and provides a scientific foundation for assessing the environmental consequences of LULC change. More than 60 scientific papers have been published and the results have served as the basis for collaborative studies of the environmental consequences of change with scientists from many organizations including the U.S. Geological Survey, U.S. Environmental Protection Agency, National Aeronautics and Space Administration, National Oceanic and Atmospheric Association, National Science Foundation, U.S. Fish and Wildlife Service, and academia.

Many Federal agencies use statistical surveys or remote sensing to track specific LULC information pertaining to research goals or land-management needs. For instance, the Forest Inventory and Analysis Program of the U.S. Forest Service provide the information needed to assess status and trends in America's forests (Gillespie, 1999). The U.S. Department of Agriculture Census of Agriculture is the leading source of facts and figures about American agriculture (U.S. Department of Agriculture, 2009a). The U.S. Department of Agriculture National Resources Inventory is a statistical survey of LULC and natural resource conditions and trends on non-Federal lands (U.S. Department of Agriculture, 2009b). The USGS's National Land Cover Database only recently became a source of 30-meter resolution, Landsat-based, spatial land-cover data for the Nation, containing layers for thematic LULC, percent developed imperviousness, and percent tree canopy density (Fry and others, 2011). Each effort contributes to our understanding of the land use and land cover, but none offer a complete, comprehensive assessment of LULC change for 1973–2000 based on methods that are spatially and temporally consistent across the conterminous U.S.

The Land Cover Trends dataset for 1973–2000 was created using a statistical sampling approach because it was a cost efficient method for characterizing LULC change across large areas such as the United States (Stehman and others, 2003). Ecological regions were used as a geographic framework for selecting sample blocks across the conterminous United States. A total of 2,688 sample blocks were randomly selected from 84 Level III ecoregions (Omernik, 1987) (fig. 1). Researchers manually interpreted Landsat Multispectral Scanner (MSS), Thematic Mapper (TM), and Enhanced Thematic Mapper Plus (ETM+) imagery for five dates (1973, 1980, 1986, 1992, and 2000), and then used the LULC data to derive change statistics for each time period (1973–1980, 1980–1986, 1986–1992, and 1992–2000) and for the entire study period (1973–2000), ultimately serving as the basis for ecoregion-based LULC change estimates used as the primary land-change metrics in reporting.

The LULC change estimates are used to determine (1) the predominant types of LULC conversions occurring within each ecoregion; (2) the estimated rates of change for these conversions; and (3) whether the types, rates, and patterns of change are constant or variable across space and time. The



Ecoregion number	Ecoregion name	Ecoregion number	Ecoregion name	Ecoregion number	Ecoregion name	Ecoregion number	Ecoregion name
1	Coast Range	22	Arizona/New Mexico Plateau	43	Northwestern Great Plains	64	Northern Piedmont[1]
2	Puget Lowland	23	Arizona/New Mexico Mountains	44	Nebraska Sand Hills	65	Southeastern Plains[1]
3	Willamette Valley	24	Chihuahuan Deserts	45	Piedmont[1]	66	Blue Ridge Mountains[1]
4	Cascades	25	Western High Plains	46	Northern Glaciated Plains	67	Ridge and Valley
5	Sierra Nevada	26	Southwestern Tablelands	47	Western Corn Belt Plains	68	Southwestern Appalachians
6	California Chaparral and Oak Woodlands	27	Central Great Plains	48	Lake Agassiz Plain	69	Central Appalachians
7	Central California Valley	28	Flint Hills	49	Northern Minnesota Wetlands	70	Western Allegheny Plateau
8	Southern California Mountains	29	Central Oklahoma/Texas Plains	50	Northern Lakes and Forests	71	Interior Plateau
9	Eastern Cascades Slopes and Foothills	30	Edwards Plateau	51	North Central Hardwood Forests	72	Interior River Lowland
10	Columbia Plateau	31	Southern Texas Plains	52	Driftless Area	73	Mississippi Alluvial Plain
11	Blue Mountains	32	Texas Blackland Prairies	53	Southeastern Wisconsin Till Plains	74	Mississippi Valley Loess Plains
12	Snake River Basin	33	East Central Texas Plains	54	Central Corn Belt Plains	75	Southern Coastal Plain
13	Central Basin and Range	34	Western Gulf Coastal Plain	55	Eastern Corn Belt Plains	76	Southern Florida Coastal Plain
14	Mojave Basin and Range	35	South Central Plains	56	Southern Michigan/Northern Indiana Drift	77	North Cascades
15	Northern Rockies	36	Ouachita Mountains	57	Huron/Erie Lake Plain	78	Klamath Mountains
16	Montana Valley and Foothill Prairies[1]	37	Arkansas Valley	58	Northeastern Highlands	79	Madrean Archipelago[1]
17	Middle Rockies	38	Boston Mountains	59	Northeastern Coastal Zone	80	Northern Basin and Range
18	Wyoming Basin	39	Ozark Highlands	60	Northern Appalachian Plateau and Uplands	81	Sonoran Basin and Range
19	Wasatch and Uinta Mountains	40	Central Irregular Plains	61	Erie Drift Plains	82	Laurentian Plains and Hills
20	Colorado Plateaus	41	Canadian Rockies	62	North Central Appalachians[1]	83	Eastern Great Lakes and Hudson Lowlands
21	Southern Rockies	42	Northwestern Glaciated Plains	63	Middle Atlantic Coastal Plain[1]	84	Atlantic Coastal Pine Barrens[1]

Figure 1. Map showing locations of 2,688 sample blocks within 84 EPA Level III ecoregions across the conterminous United States that comprise the Land Cover Trends Dataset.

analysis of change, which was described in several ecoregion publications and summarized in a national synthesis (Sleeter and others, 2013), also involved looking for spatial correlations between conversion types and selected environmental factors, such as terrain characteristics, proximity to urban development, economic conditions, and so on, in order to improve our understanding of potential drivers of change (Raumann and Soulard, 2007; Napton and others, 2010; Soulard and Wilson, 2013).

Methods

The Land Cover Trends Project was first proposed by Loveland and others (1999), and the project methodology was later published by Loveland and others (2002). Additional details on sampling design were provided by Stehman and others (2003) and Sleeter and others (2013). A detailed description of each facet of the Land Cover Trends methodology is provided here, including the ecoregion framework, sampling strategy, Landsat source data, classification system, and interpretation process.

Ecoregion Framework

A central premise of the project strategy was that EPA Level III ecoregions can provide an ideal geographic framework for characterizing regional LULC change. The ecoregion boundaries used were originally defined by Omernik (1987) and then revised by the U.S. Environmental Protection Agency (1999). The spatial boundaries were developed by synthesizing information on climate, geology, physiography, soils, vegetation, hydrology, and human factors, such that the ecoregions reflect patterns of LULC potential that correlate with patterns visible in remotely sensed data. This set of factors makes ecoregions suitable to chronicle regional stories of change, highlighting how LULC patterns, disturbance types and frequencies, environmental issues of concern, and management practices and consequences are similar regionally yet differ across the country. The Land Cover Trends project also uses this ecoregion framework because ecoregions (1) provide a means to localize estimates of the rates and driving forces of change; (2) play a significant role in determining the range of current LULC types, and the LULC trajectories that may occur in the future; and (3) provide a framework that can be extended globally.

Sampling Strategy

LULC composition and change was determined using a probability sample of 2,688 blocks randomly selected within 84 EPA Level III ecoregions (fig. 1; table 1). By adjusting the number of blocks selected for an ecoregion to the expected amount of LULC change, the total blocks in each ecoregion could be used to create LULC change estimates categorically “representative” of the ecoregion with high statistical confidence (Kish, 1987). Sample block dimensions were established based on the historical size and distribution of LULC change patterns over time. The initial design used a 20-km^2 sample size. Nine ecoregions were analyzed using 9–11 randomly selected 20×20-km sample blocks per ecoregion. The remaining 75 ecoregions were analyzed using 25–48 randomly selected 10×10-km sample blocks per ecoregion because a greater number of smaller size sample blocks would provide improved estimates of LULC change in area and type over improved characterization of LULC change patterns.

The number of sample blocks selected for each ecoregion was based on expected LULC change characteristics and the project goal to measure change within ±1-percent margin of error at an 85-percent confidence level. Sample block selection involved overlaying a grid of 10×10-km (or 20×20-km) blocks over a map of the conterminous United States and assigning blocks to a specific ecoregion following a centroid spatial allocation rule. The sample blocks within each ecoregion then were assigned a unique numerical value from 1 to N. A random number generator was used to select actual sample blocks one at a time until the total number of sample blocks was attained for each ecoregion.

Landsat Source Data

For each sample block, five dates of Landsat imagery were used to interpret and map LULC. The Landsat imagery provided a consistent, synoptic, multispectral view of the land surface from which information on LULC could be interpreted for 1973–2000.

Landsat MSS, TM, and ETM+ imagery was acquired from the North American Landscape Characterization (NALC) Project (Lunetta and others, 1998), the Multi-Resolution Land Characteristics Consortium (MRLC) Landsat Scene Library (Multi-Resolution Land Consortium, 2011), and the National Satellite Land Remote Sensing Data Archive (table 2). Landsat imagery acquired from NALC and MRLC had been used in other land characterization efforts and had the added benefits of low cost (prior to the Landsat archive becoming free to download) and robust pre-processing. The Landsat scenes acquired from NALC and MRLC were previously georeferenced to root-mean-square errors of 1 pixel or less. Additionally, most of the Landsat MSS data from NALC also had been corrected for terrain.

The Landsat scenes selected for the national Land Cover Trends mapping effort were spaced at semi-regular, 6–8-year intervals (1973, 1980, 1986, 1992, and 2000). These dates represent the core year, or center point, that each image represents. Image dates rarely deviated from ±1 year of these core dates, although there were some exceptions. Whenever possible, cloud free Landsat block images from approximately the same time in the calendar year were used.

Table 1. Ecoregion number, name, number of randomly selected sample blocks, total blocks in each ecoregion (population), and percentage of ecoregion mapped.

[Sample blocks for each Level III ecoregion were randomly selected based on the ecoregion size and how much change was expected over the study period.]

Ecoregion number	Ecoregion name	Sample size	Total blocks	Eco mapped (percent)
1	Coast Range	30	550	5.5
2	Puget Lowland	32	164	19.5
3	Willamette Valley	32	144	22.2
4	Cascades	40	466	8.6
5	Sierra Nevada	36	532	6.8
6	California Chaparral and Oak Woodlands	40	1,011	4.0
7	Central California Valley	48	458	10.5
8	Southern California Mountains	30	178	16.9
9	Eastern Cascades Slopes and Foothills	32	658	4.9
10	Columbia Plateau	36	897	4.0
11	Blue Mountains	30	652	4.6
12	Snake River Basin	36	571	6.3
13	Central Basin and Range	36	3,418	1.1
14	Mojave Basin and Range	40	1,304	3.1
15	Northern Rockies	36	1,637	2.2
16	Montana Valley and Foothill Prairies[1]	10	161	6.2
17	Middle Rockies	40	898	4.5
18	Wyoming Basin	30	1,284	2.3
19	Wasatch and Uinta Mountains	32	440	7.3
20	Colorado Plateaus	30	1,291	2.3
21	Southern Rockies	36	1,383	2.6
22	Arizona/New Mexico Plateau	32	1,921	1.7
23	Arizona/New Mexico Mountains	36	1,080	3.3
24	Chihuahuan Deserts	32	1,755	1.8
25	Western High Plains	45	2,876	1.6
26	Southwestern Tablelands	32	1,593	2.0
27	Central Great Plains	45	2,721	1.7
28	Flint Hills	28	278	10.1
29	Central Oklahoma/Texas Plains	36	1,030	3.5
30	Edwards Plateau	32	584	5.5
31	Southern Texas Plains	32	544	5.9
32	Texas Blackland Prairies	40	503	8.0
33	East Central Texas Plains	40	439	9.1
34	Western Gulf Coastal Plain	40	653	6.1
35	South Central Plains	36	1,549	2.3
36	Ouachita Mountains	32	264	12.1
37	Arkansas Valley	32	265	12.1
38	Boston Mountains	32	170	18.8
39	Ozark Highlands	42	1,079	3.9
40	Central Irregular Plains	28	1,221	2.3
41	Canadian Rockies	30	185	16.2
42	Northwestern Glaciated Plains	30	1,614	1.9

[1]Indicates ecoregion that had 20×20-kilometer sample blocks instead of 10×10-kilometer sample blocks.

Table 1. Ecoregion number, name, number of randomly selected sample blocks, total blocks in each ecoregion (population), and percentage of ecoregion mapped.—Continued

[Sample blocks for each Level III ecoregion were randomly selected based on the ecoregion size and how much change was expected over the study period.]

Ecoregion number	Ecoregion name	Sample size	Total blocks	Eco mapped (percent)
43	Northwestern Great Plains	40	3,455	1.2
44	Nebraska Sand Hills	28	603	4.6
45	Piedmont[1]	11	412	2.7
46	Northern Glaciated Plains	30	1,415	2.1
47	Western Corn Belt Plains	40	2,155	1.9
48	Lake Agassiz Plain	28	414	6.8
49	Northern Minnesota Wetlands	28	244	11.5
50	Northern Lakes and Forests	32	1,834	1.7
51	North Central Hardwood Forests	36	884	4.1
52	Driftless Area	36	474	7.6
53	Southeastern Wisconsin Till Plains	40	307	13.0
54	Central Corn Belt Plains	40	984	4.1
55	Eastern Corn Belt Plains	36	832	4.3
56	Southern Michigan/Northern Indiana Drift	36	717	5.0
57	Huron/Erie Lake Plain	40	247	16.2
58	Northeastern Highlands	36	1,266	2.8
59	Northeastern Coastal Zone	30	347	8.6
60	Northern Appalachian Plateau and Uplands	30	298	10.1
61	Erie Drift Plains	30	305	9.8
62	North Central Appalachians[1]	10	76	13.2
63	Middle Atlantic Coastal Plain[1]	11	198	5.6
64	Northern Piedmont[1]	10	75	13.3
65	Southeastern Plains[1]	11	837	1.3
66	Blue Ridge Mountains[1]	10	119	8.4
67	Ridge and Valley	40	1,106	3.6
68	Southwestern Appalachians	25	352	7.1
69	Central Appalachians	32	595	5.4
70	Western Allegheny Plateau	40	844	4.7
71	Interior Plateau	40	1,273	3.1
72	Interior River Lowland	40	929	4.3
73	Mississippi Alluvial Plain	36	1,328	2.7
74	Mississippi Valley Loess Plains	32	436	7.3
75	Southern Coastal Plain	35	1,249	2.8
76	Southern Florida Coastal Plain	30	222	13.5
77	North Cascades	32	303	10.6
78	Klamath Mountains	32	476	6.7
79	Madrean Archipelago[1]	10	103	9.7
80	Northern Basin and Range	32	1,096	2.9
81	Sonoran Basin and Range	40	1,159	3.5
82	Laurentian Plains and Hills	30	452	6.6
83	Eastern Great Lakes and Hudson Lowlands	30	580	5.2
84	Atlantic Coastal Pine Barrens[1]	9	37	24.3

[1]Indicates ecoregion that had 20×20-kilometer sample blocks instead of 10×10-kilometer sample blocks.

Table 2. Landsat data used to develop Land Cover Trends Dataset.

[Landsat sensor: ETM+, Enhanced Thematic Mapper Plus; MSS, Multispectral Scanner; TM, Thematic Mapper. Data source: Land Cover Trends Project mostly used Landsat imagery acquired by the North American Landscape Characterization (NALC) Project (Lunetta and others, 1998) and the Multi-Resolution Land Characteristics Consortium (MRLC) Landsat Scene Library (Multi-Resolution Land Consortium, 2011). Imagery for around 1980 were acquired from the National Satellite Land Remote Sensing Data Archive (NSLRSDA). Many of these data were available at no charge, and included additional pre-processing measures and steps to maintain registration consistency.]

Nominal date	Landsat sensor	Resolution (meters)	Data source
1973	MSS	60	NALC
1980	MSS	60	NSLRSDA
1986	MSS	60	NALC
1992	TM, MSS	30, 60	MRLC, NALC
2000	ETM+	30	MRLC

Classification System

The classification system for the Land Cover Trends Dataset consisted of 11 general LULC classes and is a modified version of the Anderson Level I classification system (Anderson and others, 1976). The classification system for the Land Cover Trends Dataset includes two transitional disturbance classes: (1) mechanically disturbed denotes human-induced disturbances (for example, forest clear-cutting), and (2) nonmechanically disturbed denotes natural disturbances (for example, fire or insect infestation events). The decision to use general, Level I classes was primarily made to achieve high interpretation accuracy and consistency using moderate resolution imagery (table 3).

Because Landsat MSS, TM, and ETM+ imagery has limitations on what LULC classes can be correctly identified and/or what land changes can be discerned between images, LULC maps were classified at the lower spatial resolution of the Landsat MSS imagery. A minimum mapping unit of 60×60 meters was used for the study. This meant that features with ground footprints less than 60 meters wide, such as narrow roads or low-density development, were not mapped because their width was less than the minimum mapping unit.

Interpretation Process

LULC delineations for each sample block began with the creation of a baseline reference LULC dataset. The 1992 date was usually the starting point due to the availability of the 30-meter resolution 1992 National Land Cover Dataset (NLCD) (Vogelmann, 2001). The detailed Anderson Level II NLCD classes were aggregated to match the descriptions of the more general land-cover classification system used by the Land Cover Trends Project. The NLCD data then were digitally edited by the researcher using ERDAS IMAGINE™ software, using on-screen interpretation methods while viewing the 1992 Landsat TM data along with aerial photographs (National Aerial Photography Program and National High Altitude Program) and other ancillary aids (Google Earth™, topographic maps, National Wetland Inventory datasets, and so on), which assisted and improved interpretations (table 4). This digital editing (that is, cleanup) procedure was done because NLCD data were created using automated spectral image processing procedures and were not meant for use in local-scale assessments. Additionally, the Land Cover Trends Project aimed to improve on the NLCD data by explicitly mapping land-disturbance events. The use of manual, pixel-by-pixel classification distinguishes this process from many other change-detection processes where automated spectral image products are used directly in the change-detection process without human involvement to improve the quality of the classification.

LULC for 1986 and 2000 was backward- or forward-classified using the interpreted 1992 LULC data as a template. For example, creation of the 2000 LULC image began by making an exact copy of the 1992 LULC image. This copy served as a baseline for the 2000 LULC image, with identified changes from 1992 to 2000 manually edited into the copied image. This baseline 2000 LULC image, the 1992 Landsat imagery, and the 2000 Landsat imagery were displayed on the computer screen using linked windows, allowing the analyst to view the entire area covered by the sample block, examining the 1992 and 2000 Landsat imagery and any relevant aerial photography and ancillary data (table 4) for valid LULC changes between the two dates. Any identified LULC changes were manually digitized on-screen, and the LULC classified in the 2000 LULC raster image.

Upon completion of the 2000 LULC image, the same procedures were used to create the 1986 LULC map by back-classifying areas that changed from the 1992 map based on differences in the 1986 Landsat imagery (fig. 2). The procedure then was repeated using the 1986 LULC image as the basis to map areas that changed in 1980, and the resulting 1980 image used to map areas that changed in 1973. This manual process eliminates errors that may arise between independently created LULC images for two dates prior to a spatial change analysis. Classification errors are greatly reduced because only manually identified, delineated, and coded LULC changes are delineated during this procedure.

A traditional accuracy assessment was not done for the interpreted sample blocks. However, quality-assurance and quality-control measures consisted of a formal block review

Table 3. LULC classification system used to develop data for the Land Cover Trends Dataset.

[The classification system for the Land Cover Trends Dataset consisted of 11 general LULC classes and is a modified version of the Anderson Level I classification system (Anderson and others, 1976).]

Class	Description
1 - Water	Areas persistently covered with water, such as streams, canals, lakes, reservoirs, bays, or oceans.
2 - Developed/urban	Areas of intensive use with much of the land covered with structures (for example, high-density residential, commercial, industrial, transportation, mining, confined livestock operations), or less-intensive uses where the land-cover matrix includes both vegetation and structures (for example, low-density residential, recreational facilities, cemeteries, and so on), including any land functionally attached to the urban or built-up activity.
3 - Mechanically disturbed[1]	Land in an altered and often non-vegetated state that is in transition from one cover type to another because of disturbances by mechanical means. Mechanical disturbances include forest clear-cutting, earthmoving, scraping, chaining, reservoir drawdown, and other similar human-induced changes.
4 - Barren	Land comprised of natural occurrences of soils, sand, or rocks where less than 10 percent of the area is vegetated.
5 - Mining	Areas with extractive mining activities that have a significant surface expression. This includes (to the extent that these features can be detected) mining buildings, quarry pits, overburden, leach, evaporative, tailing, or other related components.
6 - Forests/woodlands	Tree-covered land where the tree-cover density is greater than 10 percent. Cleared forest land (that is, clear-cut logging) will be mapped according to current cover (for example, disturbed or transitional, shrubland/grassland).
7 - Grassland/shrubland	Land predominantly covered with grasses, forbs, or shrubs. The vegetated cover must comprise at least 10 percent of the area.
8 - Agriculture	Cropland or pastureland in either a vegetated or non-vegetated state used for the production of food and fiber. Forest plantations are considered as forests or woodlands regardless of the use of the wood products.
9 - Wetland	Lands where water saturation is the determining factor in soil characteristics, vegetation types, and animal communities. Wetlands are comprised of water and vegetative cover.
10 - Nonmechanically disturbed[1]	Land in an altered and often non-vegetated state that is in transition from one cover type to another because of disturbances by nonmechanical means. Nonmechanical disturbances are caused by wind, floods, fire, insects, and other similar phenomenon.
11 - Ice/snow	Land where the accumulation of snow and ice does not completely melt during the summer period.

[1]Indicates class included to capture anthropogenic or natural disturbance events.

Table 4. Data sources and dates of ancillary data acquired to aid researchers in manually delineating land use and land cover from Landsat imagery.

[Aerial photography was acquired for each sample block to provide a high-resolution data source to aid in difficult interpretations. Availability of ancillary data varied, yet many datasets covered large spatial extents.]

Data source	Data provider	Dates
7.5 Minute Topographic Maps	U.S. Geological Survey	Variable
National Wetland Inventory (NWI)	U.S. Fish and Wildlife Service	Variable
Monitoring Trends in Burn Severity (MTBS)	U.S. Geological Survey	1984–present
National High Altitude Program (NHAP)[1]	U.S. Geological Survey	1978–1980s
National Aerial Photography Program (NAPP)[1]	U.S. Geological Survey	1987–1990s
National Land Cover Dataset (NLCD)	U.S. Geological Survey	1992, 2000
Google Earth™ imagery[1]	Google	1990s–present

[1]Indicates aerial photography or satellite imagery.

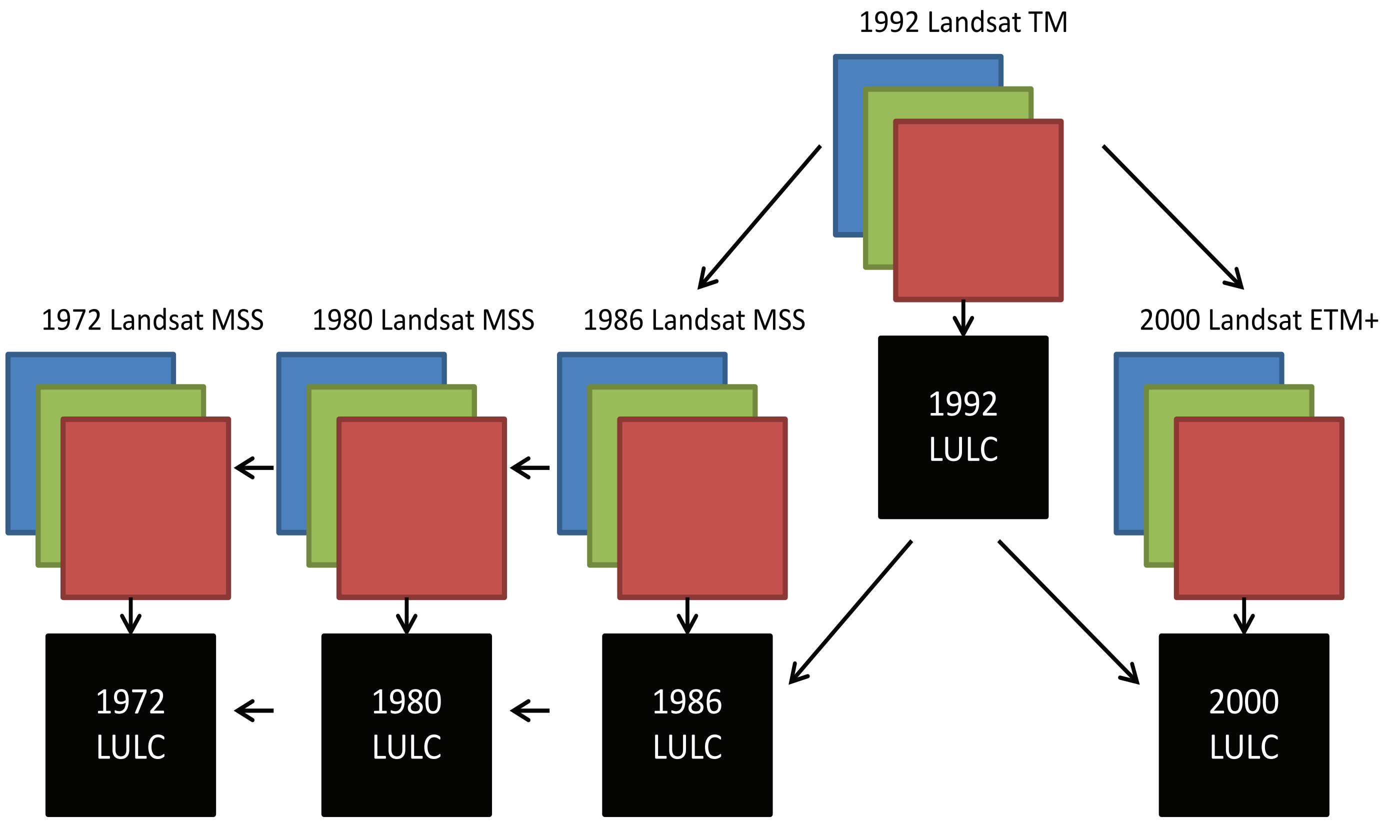


Figure 2. Flow diagram depicting block interpretation procedure used to develop Land Cover Trends Dataset. Manual interpretation process starts with development of 1992 baseline LULC. Resulting LULC map then was used to forward- and backward-classify areas that changed.

conducted by the national research team. During the block review, the national research team visually inspected each LULC date for each sample block by comparing interpreted maps to Landsat scenes and ancillary geospatial data. An examination of LULC adjacency also was conducted where blocks bordered one another. Review comments were compiled by the national research team and the researcher responsible for the interpretation was required to reconcile all errors following the block review and to document the corrections that were made.

Data Download

Five dates of LULC maps (1973, 1980, 1986, 1992, and 2000) are available for each of the 2,688 sample blocks distributed across the conterminous United States (fig. 3). The dataset includes a total of 13,440 images that are provided in a compressed file format by ecoregion. Each individual LULC map file is available in the ERDAS IMAGINE™ (.img) raster file format. The file name contains the ecoregion number, followed by the sample block number and the year of the Landsat used in the interpretation. The actual Landsat scenes are not available for download as part of this dataset. The dataset is available for downloading at http://pubs.usgs.gov/ds/844/.

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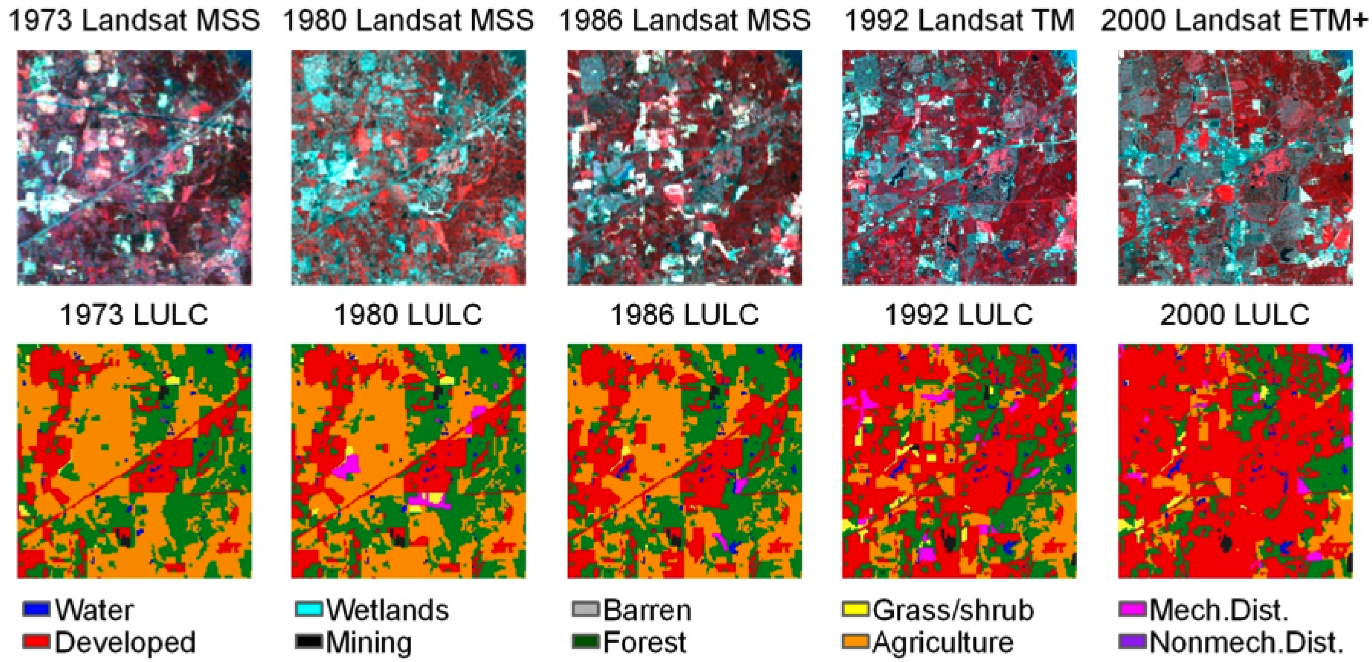

Figure 3. Example of five dates of LULC data available for each sample block. Data shown here are for sample 74_0134 in the Mississippi Valley Loess Plains Ecoregion on the northeastern edge of Memphis, Tennessee. Landsat scenes are not available for download as part of this dataset.

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