Frequently Asked Questions

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Q. What is the Connecticut Land Cover Map Series?
A. The Connecticut Land Cover Map Series consists of four dates of land cover data (1985, 1990, 1995 and 2002) created from satellite imagery. Each dataset includes eleven consistently interpreted land cover categories. The data were produced in a way to ensure easy comparison, especially for land cover change studies. The land cover data are available in digital format for use in Geographic Information Systems and can be used to produce a wide variety of map products.

Q. How is the Land Cover Map Series different from the previously created 1990 and 1995 land use land cover data?
A. The previously developed 1990 and 1995 land use land cover data also were created at the University of Connecticut from Landsat satellite imagery (the 1995 data also incorporated SPOT imagery—a French satellite). However, the purpose of these earlier versions primarily was for modeling nutrient inputs to Long Island Sound. For both datasets efforts were made, with mixed success, to infer land use (e.g. rural residential, commercial, industrial, etc.). The 1990 land use land cover dataset, which used 25 land use land cover classes, was the first statewide land use land cover dataset created by UConn researchers. Improved technologies and a different approach were used to create the 1995 land use land cover data and the classification was expanded to 28 categories. These earlier land use land cover data are very different from the new Land Cover Map Series and should not be compared to the new data.

Q. How can I view the land cover maps?
A. There are three ways on the website to view the actual maps—large-format PDF files, an online interactive map, and data download for a GIS. Each way has different features.

Q. Why can’t I see my house on the land cover maps?
A. The land cover maps were produced by interpreting Landsat satellite images, which have a ground resolution of 30 meters or approximately 100 feet. At this resolution, the satellite sensor “sees” areas that are about a quarter of an acre in size. Within any quarter acre, there may be a number of different landscape...
features and what the satellite ends up “seeing” is the largest feature or the largest group of similar features. Chances are your house, especially in forested rural areas, will be dwarfed by the surrounding trees. This will cause the area to be classified as forest rather than developed. However, if your house is in a neighborhood where houses, driveways, sidewalks, etc. are the predominant landscape features, then it will fall into a “developed” land cover class. Thus, what gets mapped depends on what the predominant landscape features are.

Q. How were the land cover data created?
A. The land cover data were produced from Landsat satellite images using a computer application called image processing. Landsat images are made up of millions of small squares called pixels. Each pixel represents an area on the ground that measures 30 meters by 30 meters. For each pixel, the Landsat image records the amount of reflected energy in 6 narrow bands of the electromagnetic spectrum (red, green and blue visible light, a near-infrared and two mid-infrared bands). Because landscape features reflect light differently, we can use reflectance data to identify areas of deciduous forest, coniferous forest, water, etc. This is where the image processing software is so helpful. Rather than you or me having to analyze data for each pixel, the software can do it much faster, and with the help of image analysts, can assign pixels to land cover classes based on differences and/or similarities in reflectance values.

Q. Is the land cover data correct?
A. Of course we’d like to think that the datasets are error free but the reality is that there are misclassification errors. A great deal of time was spent to avoid and correct errors. A variety of ancillary data sources such as USGS topographic maps and orthophotos, were used to aid the classification process. However, as of December 2003, we have not yet conducted an accuracy assessment to determine overall dataset accuracies.

Q. Why not use more detailed satellite imagery to make more detailed maps?
A. There are a couple of reasons why we chose Landsat imagery for the Land Cover Project.
1) A Landsat image is about 185 kilometers on each side and one image covers almost the entire state. One image, acquired on a cloud free day, would provide the bulk of the data for each of the four dates.
2) Landsat imagery is relatively inexpensive. It costs $600 per image and the University already had an extensive collection of imagery on file.
3) 30-meter resolution Landsat imagery was first collected in 1982 making it possible to create historic land cover data for change studies.

High resolution datasets were not used for the regional analysis for these reasons:
• **Unmanageable file size.**
• **Too many scenes.** Images captured from high resolution satellites have much smaller footprints (area covered on the earth) then Landsat images. It would be difficult to create a seamless dataset from so many images.
• **Limited historical archive.** Commercial high resolution imagery has only been available since the late 1990’s. The limited archive would prohibit meeting the project objective—to derive a time series of land cover over a 17 year period.
• **Likelihood of seasonal and temporal variability.** Because so many scenes would be required to cover the study area, it is likely that images would be captures on many different days, introducing artifacts such as variations in vegetation phenology and atmospheric effects (haze).
• **Classification Methodology.** Classification techniques applied to the Landsat images in this project do not work well on high resolution imagery. New techniques and software would need to be used. Currently, the software does not adequately handle extremely large datasets.
• **High Cost.** High resolution satellites are operated commercially and not by the government, they are expensive, especially for the huge number of images necessary to cover the area.
• **Project Objectives.** The objective of the project was to create a regional assessment. Detail available in high resolution images actually makes it more difficult to provide regional information.
Q. Why doesn’t the data go back farther in time?  
**A.** The first Landsat satellite was launched in 1972. However, it acquired imagery at 80-meter resolution, which is too coarse for this project, and in different bands of the electro-magnetic spectrum. Since we wanted to create land cover data sets that were comparable, we need to use spatially and spectrally consistent imagery. The first Landsat satellite to acquire 30-meter resolution imagery was launched in 1982.  

Q. Does the data show loss of agricultural land?  
**A.** Land cover classification is done with image processing software that uses spectral reflectance data to assign land cover classes. Unfortunately, agricultural lands such as pastures, cropland and fallow fields are not spectrally unique. Consequently there is a lot of “confusion” between agricultural land covers and other grass covered areas, which makes it impossible to accurately map agricultural land cover.  

Q. Does the land cover data show land use?  
**A.** No. With Landsat imagery it is possible to consistently and accurately determine what is on the land’s surface but it’s not possible to determine how the land is being used. For example, at 30-meter resolution, a group of homes, a group of farm buildings or a group of small offices may reflect light similarly. It’s possible to classify the group as developed land but it’s difficult, if not impossible, to determine reliably how the buildings are being used.  

Q. Does the land cover show all increases in developed land?  
**A.** The land cover data certainly show an increase in developed land between any two time periods. However, it is likely that isolated or small development, especially within forested areas, may be missed due to the spatial resolution of the Landsat imagery. Therefore, we consider this to be a conservative measure of development. It’s also worth mentioning that for the developed land cover class, the land cover data only show the actual developed portion of any particular site. In other words, if a 100 acre parcel is developed as a business park, only that portion that includes buildings, parking lots, roads etc. will be depicted as developed. Any vacant portion of such a site would be classified based on the predominant land cover—forest, non-forested wetland, turf & grass, etc.  

Q. Why is there a decrease in the area of water over the 17 year span?  
**A.** There is a considerable decrease in the water land cover class largely because 1995 and 2002 were dry years. Drought conditions result in lower water levels in rivers, streams and waterbodies and increases in exposed shorelines. Also, as shallow waterbodies become drier, they tend to appear more like wetlands on satellite images. The net result is that the area of land cover for water decreases while the area of wetlands and barren lands increases. Such shifts in land cover are directly attributable to short-term climatic changes and typically are not permanent.  

Q. Where can I get a copy of the land cover data?  
**A.** Any of the land cover data can be downloaded from the CLEAR website ([http://clear.uconn.edu](http://clear.uconn.edu)) as ESRI grid files, ESRI shapefiles or IMAGINE files. All the data are in Connecticut State Plane Coordinates, NAD 83 and are in units of feet. To help CLEAR researchers understand how the land cover data are being used and to notify users via e-mail of new derived data products, we are requesting that you register prior to downloading the data. A simple easy-to-complete on-line form is provided for this purpose.