

To the left is an example of urban growth, as shown by our 1999 Chicago-area land cover classification, overlaid with 1990 roads. Recent subdivision additions are shown by pink and red, without roads.

Our first challenge was found in creating an urban mask in a region of explosive urban growth. The most recent roads vector coverage was approximately 10 years old. Much development had taken place in the past ten years in the Chicago region, which made creating an urban mask directly from the roads file impractical.

We solved the problem with a two-part approach. First, we followed methods outlined by Morissette, J.T., H. Chesire, C. Stallings, and S. Khorram, 1996, in "An Urban Mask Raster Image for Vector Street Files", in *Raster Imagery in Geographic Information Systems*, edited by Morain, Stan and Shirley Lopez Baros, Onward Press, Santa Fe, N.M. The theory is to account for areas of high road density, which is a measure of urban density.



Part I involved four steps performed in ARC/INFO GRID, v. 7.2:

- 1) Convert the road vector coverage to grid format using LINEGRID
- 2) Grow out the road grid by five pixels (150 meters total) using EXPAND.
- 3) Reduce the encompassed area of high road density using SHRINK.
- 4) Grow out the encompassed area once again to produce an area of urban density using EXPAND.

The final product of Part I is shown to the right as a grid coverage in yellow, with the original roads vectors from which it was derived.

Part II of the process involved on-screen digitization of urban expansion areas not encompassed by the area grown out from the roads grid. Digitizing was performed in ArcView 3.2 with the July 1999 Landsat TM image displayed as background.

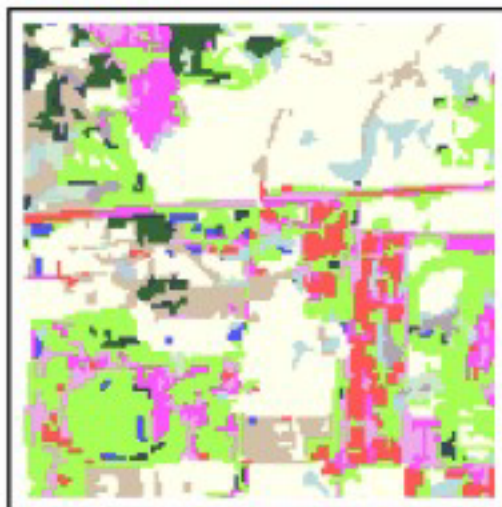
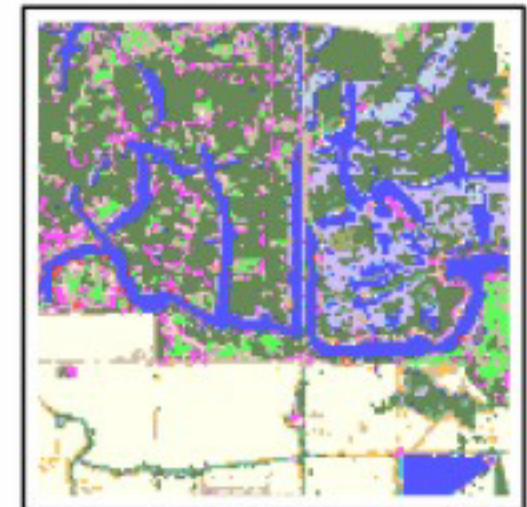
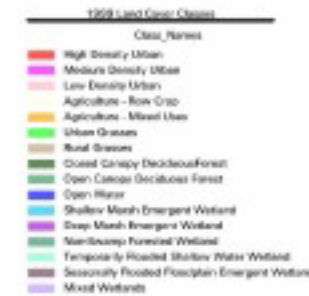


To the left is the level I 1995 Land Cover of Illinois. The area shown was the former site of a surface mining operation which left water-filled pits.

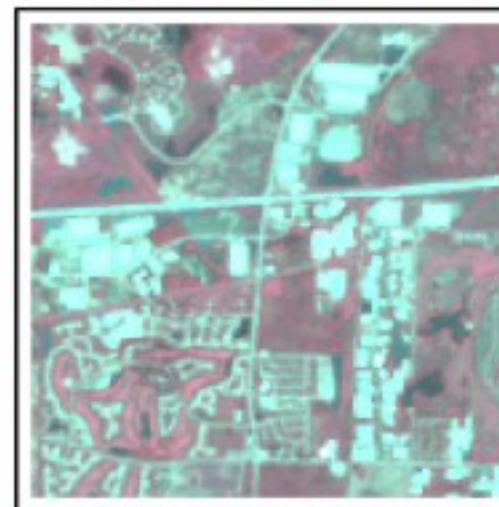
To the right is the 1999 Landsat TM scene. One can see that the "lake" to the right has been filled in, and residential development has sprung up around the finger lakes to the right. Rural grasses are now forested to some extent.



In the image to the right, one can observe the transformation of the area to a wooded, residential development. Many homes line the finger lakes on the left side of the image, while the right side has been filled in.



The final three images illustrate the pattern of urban development. Areas that were once agricultural fields have been converted to residential and commercial properties. New roads have been built to link new development to older urban centers, providing a causeway for more urban expansion. Open grassland habitat has been lost to a highly fragmented landscape. Many urban expansion areas in northern and central Illinois create man-made "lakes" for drainage purposes, which do provide aquatic habitat for waterfowl.



The image at the far left shows the land cover in a western suburb of Chicago in 1995. The 1999 Landsat TM image for that same area is shown in the middle. One can see new roads and urban structures. The 1999 Land Cover Classification to the right illustrates the change in fragmentation of the landscape and the conversion of agricultural land to urban uses.

