

# Hydrologic Land Cover Maps

Aderbal Correa and Janggam Adhityawarma  
Center for Environmental Technology  
Department of Civil & Environmental Engineering  
University of Missouri-Columbia

## Objectives

Hydrologic Land Cover Maps (HydroLCM) are remote sensing products used to display land cover (and in some cases land use) for urban and rural areas to support and enhance the application of hydrologic modeling. HydroLCMs were developed in response to the need by local government of updated information about trends in urban growth, to locate and monitor new urban developments and stage of construction, to derived the data needed for flood zone determinations and other planning purposes. A major consideration in developing HydroLCMs was to evaluate to what extent high-resolution satellite images could replace total or partially aerial photographs as information data source. The conclusion was that aerial photographs still couldn't be replaced for applications that require spatial resolutions of less than 1 meter. However, because of the cost of aerial photo surveys and map production, satellite images can effectively replace them for map updates or for frequent monitoring of urban and land cover changes.

## User Community

The user community for HydroLCMs consists of local government managers and engineers, consulting firms, utility companies and private citizens.

## Product Development

This product has been continuously developed since the start of the Synergy program to respond to application requirements. As land cover changes in the urban environment due to human activity, there are also changes such as those indicated by the vegetation that are seasonal. A major difference is observed when land cover is mapped during the summer, when all trees have their leaves on, as opposed to the winter when deciduous trees have no leaves and the image data shows the ground cover. The Synergy program allowed for the acquisition of Fall images and the resulting land cover map was quite different from the Spring land cover mapped for Synergy I. The availability of Ikonos data for two different seasons provided an additional insight into the land cover mapping problem and allowed for the development of change detection products applicable to hydrology, environmental quality control and other applications.

HydroLCMs are produced by supervised classification of Ikonos multispectral data using a two-step approach. Initially the data is classified into 18 classes: woodland, mixed woods, grassland types 1 and 2, soil types 1 through 5, water type 1 (clear), water types 2 and 3 (turbid), rooftops types 1 and 2, concrete types 1 and 2, asphalt. Some of these classes are combined to produce the 7 classes used for most hydrologic applications: woodland, mixed woods, grassland, soil (construction), soil (agriculture), impervious, water. In some datasets it was necessary to include a shadow class.

## **Experience of User Community**

The experience of the user community with HydroLCMs still is rather limited. Land cover mapping results at this time are still used as an intermediate product to produce data used in hydrologic modeling, environmental quality control and other applications.

## **Potential Activities for Synergy III**

Synergy III will provide the opportunity to create new products. These include:

- a) Land cover maps that will provide the user with information about the dynamic aspects of the Earth's surface such as seasonal changes of land cover;
- b) Hydrologic land cover maps using merged Ikonos 4- and 1-meter resolution datasets;
- c) Land cover map produced for the airborne digital image 1-m data

## **Funding Support**

This research was funded solely by Raytheon Synergy (100%).

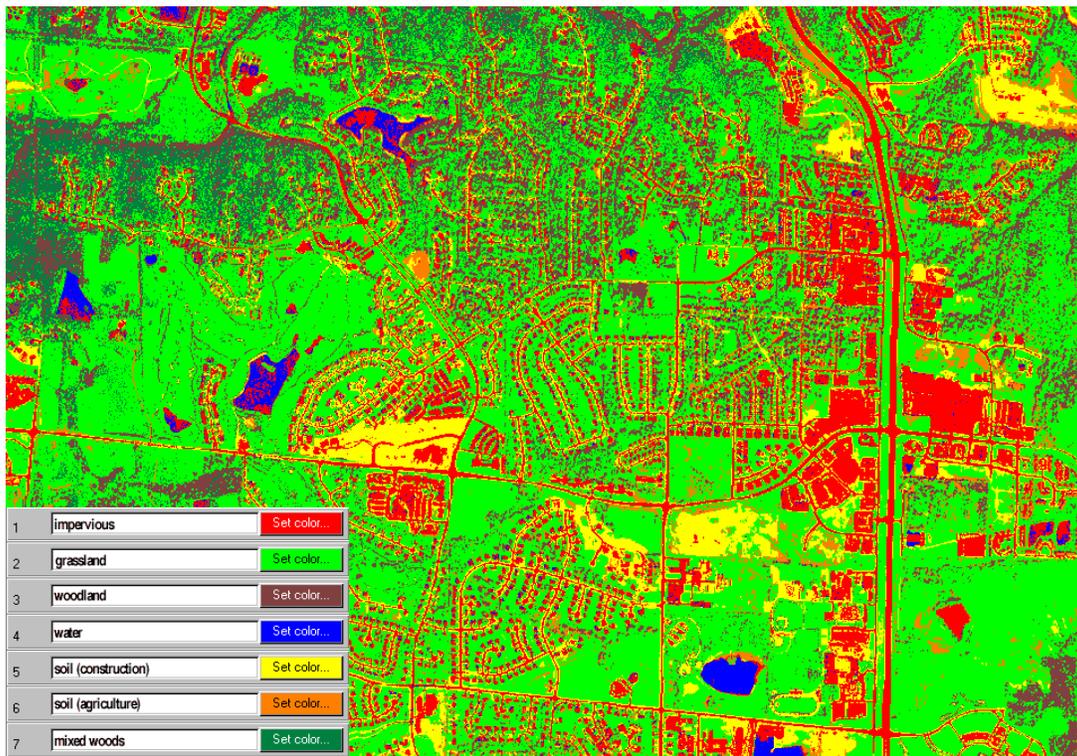
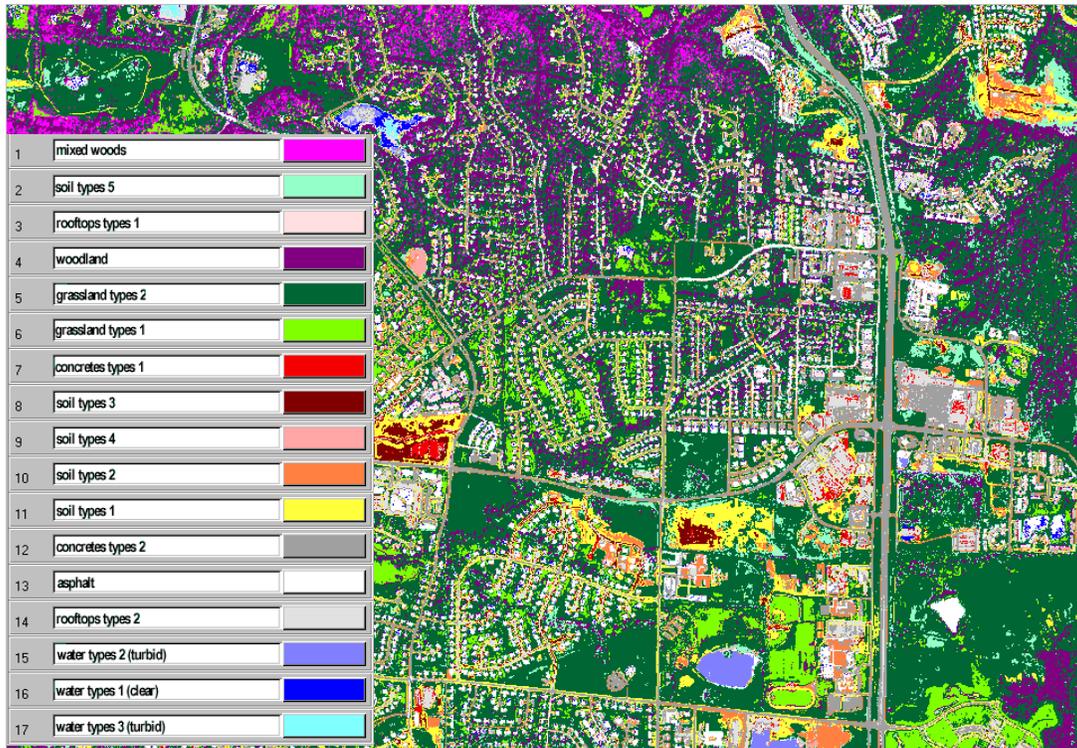


Figure 1. Top: Urban land cover map with 18 classes mapped for part of southeast Columbia. Bottom: Hydrologic land cover map with 7 classes mapped for same area.