Topic 6

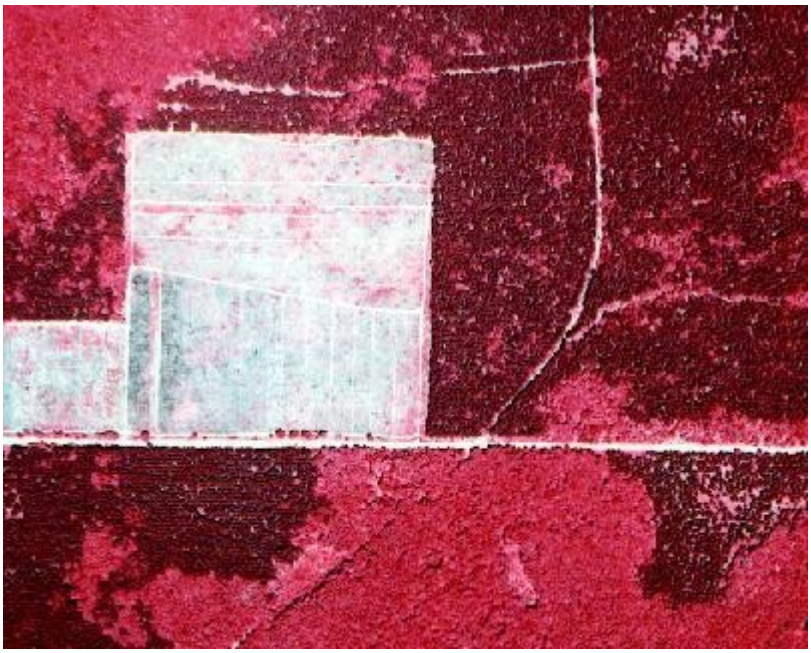
Land Use / Land Cover

One of the most important uses of image interpretation in remote sensing is the production of ***Land Use*** and ***Land Cover*** maps.

Land Use: refers to the ***purpose the land serves***, for example, ***recreation, wildlife habitat, or agriculture, urban development,*** and mostly areas impacted by human activity. Knowledge of land use helps us to develop strategies to ***balance conservation, conflicting uses,*** and ***developmental pressures***. Some of the issues which are of concern include the removal or ***disturbance of productive land, urban encroachment***, and ***depletion of forests.***

Land Cover: refers to the ***surface cover*** whether ***vegetation, water, bare soil, urban development*** or other. Identifying, delineating and mapping land cover is important for ***global monitoring studies, resource management***, and ***planning activities.***

LU/LC Example 1: Portion of a ***CIR*** Airphoto, ***Hiawatha National Forest***, Michigan



LU/LC Example 2: Portion of a B&W Airphoto, ***Sault Ste. Marie***, Michigan

Land Use / Land Cover Classification Systems

For practical reasons, land use and land cover classification was combined into a single hierarchial system by the USGS and referred to as the ***USGS Land Use Land Cover Classification System.***

USGS LU/LC Classification: The classification systems consists of four Levels.

USGS Level I is the most general and allows for ***land classification at a small scale*** (>1:250,000) and is used for ***satellite imagery (Landsat).***

	Level I Categories
1	Urban or Built-up Land
2	Agricultural Land
3	Rangeland
4	Forest Land
5	Water
6	Wetland
7	Barren Land

8	**Tundra**
9	**Perennial Ice or Snow**

USGS Level II is a subdivision of Level I categories into related classes. This level of generalization is useful for ***airphotos*** at scales of about ***1:80,000.***

Level II Categories: (from ***Michigan Land/Use Cover Classification System***)

I URBAN & BUILT UP
- 11 Residential
- 12 Commercial, Services, & Institutional
- 13 Industrial
- 14 Transportation, Communication & Utilities
- [15] Map Industrial Parks under appropriate category in Commercial Services & Institutional (12) or Industrial (13)
- 16 Mixed
- 17 Extractive
- 19 Open & Other

2 AGRICULTURAL LAND
- 21 Cropland, Rotation & Permanent Pasture
- 22 Orchards, Bush-Fruits, Vineyards & Ornamental Horticulture Areas
- 23 Confined Feeding Operations
- [28] Inactive Land (These plant communities will be mapped under herbaceous, rangelands (31).
- 29 Other Agricultural Land

3 RANGELAND
- 31 Herbaceous Rangeland
- 32 Shrub Rangeland

4 FOREST LAND
- 41 Broadleaved Forest (generally deciduous)
- 42 Coniferous Forest
- 43 Mixed Conifer-Broadleaved Forest

5 WATER
- 51 Streams & Waterways
- 52 Lakes
- 53 Reservoirs
- 54 Great Lakes

6 WETLANDS
- 61 Forested (wooded) Wetlands
- 62 Non-Forested (non-wooded) Wetlands

7 BARREN
- 71 Salt Flats (not applicable to Michigan)
- 72 Beaches & Riverbanks
- 73 Sand Other than Beaches
- 74 Bare Exposed Rock

75 Transitional Areas
79 Other

8 TUNDRA (not applicable to Michigan)

9 PERMANENT SNOW & ICE (not applicable to Michigan)

Level III is suitable for classifying images at scales ranging from ***1:20,000 to 1:80,000.*** The ***categories*** are designed to be ***adaptable*** to the local needs of public agencies.

Level IV is most useful for airphotos at scales larger than ***1:20,000***. The categories are designed to be ***adaptable*** to the local needs of public agencies.

Level I,II, III and IV Classification Example

4 Forest Land (Level I)

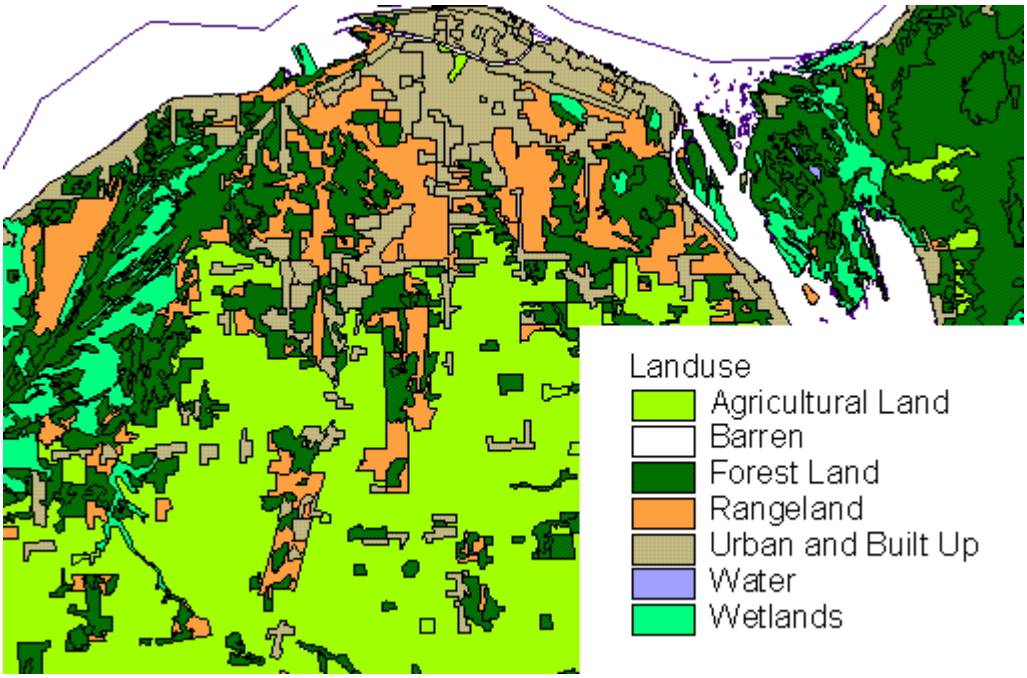
42 Coniferous Forest (Level II)

421 Upland conifers (Level III)
- **4211 White pine predominates** (Level IV)
- **4212 Red pine predominates** (Level IV)
- **4213 Jack pine predominates** (Level IV)
- **4214 Scotch pine predominates** (Level IV)
- **4215 White spruce perdominates** (Level IV)
- **4219 Other** (Level IV)

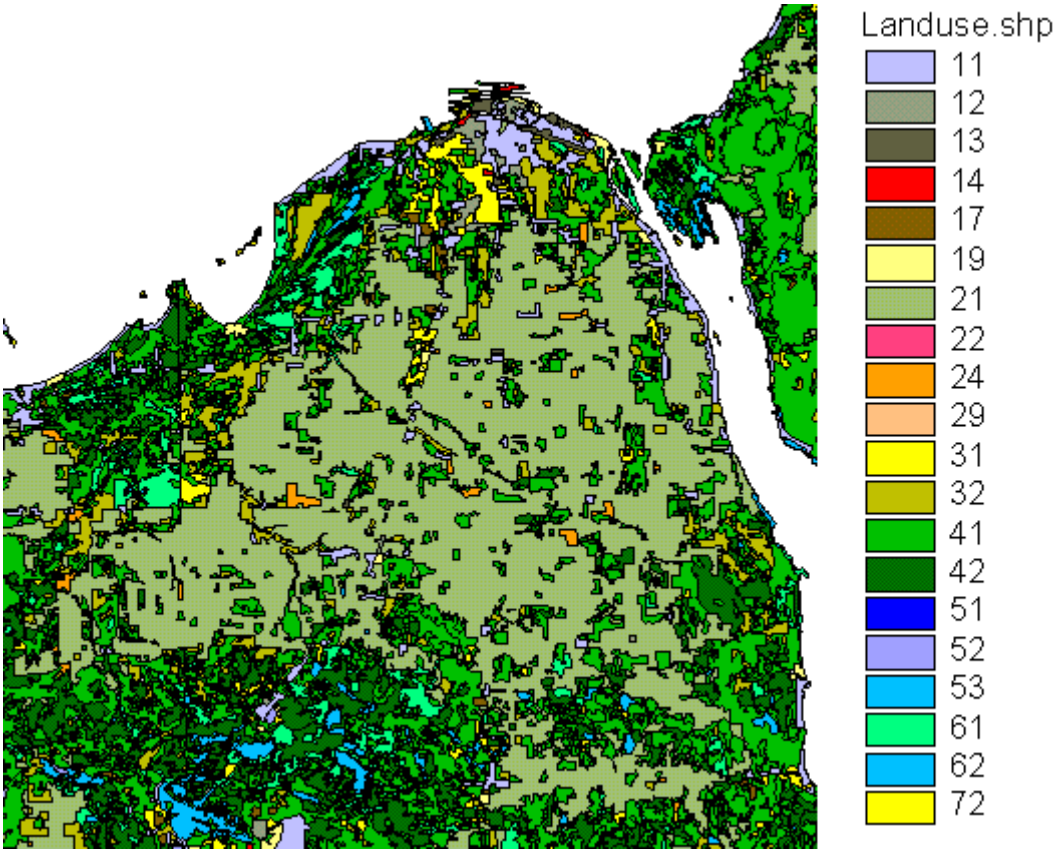
422 Lowland conifers (Level III)
- **4221 Cedar predominates** (Level IV)
- **4222 Black spruce predominates** (Level IV)
- **4223 Tamarack Predominates** (Level IV)
- **4224 Balsam fir-white spruce predominates** (Level IV)
- **4225 Balsam fir predominates** (Level IV)
- **4229 Other** (Level IV)

Michigan Land Use/Cover Classification

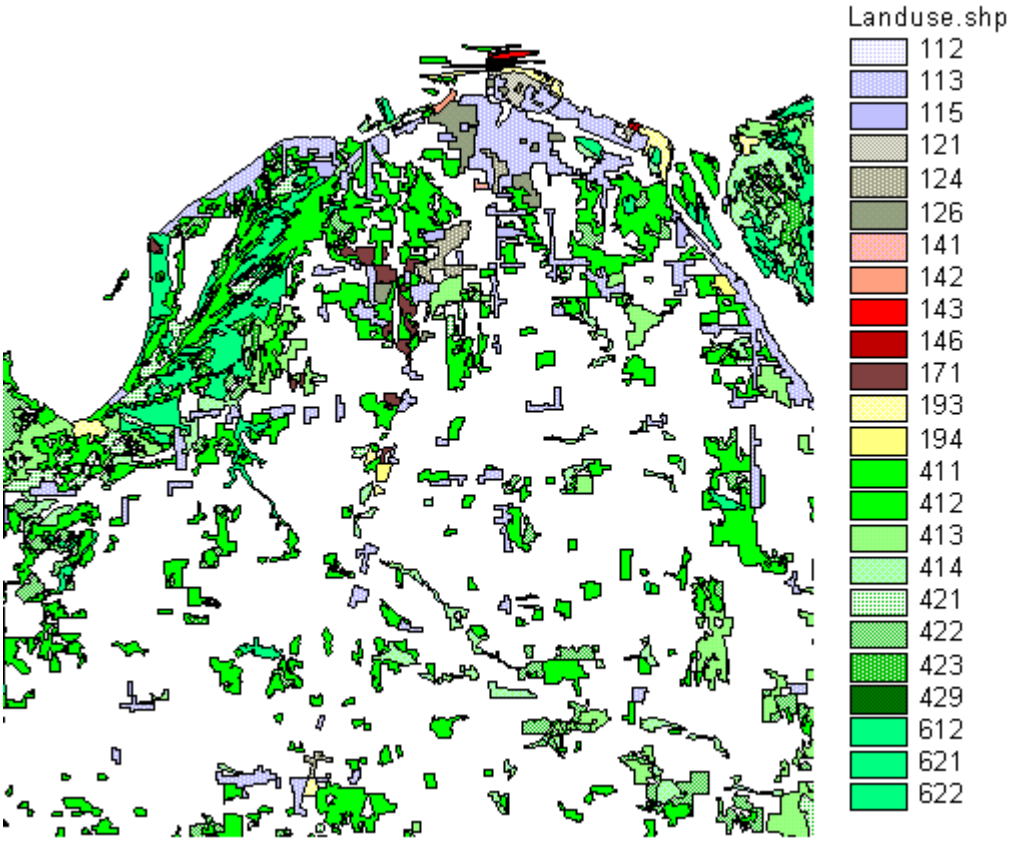
Chippewa County Level I



Chippewa County Level II



Chippewa County Level III



Limitations in Land Use / Land Cover Mapping

The classification level used for Land use and land cover mapping and the ***accuracy*** attainable is dependent on a number of ***important factors*** such as ***image scale, season***, and ***interpretability.***

Image Scale: the ability to classify a feature will vary with the image scale which affects the classification level that can be used.

Seasonal Variations: Vegetation characteristics vary with the season which affects the ease of interpretation.

Interpretability: classification of features should be repeatable between interpreters. The ***precise boundaries*** within and between classes may be ***gradational*** making this difficult to achieve.

Michigan Resource Inventory Program

This program was established to gather the best available information about the ***status of land*** and ***water resources*** and have it available for private and public use.

Several inventories of information were collected such as: ***Topographic Data, Land Use /Land Cover Inventory, Mineral Resource Inventory, Soil Survey Data***, and ***Forest Inventory.***

Each of these inventories form a ***computerized database*** which is accessible using ***Geographic Information Systems*** and represented as **'layers'** or ***'overlays'*** which can be queried and analysed.

References:

Gersmehl: p. 67 - 98

Arnold: p. 36 - 49