Learning Objective

Lesson 2.7

From classification to legend

At the end of this lesson, you will be able to:

- define the concept of classification and legend;
- define the concept of minimum mappable unit and mixed mapping unit
- describe different types of mixed coding for mixed unit.

Classification and Legend

Example of the formation of land cover classes.

EXAMPLE: "NATURAL AND SEMI-NATURAL TERRESTRIAL VEGETATION" (A12)

Classifiers used	Boolean formula	Standard class name	Code
Life form and cover	A3A10	Closed forest	20005
Height	A3A10B2	High closed forest	20006
Spatial distribution	A3A10B2C1	Continuous closed forest	20007
Leaf type	A3A10B2C1D1	Broad-leaved closed forest	20095
Leaf phenology	A3A10B2C1D1E2	Broad-leaved deciduous forest	20097
2nd layer: LF, C, H	A3A10B2C1D1E2F2F5F7G2	Multi-layered broad-leaved deciduous forest	20628
3rd layer: LF, C, H	A3A10B2C1D1E2F2F5F7G2	Multi-layer broad-leaved deciduous forest with emergents	20630

Example of land cover classes in LCCS.

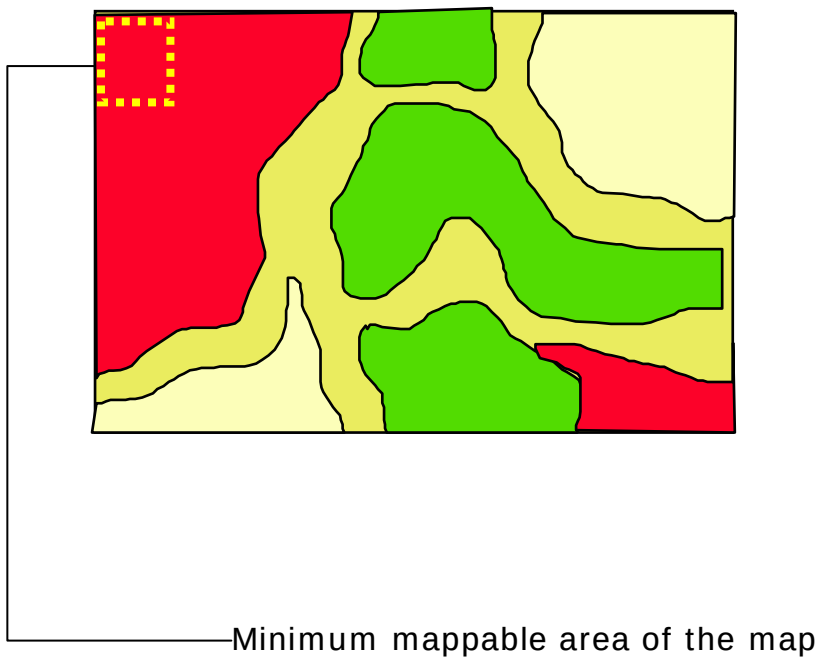
Classification is an abstract representation of the situation in the field. In LCCS is done using well-defined diagnostic criteria: **the classifiers**.

A classification describes the systematic framework with the names of the classes and the criteria used to distinguish them, and the relation between classes.

Classification thus necessarily involves definition of class boundaries, which should be clear, precise, possibly quantitative, and based upon objective criteria.

A *legend* is the application of a classification in a specific area using a defined mapping scale and specific data set. Therefore a legend may contain only a proportion, or sub-set, of all possible classes of the classification.

The minimum mappable area concept

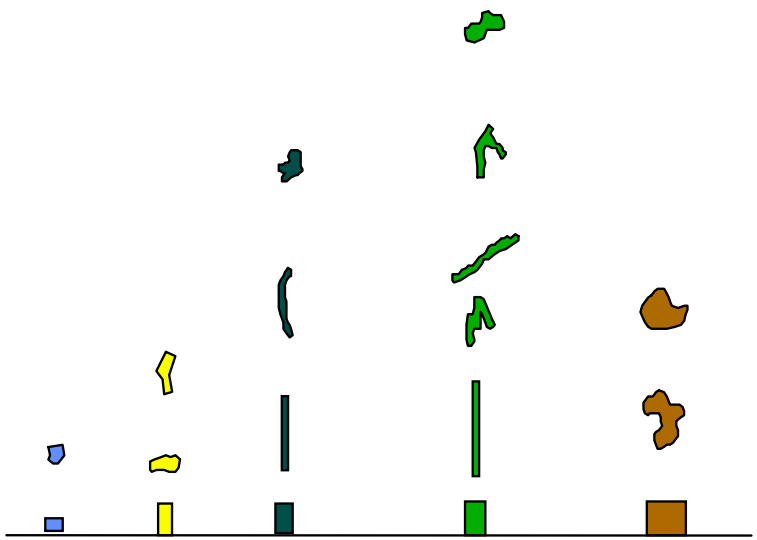


The transition from classification to legend implies establishment of specific conditions not present in the classification concept, in particular:

- Minimum Mappable Area
- Mixed Mapping Units.

The **Minimum Mappable Area** is a concept applied by cartographers when addressing the smallest area that can be shown on a map.
This concept is therefore scale-dependent and not related to classification.

The minimum mappable area concept



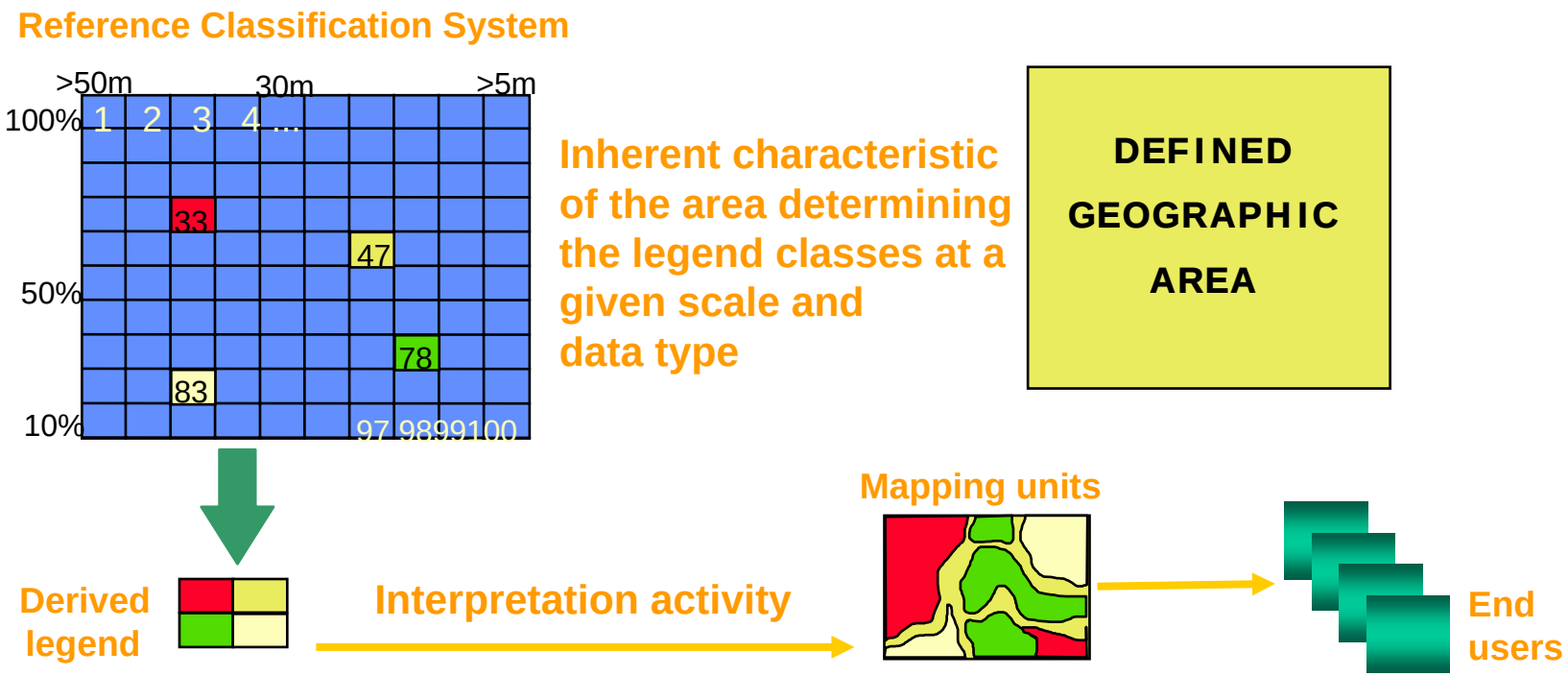
Examples of Variable Minimal Mappable Areas as used by the *Africover - East Africa Project.*

Usually, the cartographer determines one particular minimum area to be represented on the map. This was applied to all classes contained in the legend. The disadvantage of this method is that classes with a different importance would follow the same rules. It would have been more logical to define a set of different sizes for the various features with differing importance (Di Gregorio, 1991).

The flexibility of the LCCS classification system allows the introduction of the concept of a variable minimum mappable area. Thus, in LCCS the user can relate the size of the minimum mappable area to the eight major land cover types from which the classes are derived.

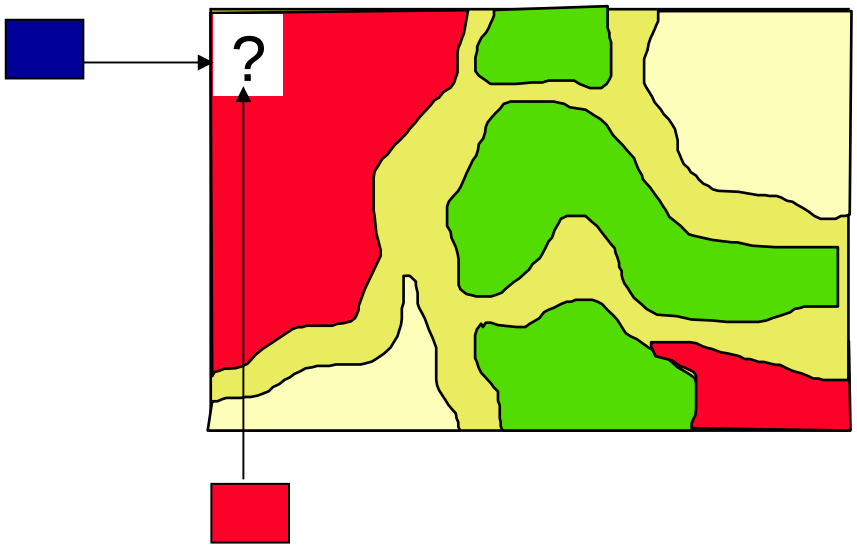
The occurrence of mixed mapping units

When moving from the abstract concept of the classification system to the practicalities of the field, the user has to deal with a particular **legend** that reflects both parameters of scale and inherent characteristics of the area but this process is not simple….



The occorrence of mixed mapping units

Suppose that inside a minimum mappable area (the white square) we find both red and blue colors. Which one should be represented in the map?



In order to solve this and other similar troubles, LCCS2 offers the possibility of generating a **mixed unit** when saving a class from the classification to the legend module.

More in details, LCCS2 considers several types of **mixed unit**, with an exhaustive and codified syntax. Two basic types of mixed coding are present:

- thematic mixed coding
- spatial (with or without being time-related) mixed coding.

The occurrence of mixed mapping units

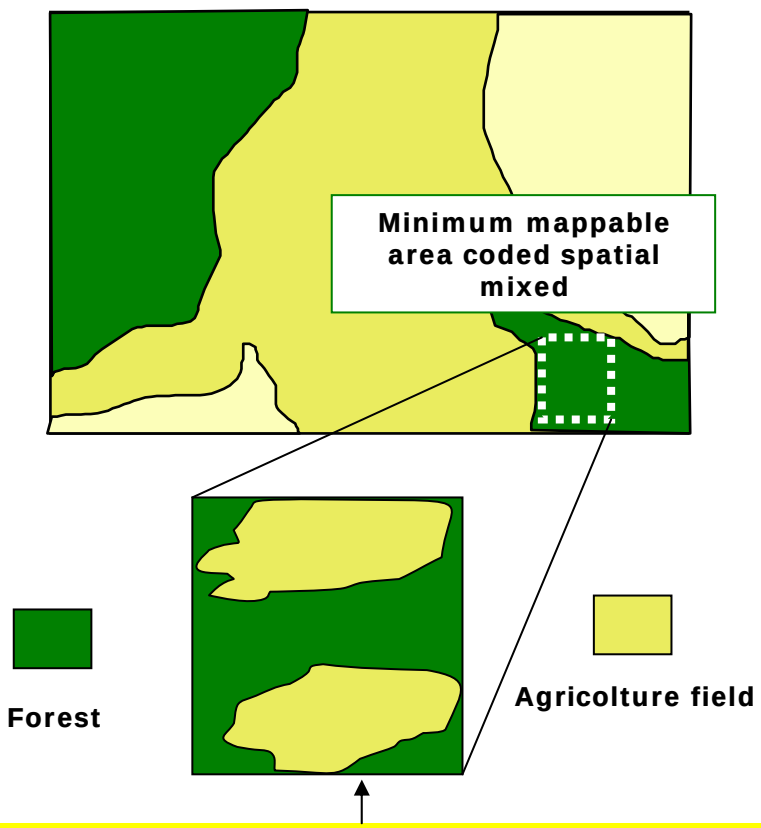
If, for instance we have to classify an intricate mixture of trees and shrubs in which neither trees nor shrubs are clearly dominant we can use a ***thematic* mixed coding**.

For example if the user is not able to say if the dominant life form is composed by Grassland OR Agriculture Fields, the use of a mixed coding is recommended.

Thematic mixed coding is an extra resource for the user to further generalize the thematic meaning of a class or for acting at a single-polygon level where, due to interpretation problems, a certain level of generalization is required.

Thematic mixed coding relates to a thematic uncertainty.
It means that the specific polygon coded with the “thematic mixed code” cannot reflect unique thematic information
It is written **A*//*B**, implying **“equal to A *OR* B”**, where A and B are land cover classes.

The occurrence of mixed mapping units



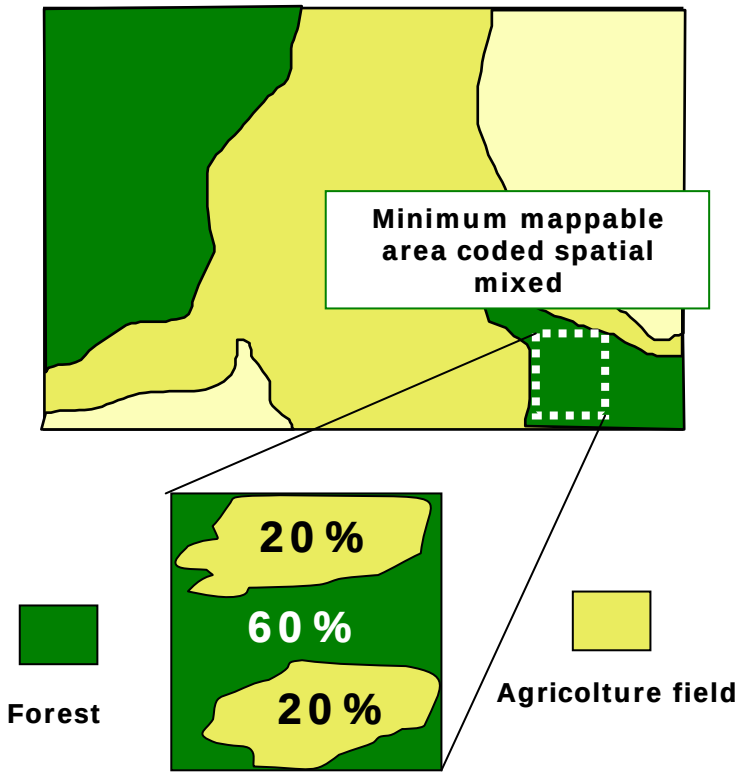
Concrete situation in the field:
we have two classes but due to the scale constraint they cannot be represented singularly.

Spatial mixed coding relates to the constraint of the scale when representing a geographical feature. It means that in the specific polygon coded Spatial Mixed, all the features are present but, due to the scale constraint (Minimum Mappable Area), they cannot be represented singularly.

It is written **A/B, implying "equal to A and B"** where A and B are land cover classes.

A Spatial Mixed Mapping code is always characterized by two or three (maximum) separate single land cover classes as defined in the classification system. The conditions governing the use of mixed mapping units are that within the minimum mappable area, two or more land cover classes are present, in a spatially separate entity (e.g. patches of agricultural fields inside a forest).

The occurrence of mixed mapping units



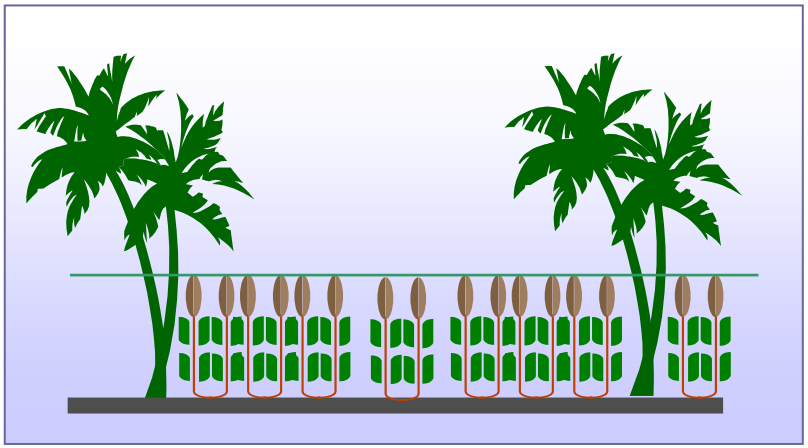
With **spatial mixed coding**, the general criterion proposed is that the cover of each one of the classes considered must be more than 20 percent (and consequently less than 80 percent) of the mapping unit.

The limit of 20 percent is thus the threshold of "visibility" of a class in a Spatial Mixed Unit. The only exception to this rule is in the major land cover type *Cultivated Areas,* where the use of the option *Scattered Isolated* of the classifier *Spatial Distribution* goes from 10 to 20 percent.

The sequence of the class names in a mixed mapping unit represents the dominance.

In this example the class name is *Forest/Cultivated Areas,* Forest is more than 50 percent and less than 80 percent, whereas Cultivated Areas is less than 50 percent but more than 20 percent).

The occorrence of mixed mapping units



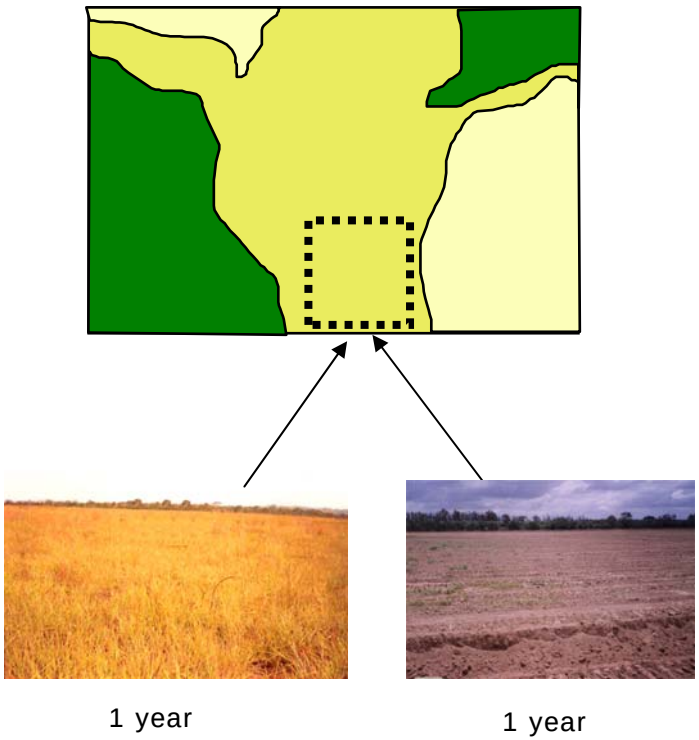
In this example, palm trees is followed by a second layer of cereal crop.

A variation of **spatial mixed coding** is the so-called "**Layering**".

This situation applies when a feature belonging to Agricultural and Managed Area and another belonging to Natural Semi-Natural Vegetation occur in two separate strata (e.g. rainfed cultivated fields with open natural trees).

For this specific case a different syntax is used: **A + B**, implying "**A and B layering**" where A and B are land cover classes.

The occurrence of mixed mapping units



A particular case is “Time-Related” Mixed coding.

This applies only to classes belonging to the major land cover categories *Cultivated and Managed Terrestrial Area(s)* or *Cultivated Aquatic or Regularly Flooded Area(s)* where the syntax is **“A/ / /B”, indicating “A in one year; B in the other**”.

Such coding is used to describe the situation where, in different years, different types of cultivation occur in the same field (i.e. the mapping unit).

The occurrence of mixed mapping units

"Time-Related" Mixed coding is applied when the user has, for example, a situation of cultivated fields of paddy rice in one year (e.g. when there is sufficient rainfall), followed by a terrestrial crop in a subsequent year (e.g. when rainfall is poor).

This particular type of Time-Related Mixed coding shows often a cyclic, almost customary, alternation of different crops in subsequent years (e.g. generally an Aquatic crop followed by Terrestrial crops, or an Irrigated crop followed by Rainfed crops). It is important to note that **the alternation of crops should be considered only when this occurs on an annual basis**.

Note: the combination of different crops in the same growing period is an option already considered in LCCS class creation. However, because of the specific nature of this type of Mixed Unit, that occurs only where crops are growing, the **classes composing such a mixed unit can only be those of Cultivated Area(s)**.

The occorrence of mixed mapping units

Try to match each mixed code with the right definition.

The dominant life form in the mapping unit is composed by Closed Trees AND Open Shrubs.

a

The dominant life form in the mapping unit could be composed by Closed Trees OR Open trees.

b

The dominant life form in the mapping unit is Cereal crops for one year and Sparse shrubs for the other year.

c

The dominant life form in the mapping unit is composed by Closed Shrubs (first layer) and Sparse Trees (second layer).

d

1. Closed trees/ /Open trees
2. Closed trees/Open shrubs
3. Closed shrubs +Sparse Trees
4. Cereal crops / / /Sparse shrubs

Click on Mixed mapping units names on the right and drag them into the empty boxes.

Summary

Key concepts of this lesson:

• **Classification** is an abstract representation of the situation in the field using well-defined diagnostic criteria: **the classifiers**. Classification is scale and source independent.

• A **legend** is the application of a classification in a specific area using a defined mapping scale and specific data set. Therefore a legend may contain only a proportion, or sub-set, of all possible classes of the classification. It is scale and cartographic representation dependent and data and mapping methodology dependent.

• The transition from classification to legend implies establishment of specific conditions not present in the classification concept, in particular: Minimum Mappable Area and Mixed Mapping Units.

• The **Minimum Mappable Area** is a concept applied by cartographers when addressing the smallest area that can be shown on a map. This concept is therefore scale-dependent and not related to classification.

• A **mixed mapping unit** could be needed when saving a class from the classification to the legend module. LCCS2 considers several types of mixed unit, with an exhaustive and codified syntax. Two basic types of mixed coding are present:

- thematic mixed coding
- spatial (with or without being time-related) mixed coding.