Introduction to Land Cover Mapping Toolbox FAO / NRL Geospatial Unit

Ilaria Rosati

Ph D, FAO consultant

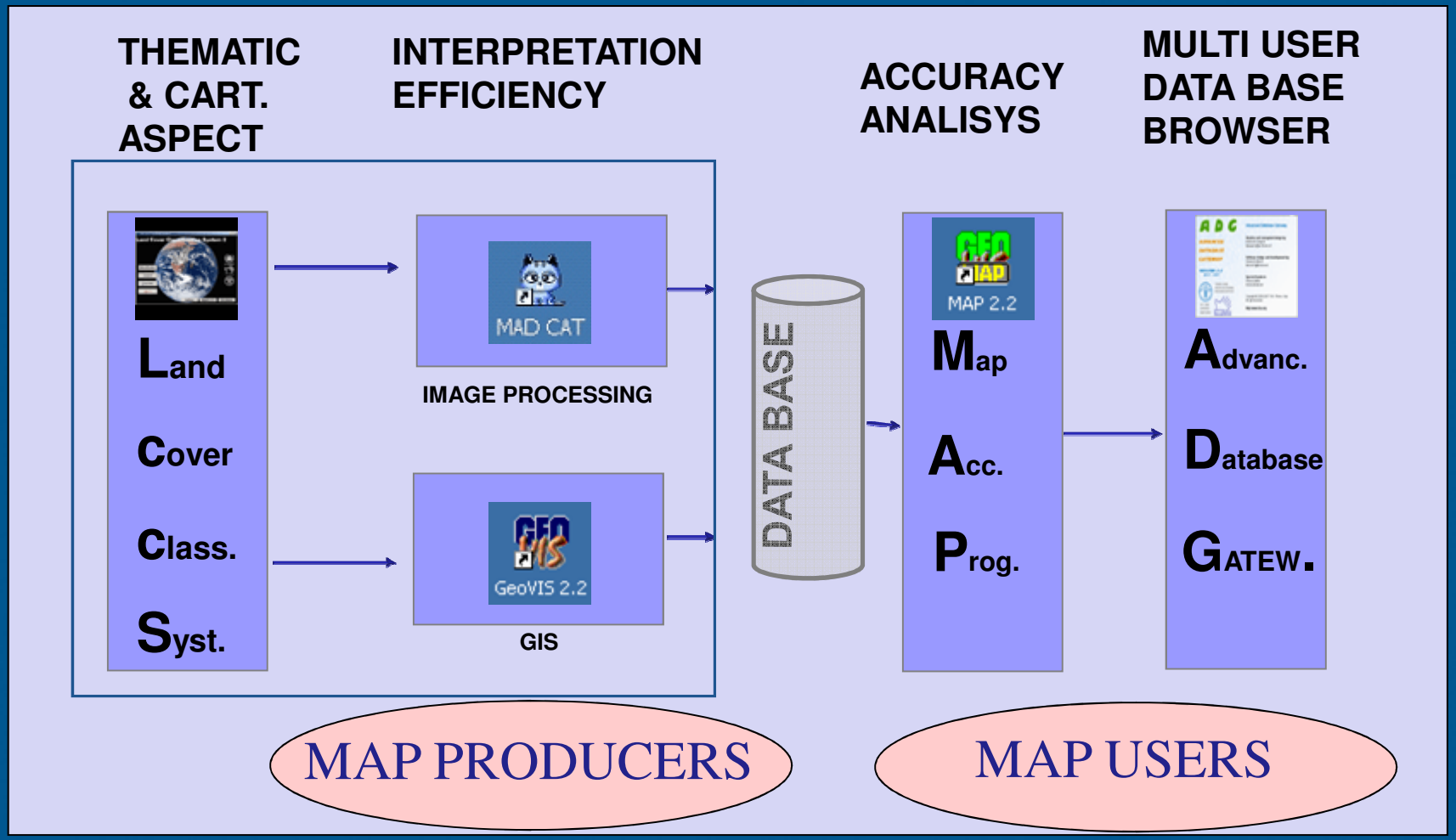
ECOWAS – GBEP REGIONAL BIOMASS RESOURCE ASSESSMENT WORKSHOP

Rome, Italy

FAO Headquarters, King Faisal room

13-14 November 2012

Land Cover mapping toolbox - Map Producers



Land Cover Assessment and Monitoring Toolbox

TOOL BOX FOR LAND COVER ASSESSMENT

Land cover and land use are key parameters for natural resources management. Land cover represents the baseline information for any management policy aimed at a sustainable use of natural resources.

In order to ensure long term availability of needed resources, initiatives for assessing and monitoring the environment are being developed within the frame of international agreements and conventions (UNFCCC, UNCCD, CBD Millennium Ecosystem Assessment).

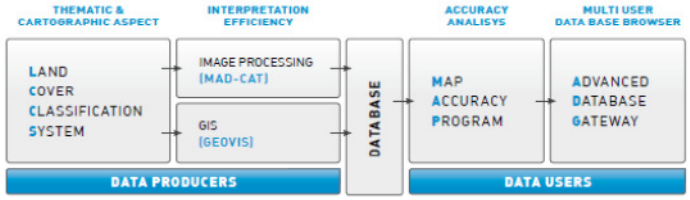
Management practices need detailed, reliable and up-to-date information on the status of the land, most often obtained from land cover maps, as well as information on changes inland cover over time, depicting eventual trends in land conversions..

Developing countries are usually most affected by the lack of assessment data and monitoring tools, making their future management decisions more difficult.

NATURAL RESOURCES MANAGEMENT AND ENVIRONMENT DEPARTMENT (NR)

TOOL BOX FOR LAND COVER ASSESSMENT

FAO is heavily involved in the development of tools for supporting countries in the assessment of land cover and monitoring it over time. Starting from development of technical tools for land cover mapping and change assessment, to the standardization of procedures for land cover classification and analyses, FAO's work represents a significant contribution to the development of tools that provide essential land cover data needed for management purposes.



▲ The flow of products and data producers/users with inputs from FAO products.

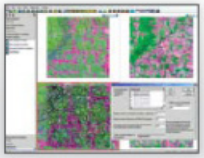
FOOD AND AGRICULTURE ORGANIZATION OF UNITED NATIONS

▼ Following is the list of components of the "GLCN tools set"

LAND COVER CLASSIFICATION SYSTEM (LCCS)

LCCS – A comprehensive, standardized a priori classification system that enables universal land cover classification to be used for effective management and land cover change assessment. Developed based on the experience gained from numerous United Nations, international and country mapping activities.

MAPPING DEVICE–CHANGE ANALYSIS TOOL (MAD–CAT)



MAD-CAT – A stand alone, interactive, and completely integrated environment for mapping land cover, detecting its changes over time, editing the land cover maps produced -so as to link them to land use information-, validating the results obtained and reporting through built-in statistics. MAD-CAT includes the innovative classification of satellite imagery using object-based approach, thus simplifying the procedure for land cover change analyses through comparison of objects across images of different dates.

GEOGRAPHICAL VECTOR INTERPRETATION SYSTEM (GEOVIS)

GeoVis – features an extensive number of functionalities specifically designed to perform an efficient visual interpretation of remotely sensed images. Directly linked to LCCS, enables immediate assignment of polygons to specific land classes. It includes a module for estimating thematic mapping accuracy (MAP).

ADVANCED DATABASE GATEWAY (ADG)

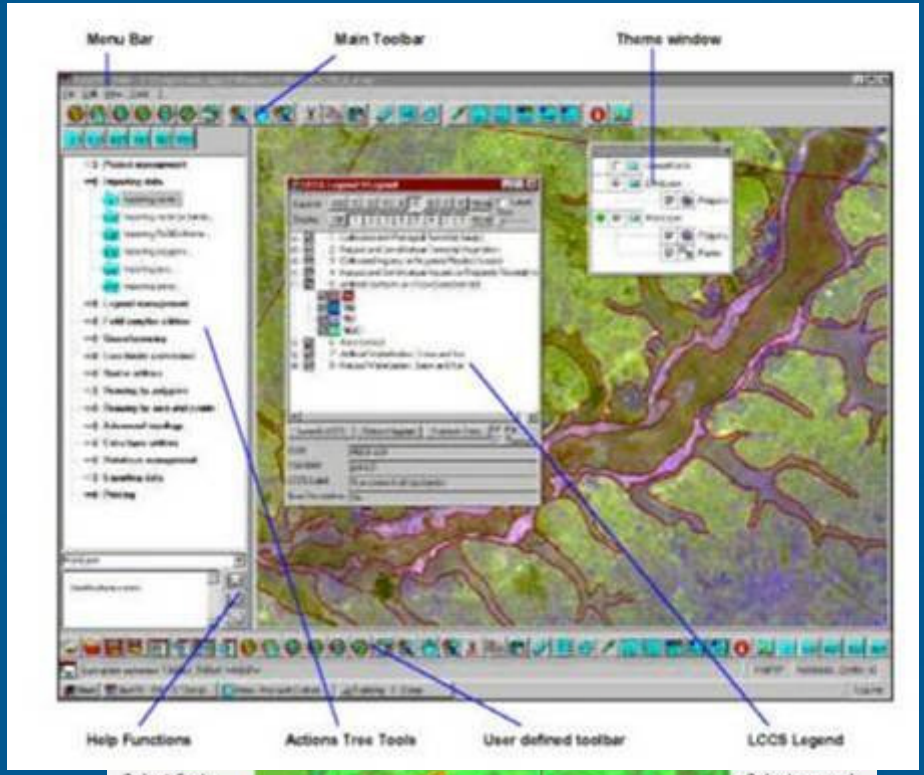
ADG – a cross-cutting interrogation software that allows the easy and fast recombination of land cover polygons according to the individual end-user requirements. Aggregated land cover classes can be generated not only by name, but also using the set of existing classifiers.

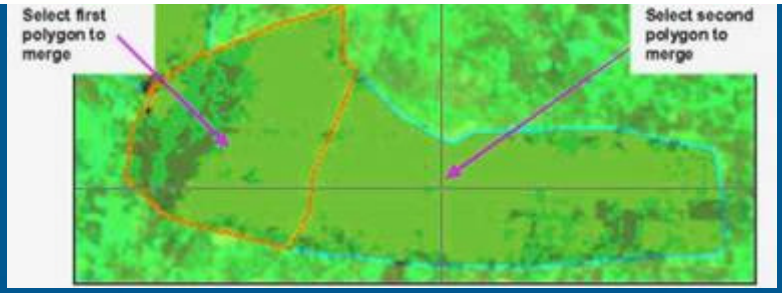
NATURAL RESOURCES MANAGEMENT AND ENVIRONMENT DEPARTMENT (NR)

GeoVIS

The Geographical Vector Interpretation System (GeoVis) is a vector-based editing system specifically designed for thematic interpretation.

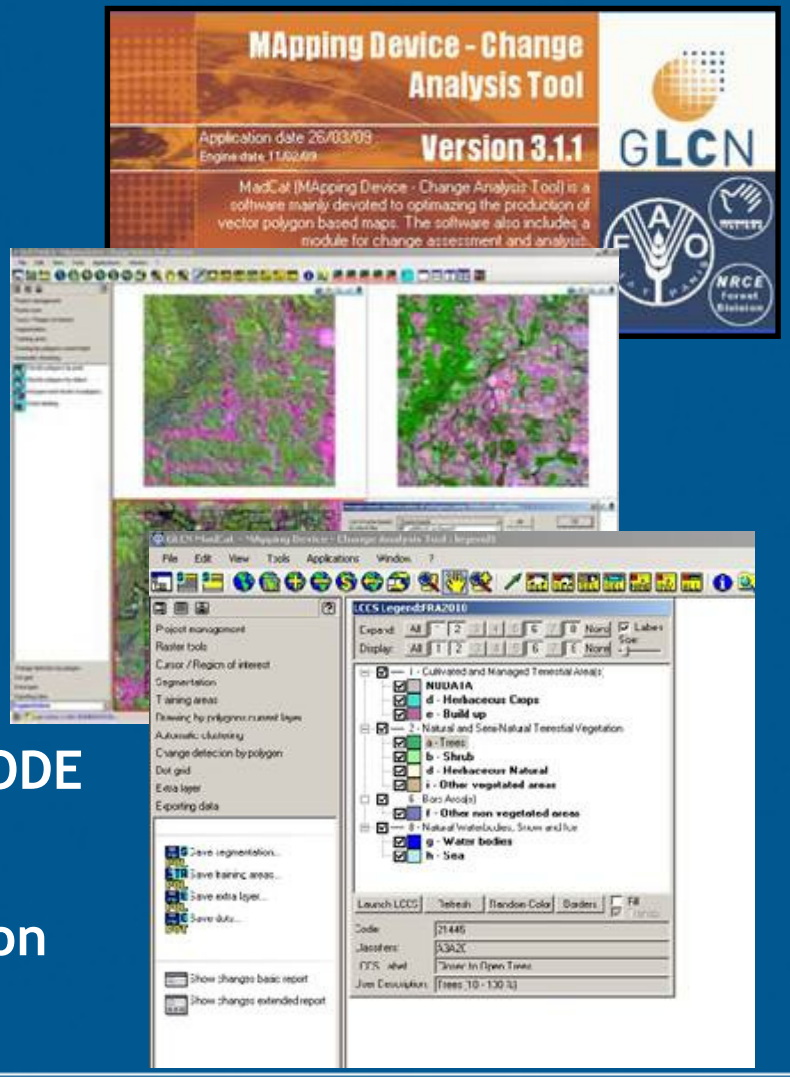
- It facilitates and speeds up all mapping activities based on remote sensing data.
- It is very user-friendly and embeds powerful vector drawing and editing functions.
- It has a direct link with LCCS.
- Free to use for FAO programmes





Mapping Device - Change Analysis Tools (MADCAT)

- Application designed by FAO
- Uses object-base classification
- Current version - Release June 2012
- Wizard driven installation
- Implemented using .Net Framework
- Requires Windows XP / Vista/W7
- Free to use for FAO programmes
- One time activation needed:
  - Institution, User Name, Address, PC CODE
  - send request by email
- Automated online updates / notification

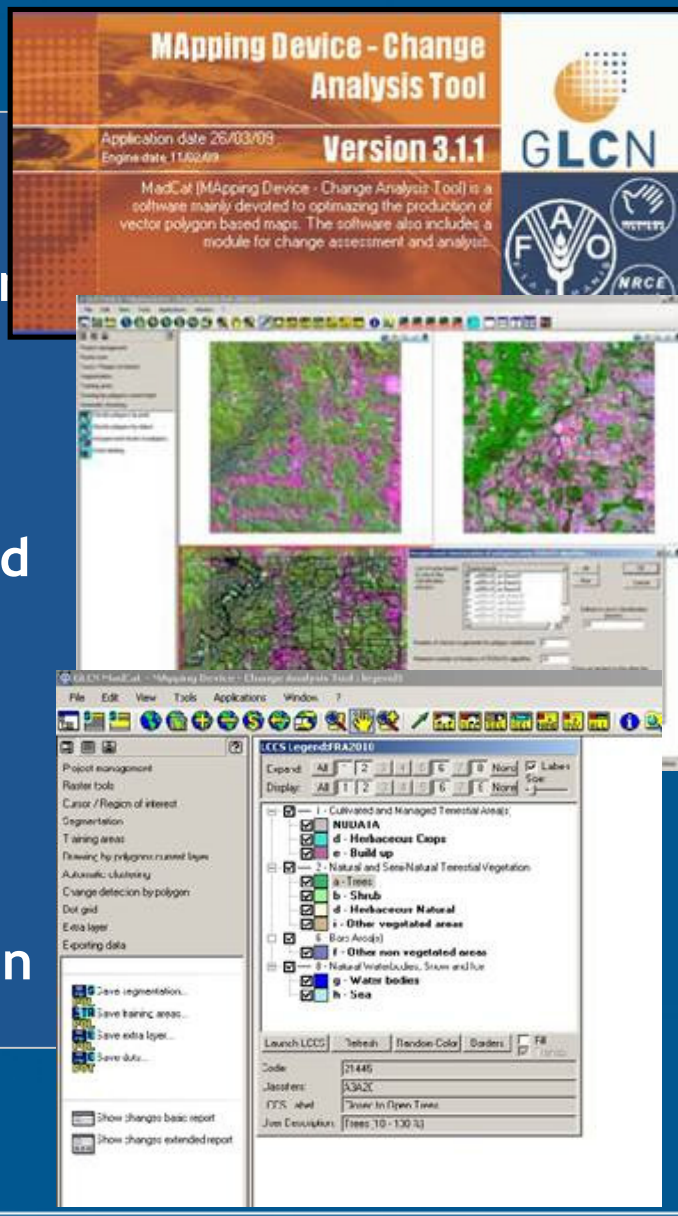


Mapping Device - Change Analysis Tools (MADCAT)

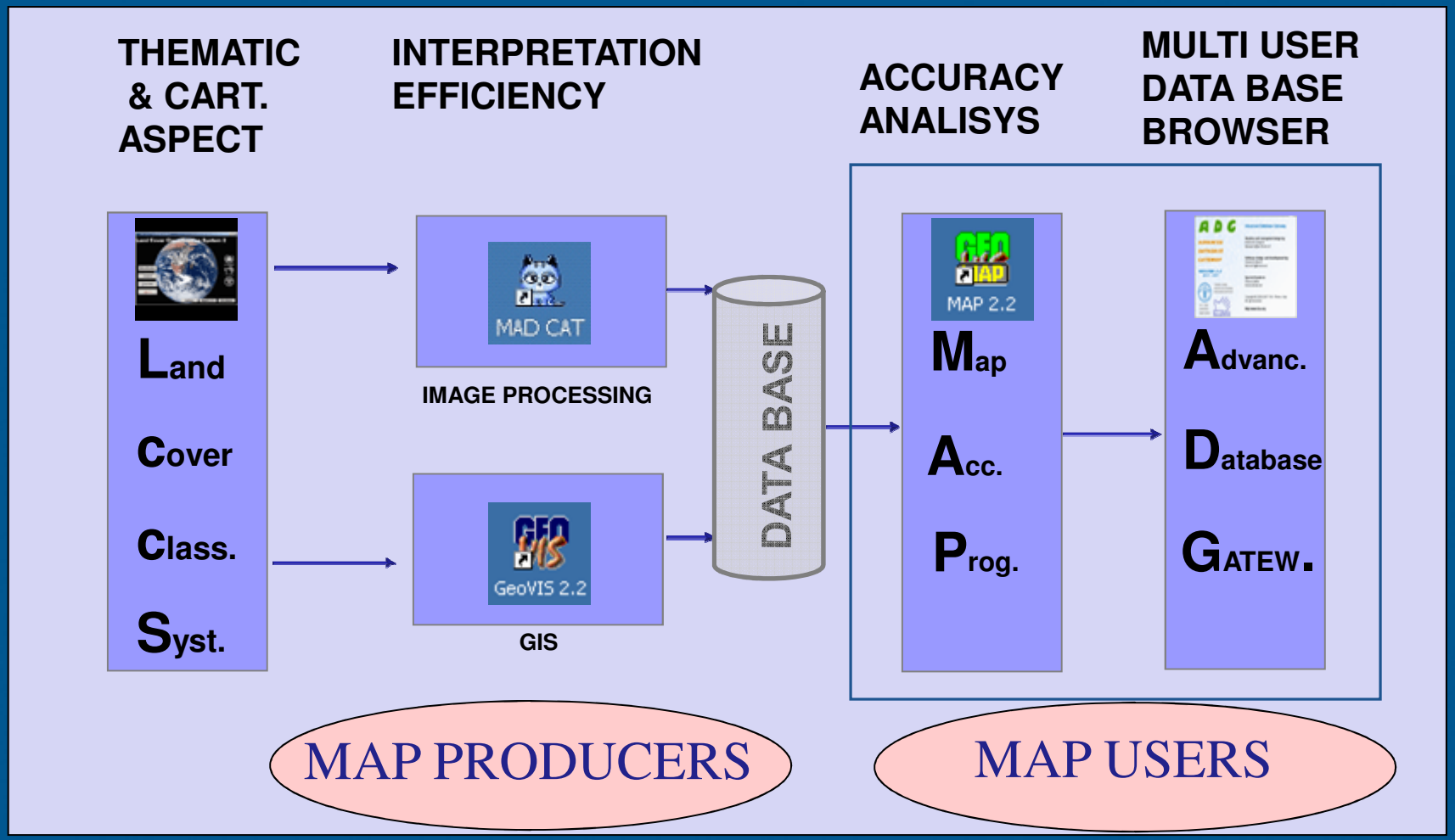
- A stand-alone, interactive and completely integrated application for mapping, change detection, editing, validating and reporting
- Graphical interface and testing environment; editing tools
- Interactive analysis and visualization of results, User friendly, intuitive, easy to use interfaces, Embedded analysis engine
- Direct link with LCCS
- Direct link with Google Earth
- Supports large datasets and batch macro editing
- Built-in reporting capabilities

Main functionalities

- Multiple window editing environment, synchronized and un-synchronized window visualization and multiple band combinatio
- Multivariate raster segmentation
- Raster bands arithmetic and normalization
- Automatic object based classification using Minimum Distance, Maximum Likelihood and ISODATA
- Smart labelling of objects of interest based on few user defined samples
- Semi-automated pixel based change detection,
- Pattern recognition filters, Cross Correlation Analysis
- Dot Grid analysis
- Reporting

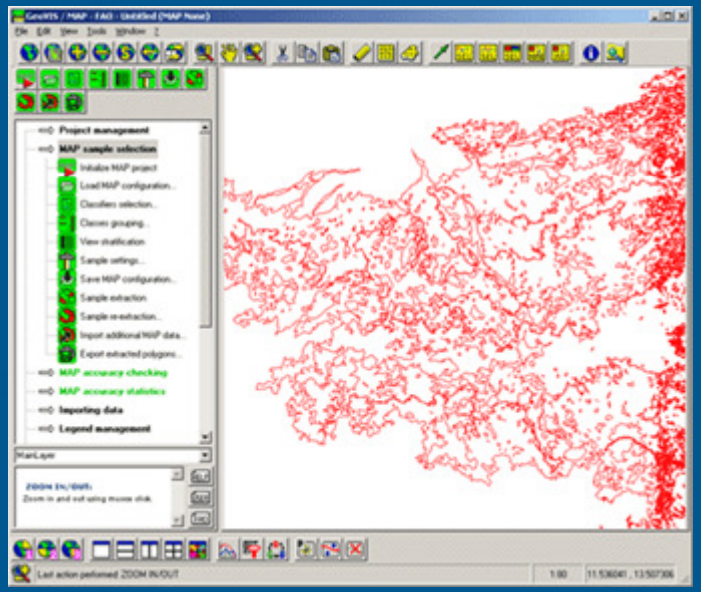


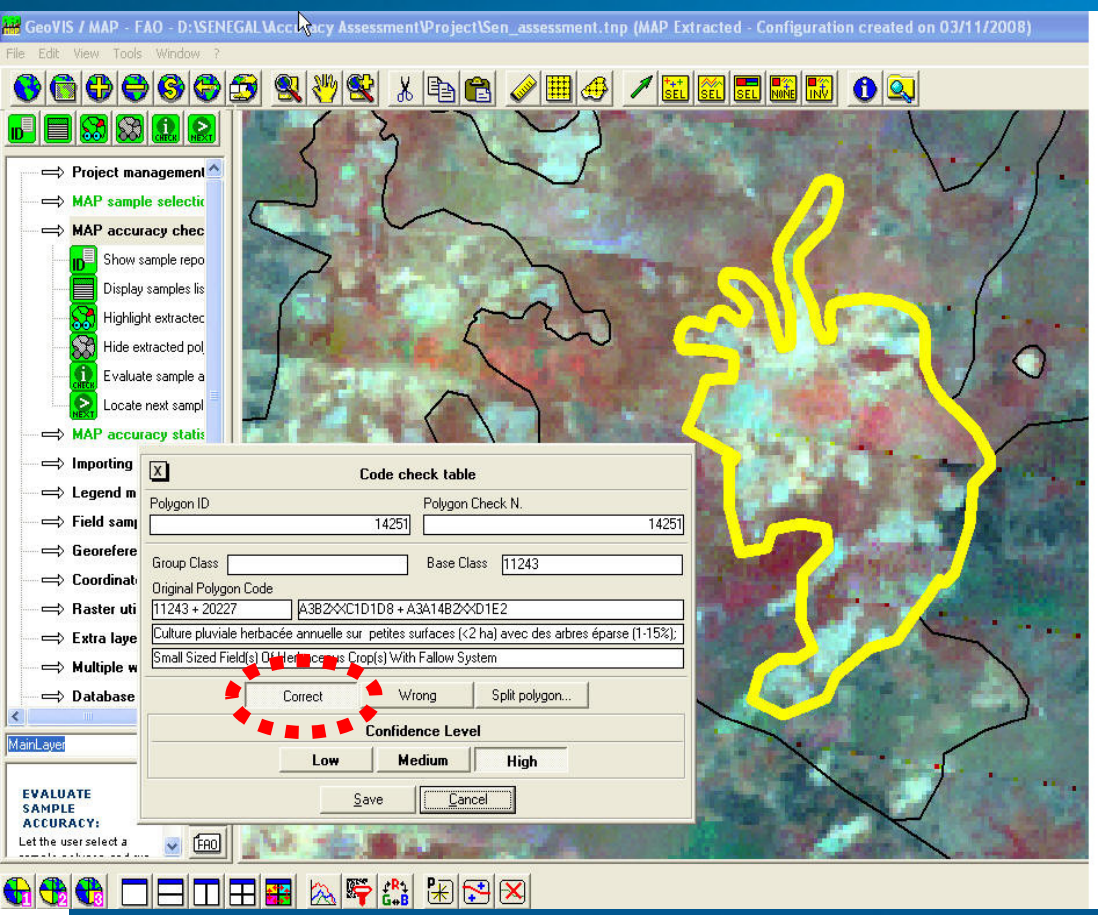
Land Cover mapping toolbox - Map User

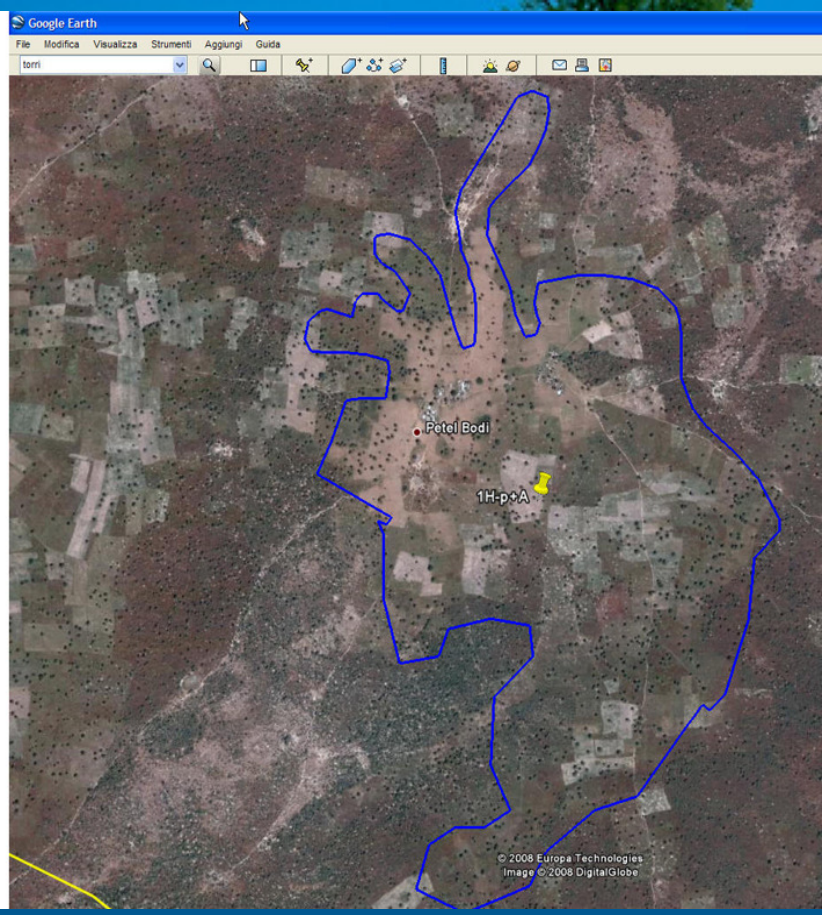


GeoVIS - Mapping Accuracy Program MAP

- GeoVis comes with MAP, a statistical program that allows the automatic calculation of the mapping accuracy different expected level of statistical confidence.
- It is used to estimate the accuracy of land cover data sets with an LCCS legend.

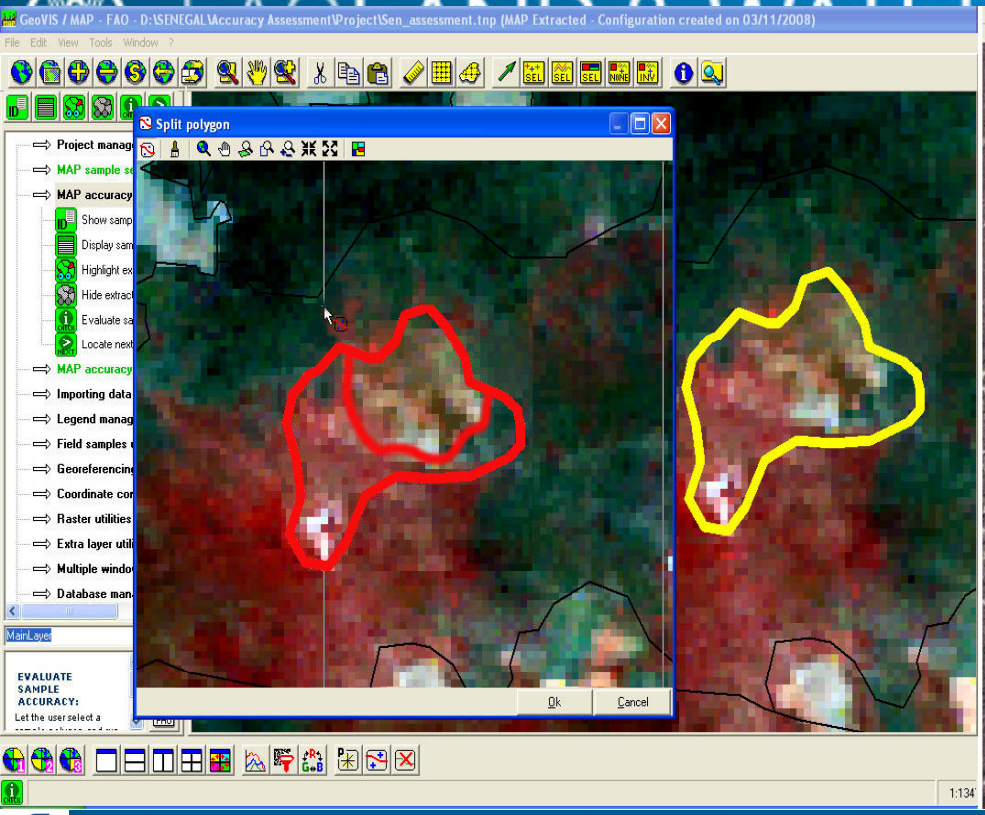


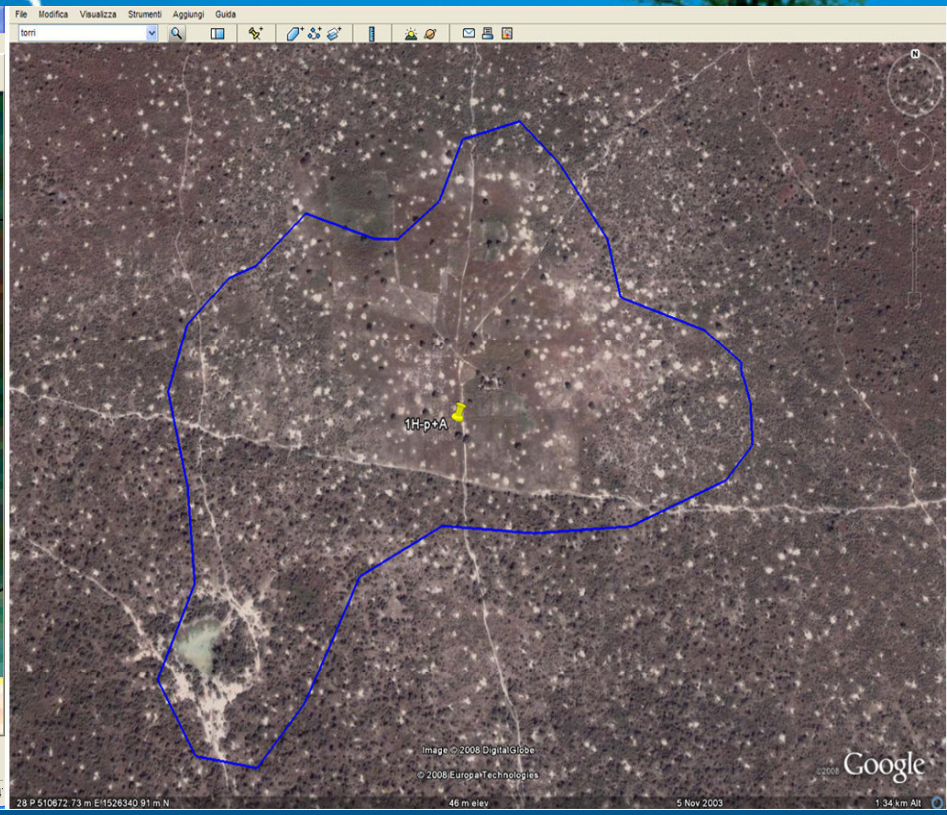




Example of correct photo-interpretation.

On the Left figure the polygon is checked and evaluated with the GeoMAP software; in this case the code (1H-p+A = Small Rainfed Herbaceous crops with a layer of Sparse Trees) is correct as can be seen on the right figure, where the polygon to be checked is visualized on a Google Earth high resolution image. So clicking on the “Correct” key of the GeoMAP window, the assessment of the polygon is finalized.





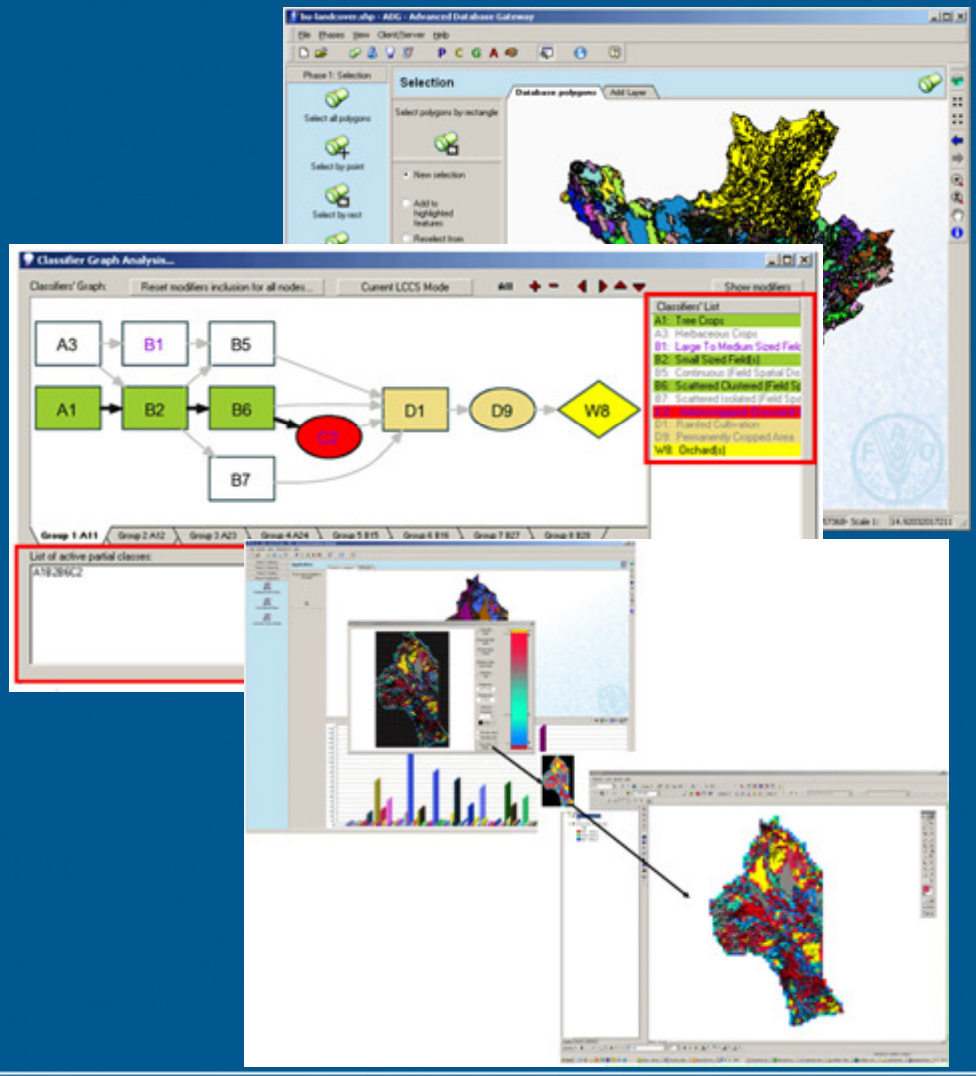
Example of partially correct photo-interpretation.

On the left figure, the polygon is checked and evaluated with the GeoMAP software. A portion of the polygon is not correct, as it is shown on the right figure, where the polygon to be checked is visualized on a Google Earth high resolution image.

Clicking on the "Split" key of the GeoMAP window one new window pops up; on this latter window (the one with the red polygon in the left figure) is possible to cut the polygon with the "Split polygon" tool, separating the correct portion from the wrong one. The correct portion keeps the original code while to the wrong portion is given the code of the corresponding class.

Advanced Database Gateway - ADG

- ADG is a cross-cutting interrogation software that allows the easy and fast recombination of land cover polygons according to the individual end-user requirements.
- Polygons from data sets with an LCCS legend can be aggregated at the level of classifiers.
- New classes can be created and stored.



Phase 1: Selection

Phase 2: Ch

Legend on Poly

Legend on

Legend on Maj

Report : L

Report : List thematic c

Report : List o codes and scal

Report : List of used

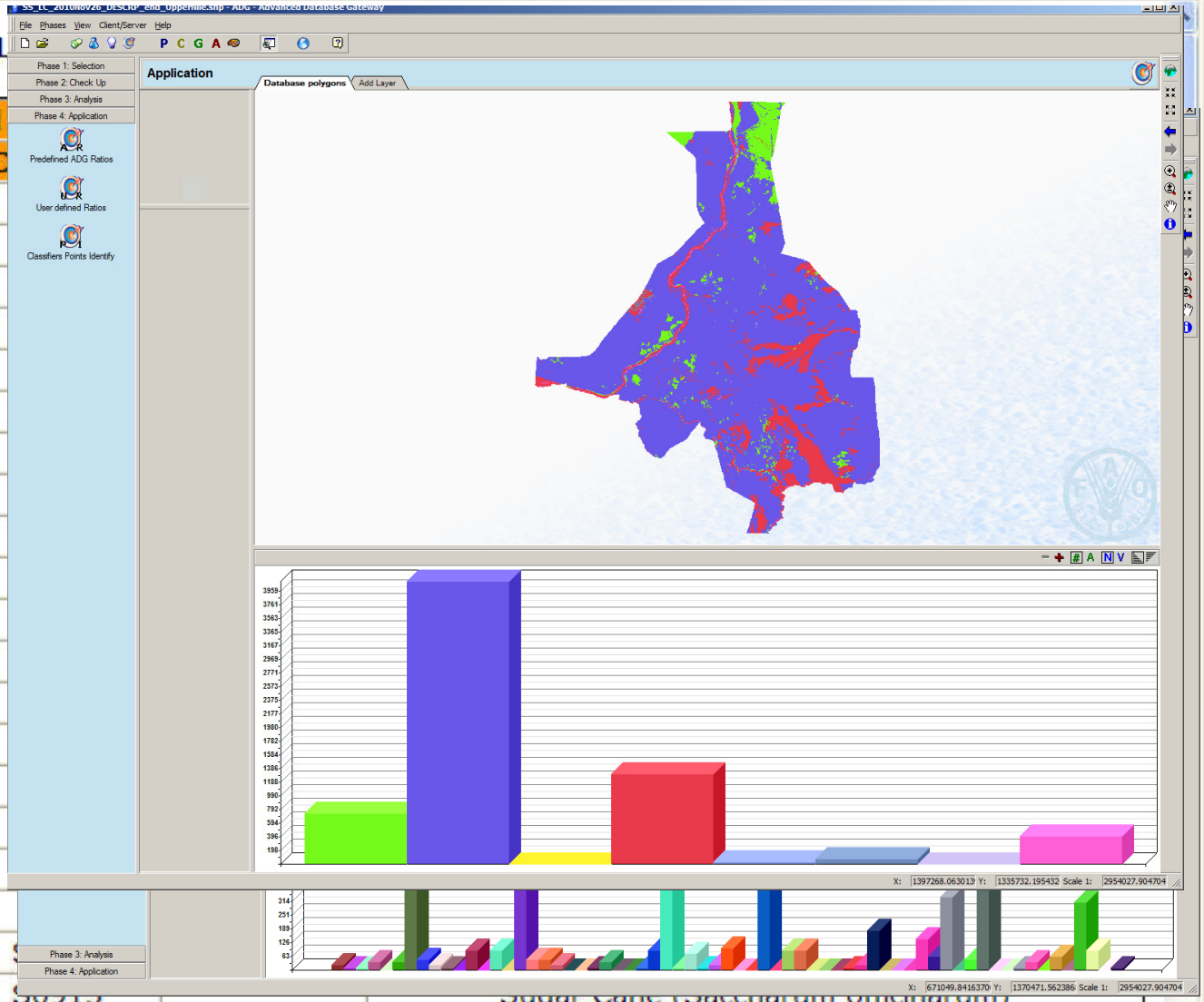
FOOD A

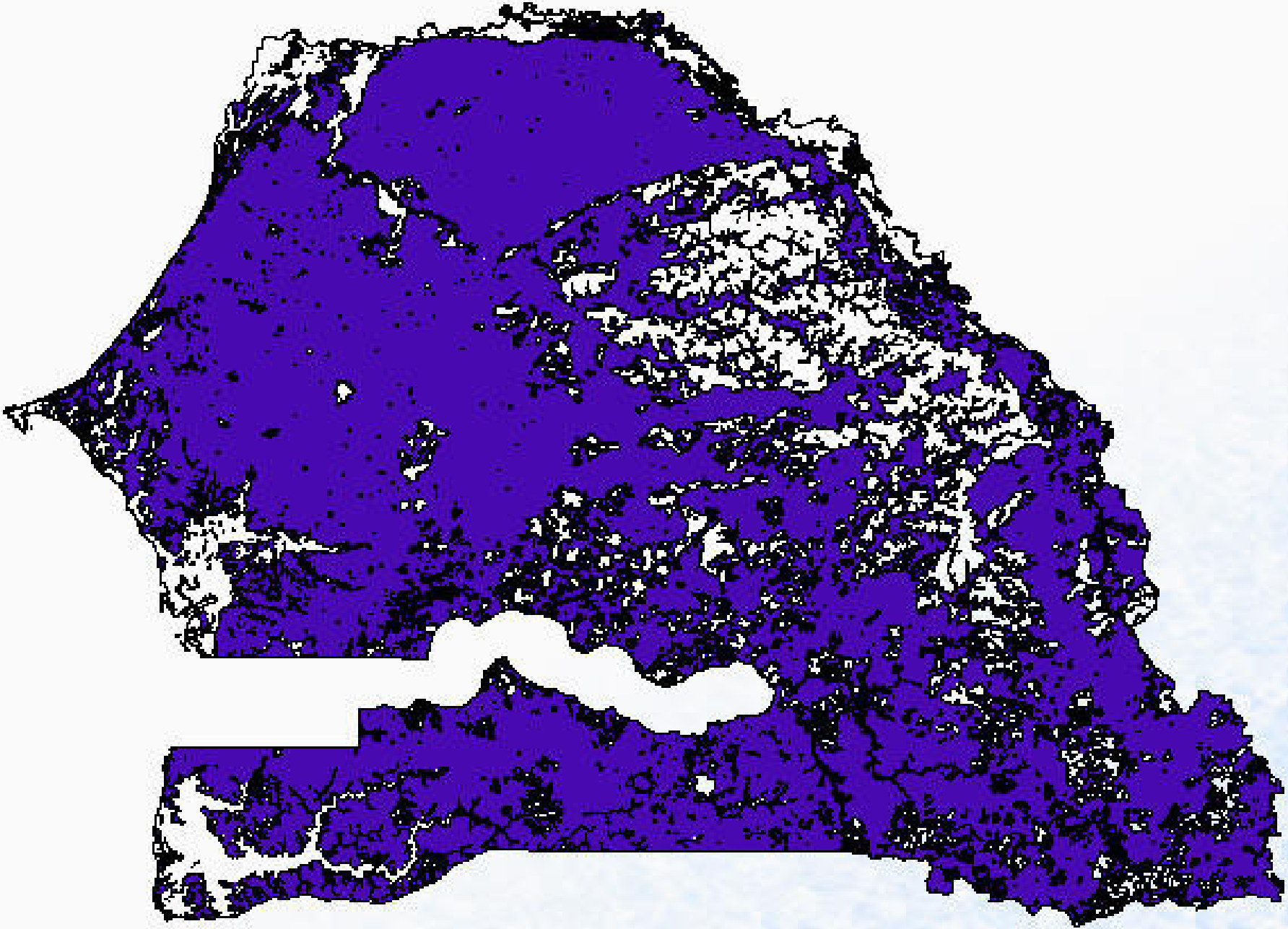
Classifiers Report

SEN_LC_z28_ : L

A11 - Cultivated	
#	C
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	S1099

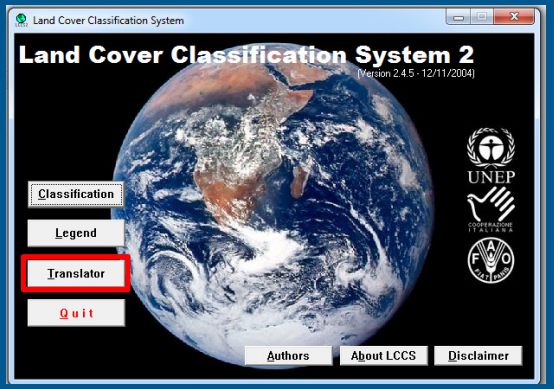
Other wood/timber



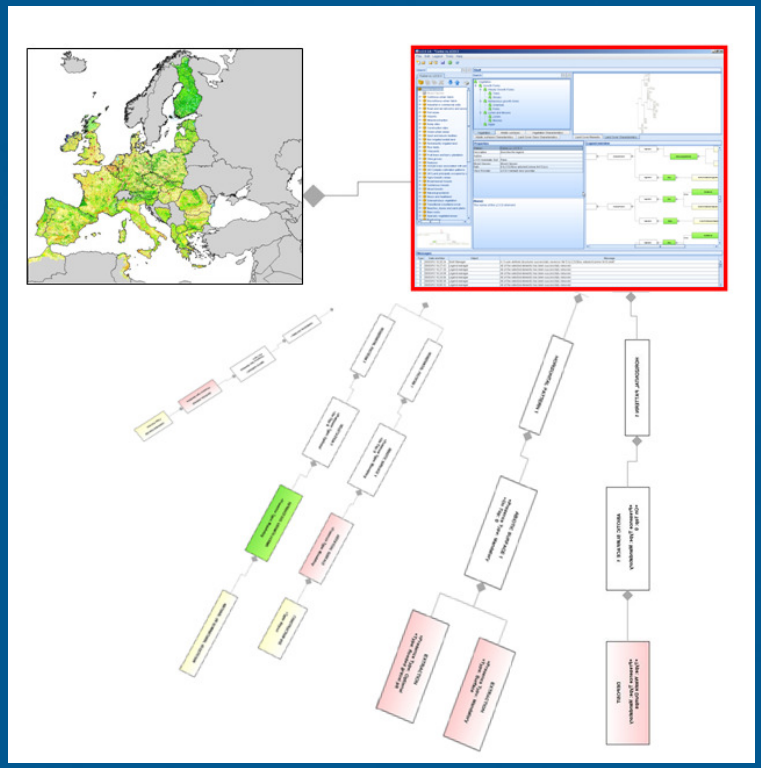


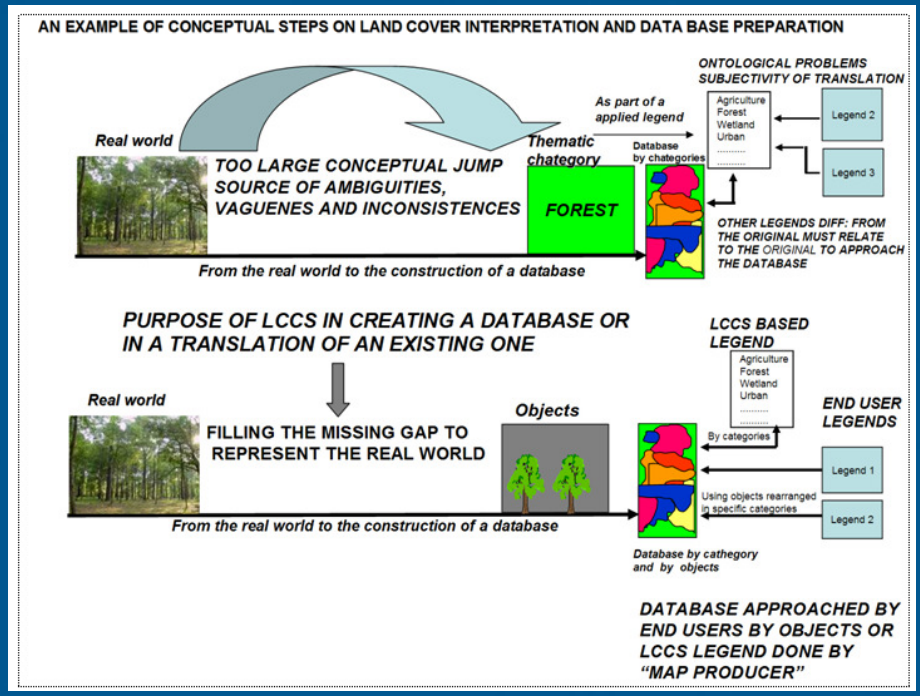
LAND COVER data translation

Translation module



e.g. Corine translation for Europe





Live section

Thank you

Contact:

Ilaria.Rosati@fao.org
John.Latham@fao.org