MONITORING OF THE WALLOON AGRICULTURAL STATE WITH REMOTE SENSING (SAGRIWATEL PROJECT)

Context

Regionalisation of the Belgian agriculture

Evolution of the Common Agricultural Policy in Europe
Needs of the Walloon Region

Monitoring of the state of the Walloon agriculture

- **Agricultural activities**
  - Agricultural yields, acreages, productions
  - Monitoring of the agricultural campaign
  - Monitoring of different stresses (water, nutrient, diseases...)

- **Agri-environmental activities**
  - Agri-environmental measures (MAE)
  - Good agricultural practices
Needs of the Walloon Region

- Control of farmer declaration
- Supervision and technical support of farmers
- Knowledge of the general trends, evolutions
Assets of the Wallon Region

IACS
(Integrated Administration and Control System)

SAGRIWATEL

B-CGMS
(Belgian-Crop Growth Monitoring System)

Remote Sensing

- Access to updated spatial databases
- National policy promoting remote sensing
Project objective

Conception of tools for the control, the support and the monitoring activities of the Agricultural Administration in order to better know the state of the wallon agriculture.

These tools are mainly based on the valorization of spatial information derived from B-CGMS, IACS and RS data.
1. Set up of a knowledge data base management system for the Monitoring of the agriculture in Walloon Region.

⇒ Elementary spatial unit = agricultural parcel

⇒ Valorization of Walloon assets

⇒ Multifunctional system

• Only solution for an optimized valorisation of this gigantic amount of data

• Combination of already existing system rather than creating new ones

• Open and modular system
2. Indicator approach chosen deliberately

- Approach selected by Walloon Region to present its Environment state
- A global approach is requested because all the Walloon Region is targeted
- Indicators allow to target zones for a specific control, a preferential support (selective monitoring).
- Multi-scale indicators
  - Parcel
  - Farm
  - Municipality
  - County
  - Watershed
  - Walloon Region
Methodology

3. Exchange Information Plateform – Farm advisory system
   - Conception and development of a geographical plateform adapted to the Administration needs (WebGIS)
   - Set-up of this plateform in a production environment

4. Team work
   - 4 scientific institutions (ULG, CRAW, FUSAG, UCL)
   - Permanent dialog with the Administration when choosing and conceiving indicators
Some applications
From 1998 to 2003, shift of the arable land parcel distribution frequency to smaller parcels: in 2003, 49% of the Used Agricultural Area (SAU) is covered by parcels < 6ha against 45% in 1998.
**Yield and Production Forecasting**

**INPUTS**
- Raw METEO Station Data
- Crop/Soil Parameters
- Low Resolution RS-Images
- Historical Yields
- Expert Knowledge Recent Info
- Crop Acreages
- Synthesis by Analyst

**ANCILLARY MAPS (Counties, soil map, DTM, …)**

**INDICATORS**
- METEO Grid
- METEO Indicators
- Model-based Indicators
- RS Indicators
- Trend Indicators
- Qualitative Indicators

**FORECASTS**
- Quantitative Forecast
- Final Yield Forecast
- Production Forecast
- Data Dissemination (Internet / Bulletin)

**GENERAL PHILOSOPHY, STRATEGY & APPLICABILITY**

**Monitoring application**

Site Web
(http://b-cgms.cra.wallonie.be)
Agregated results at farm scale
Winter land cover assessment

- Based on IACS farmers declarations
- and with teledetection

Land cover map
December 2003
Situation
(SPOT5 image)

\[ I = \frac{\text{arable land with bare soil in winter}}{\text{total arable land}} \]
Crop succession (rotation) assessment

\[ I_{sc} = k_p k_r k_d \]

adapted from the French Indigo procedure

- Former crop
- Return time
- Crop diversity

Spatial representation of the crop succession indicator in Walloon Region
Agroecological network

Some elements

• Woods parcels
• Hedges
• Isolated tree

Control application

VHR Images

Habay-la-Neuve – Stereo scientific meeting – 20.09.2005
Nitrogen fertilization for maize parcels

Support application

Habay-la-Neuve – Stereo scientific meeting – 20.09.2005

Hyperspectral images

Precision : 75%
Conclusions

A set of concrete applications have been set up for the needs of the Walloon Agricultural Administration such as:
- yields and productions forecasting
- water stress areas delineation
- location and length/size estimation of buffer strips, hedges, water ponds...
- location of winter land cover
- location of ploughing direction versus parcel slope/length
- monitoring of crops successions (rotations)
- monitoring of crops diversity
- evolution of parcel sizes
- monitoring of N-Fertilization in corn crop
...

Some applications are in a nearly operational state, others do require more research.
Conclusions

1. Original Valorization of the Geographical IACS.
2. Interest of the combination of IACS database with aerial or satellite information.
3. Tools modulable and adaptable to evolution of needs.
4. Extension of a tool already controled by the Administration
5. Management computing coupled with scientific developments.
6. Permanent link between Research and Administration