



3rd INTERNATIONAL SCIENTIFIC MEUSE SYMPOSIUM
THE MEUSE DISTRICT : CHALLENGES FOR TOMORROW

LIEGE, April 22 – 23, 2010

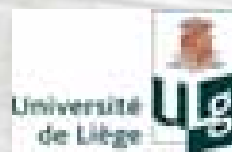
**SCIENTIFIC CONTRIBUTION TO THE
EFFICIENCY OF THE NITRATE ACTION
PROGRAMMES**

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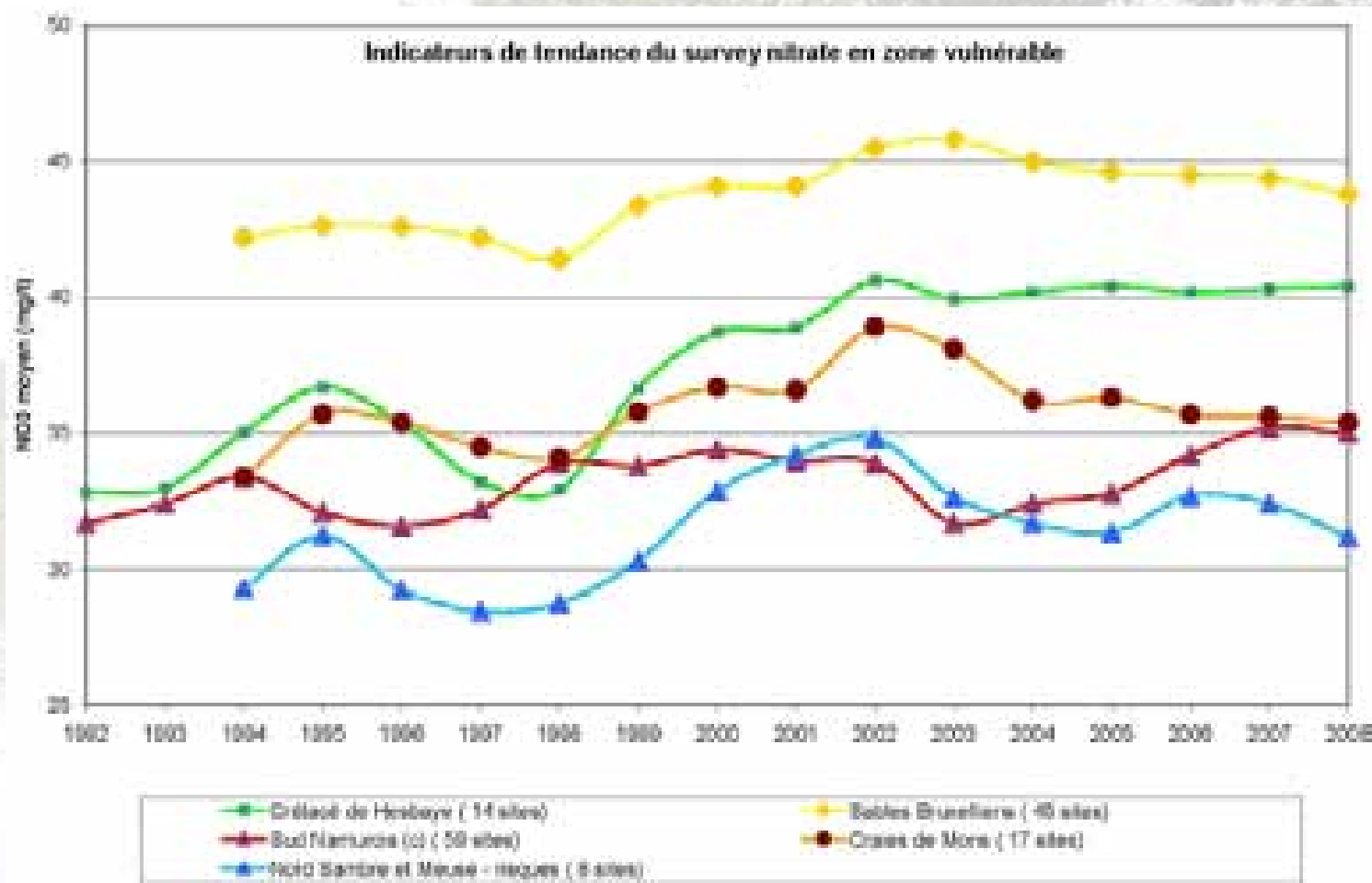
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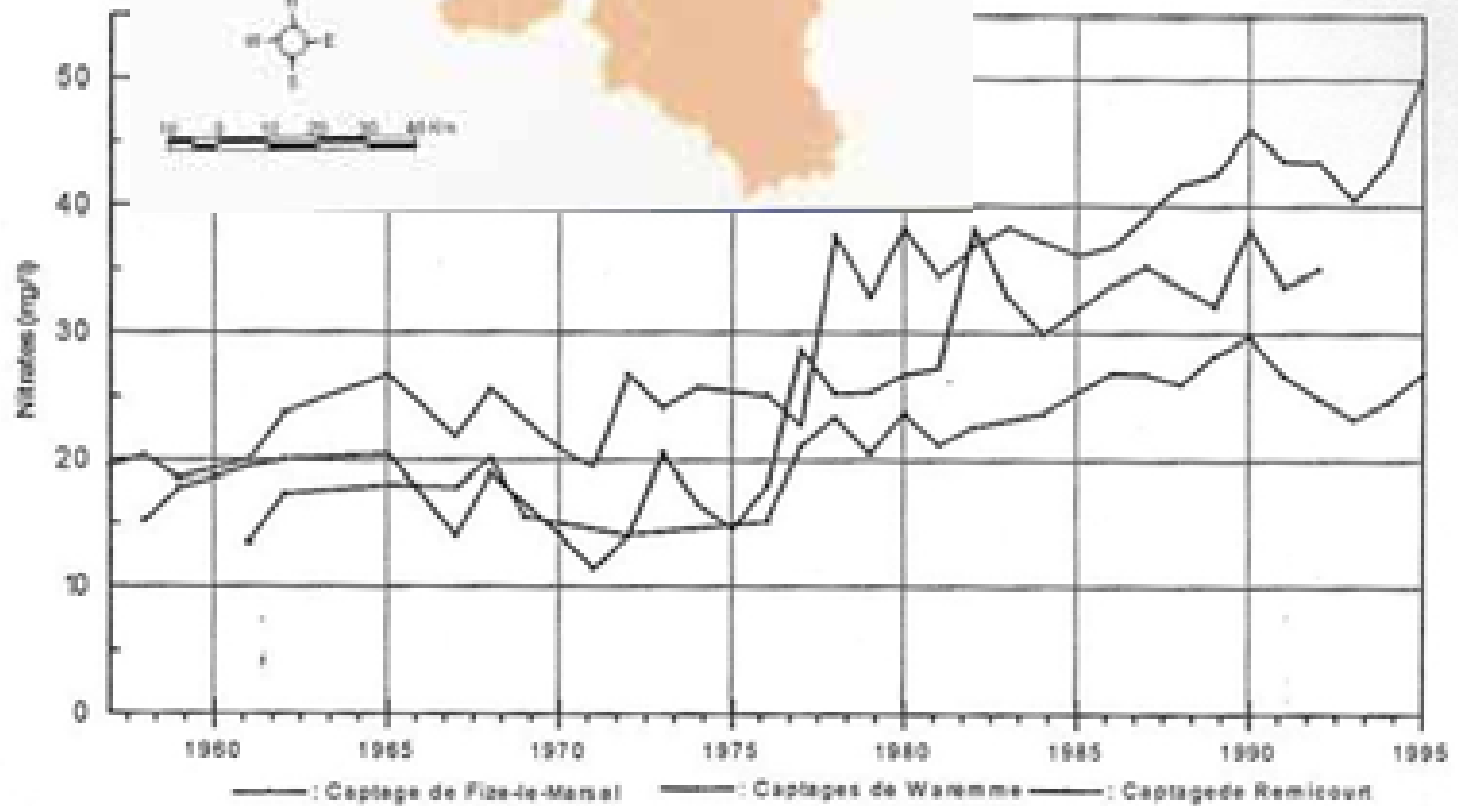
Survey Nitrate in the vulnerable zones



The degradation observed in most of the Walloon's aquifers has begun ...

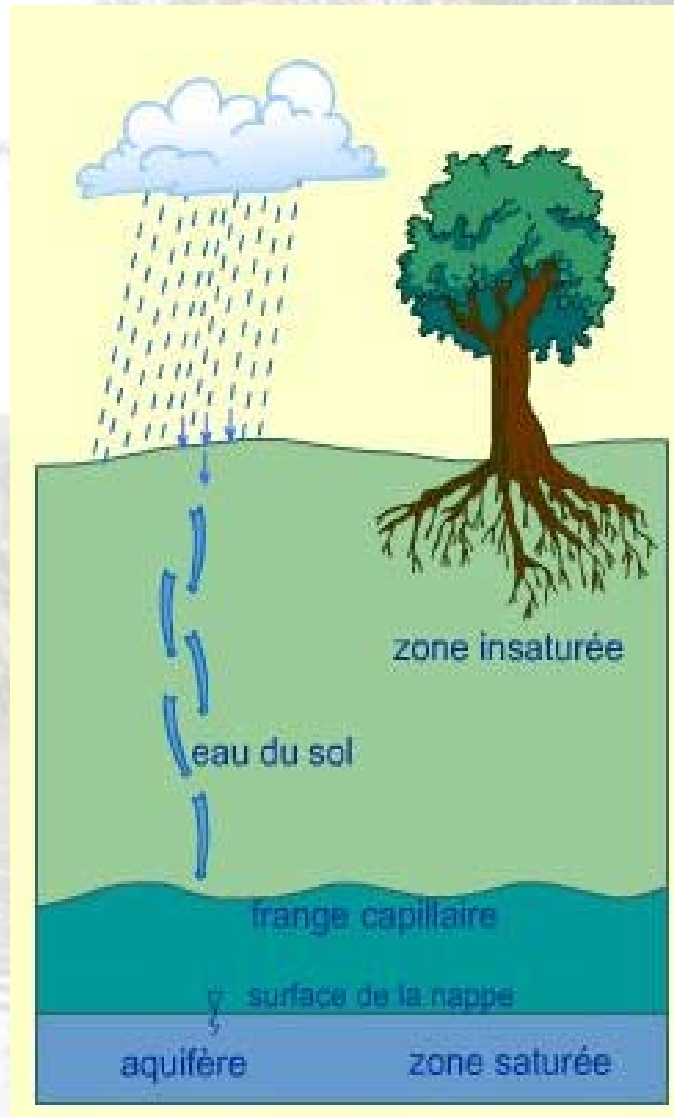


...in the middle of the '70



Time to transfer
nitrate to the
aquifer

10 to 25
years

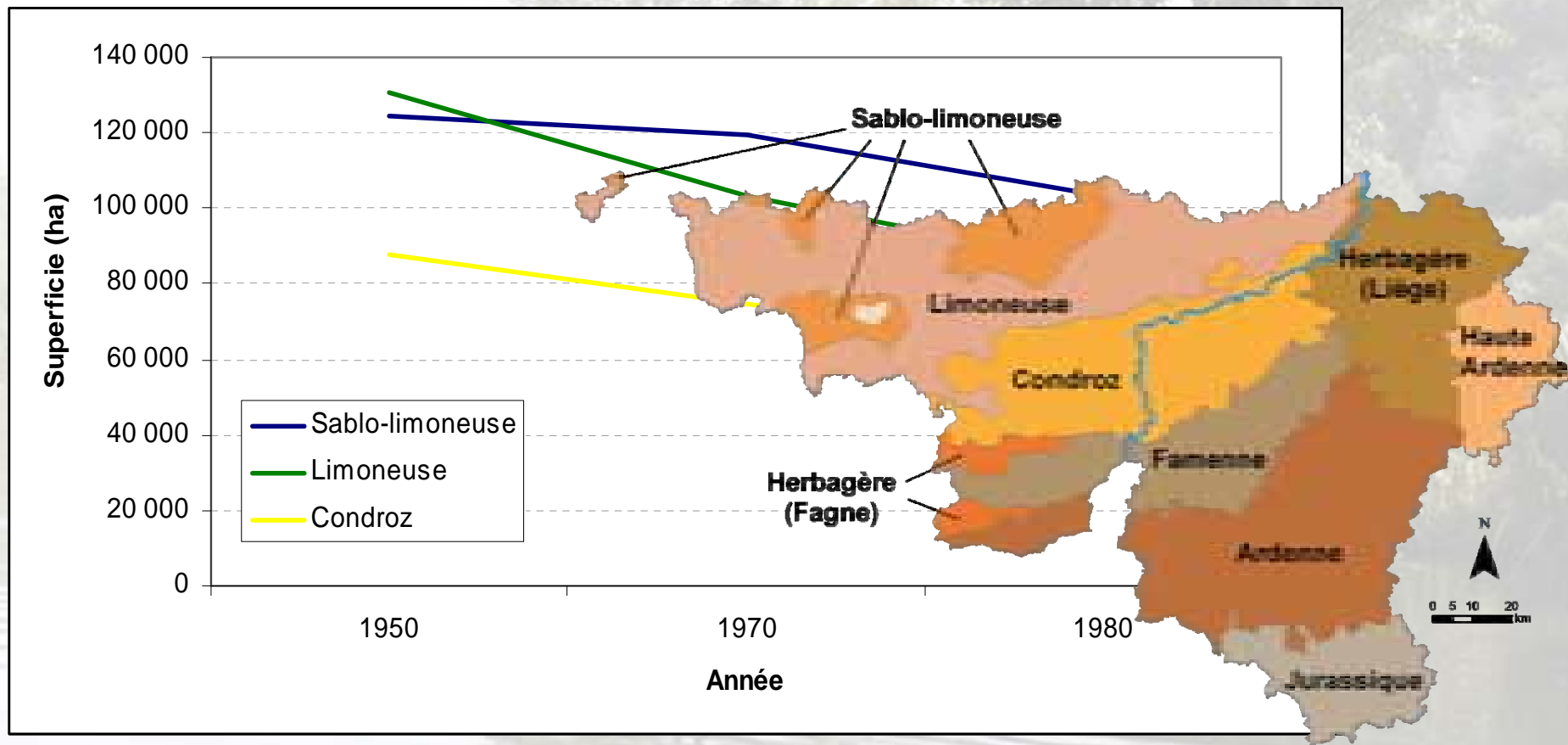


Origine : change
of the agricultural
practices in the
'50 – '60



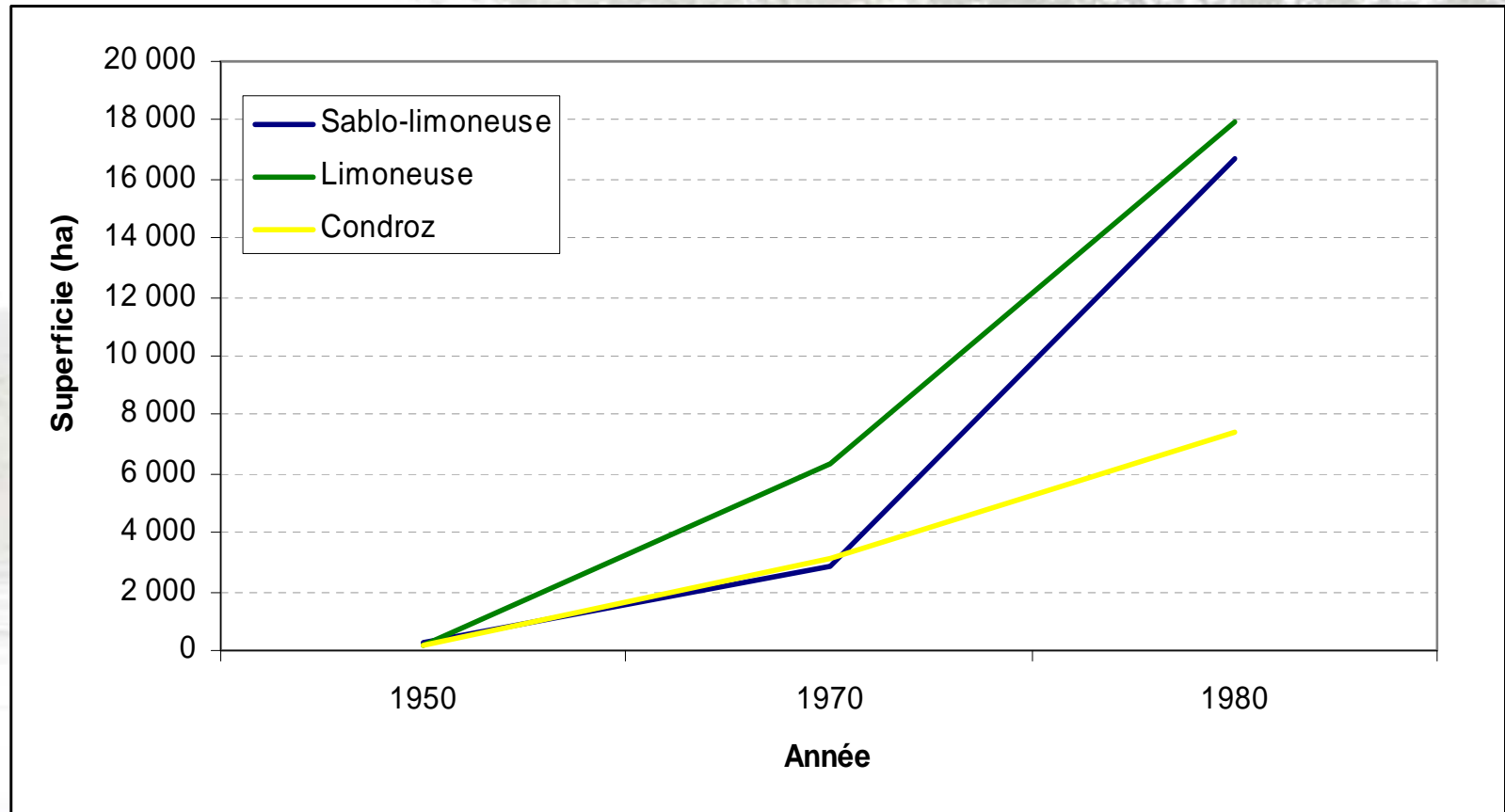
1975

Land cover : reduction of the grassland area



After data of the belgian National Institute of Statistics

Annual crops : increase in maize area



After data of the belgian National Institute of Statistics

Livestock increase

In the Walloon region

thousand of heads	Loamy region	
	1950	1970
Cattle	392	463 +18%
Pigs	208	507 +144%

In Belgium

million of heads	1950	1970	1980	1990
Cattle	2.0	2.9	3.0	3.2
Pigs	1.3	3.7	5.1	6.7

After data of the belgian National Institute of Statistics

Fertilization versus crop yield

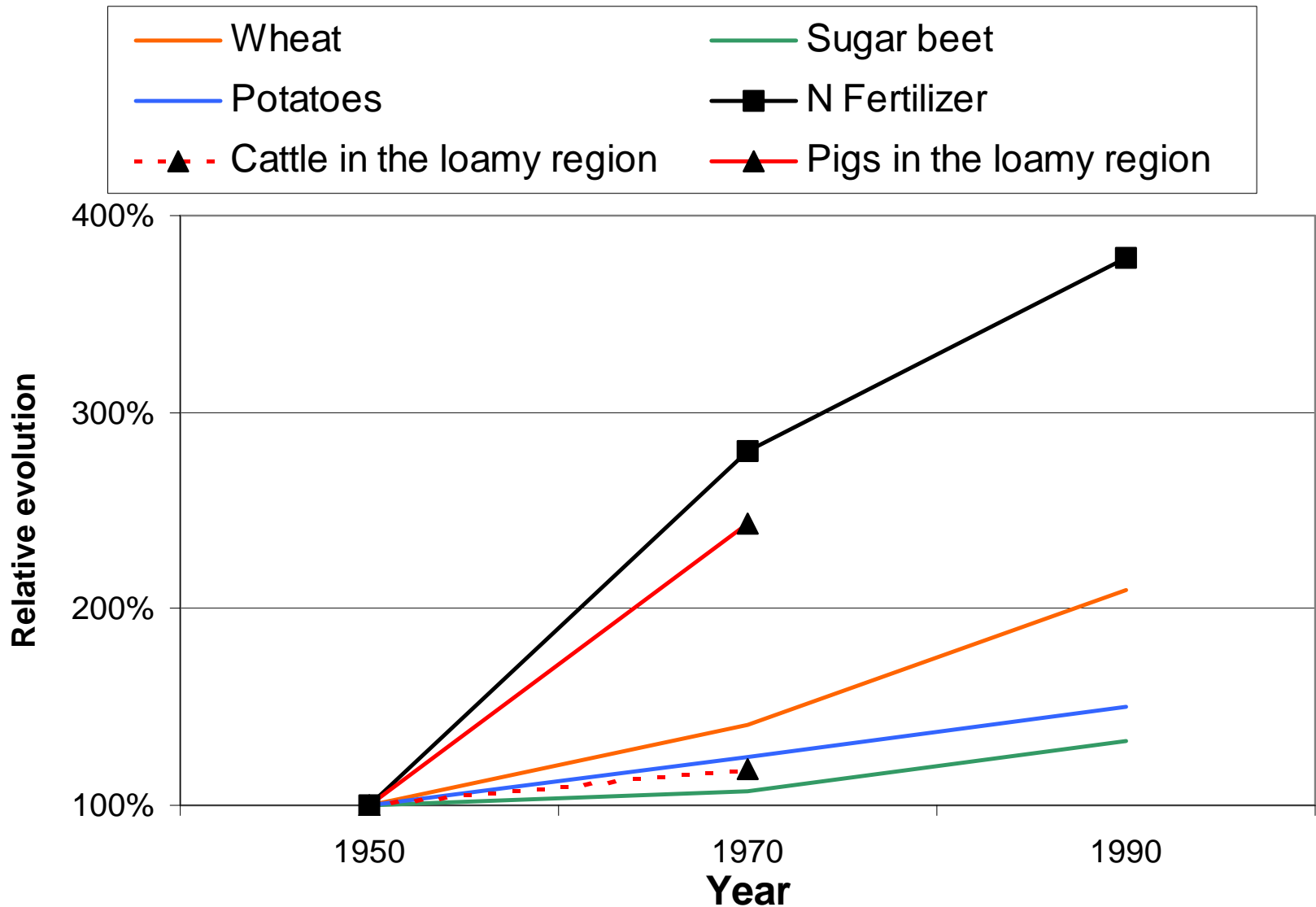
Mineral fertilization
(kg N/ha.an)

	1950	1970	1980	1990
Nitrogen	41	115 + 180%	126	155

Crop yield
(t/ha)

	1950	1970	1980	1990
Wheat	3,2	4,5 + 40%		6,7
Sugar beet	43	46 + 7%		57
Potatoes	24	30 + 25%		36

Context





Action Programme

1. Designation of vulnerable zones



Vulnerable zones

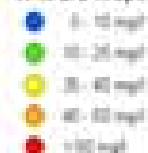
Average concentration (NO₃⁻)



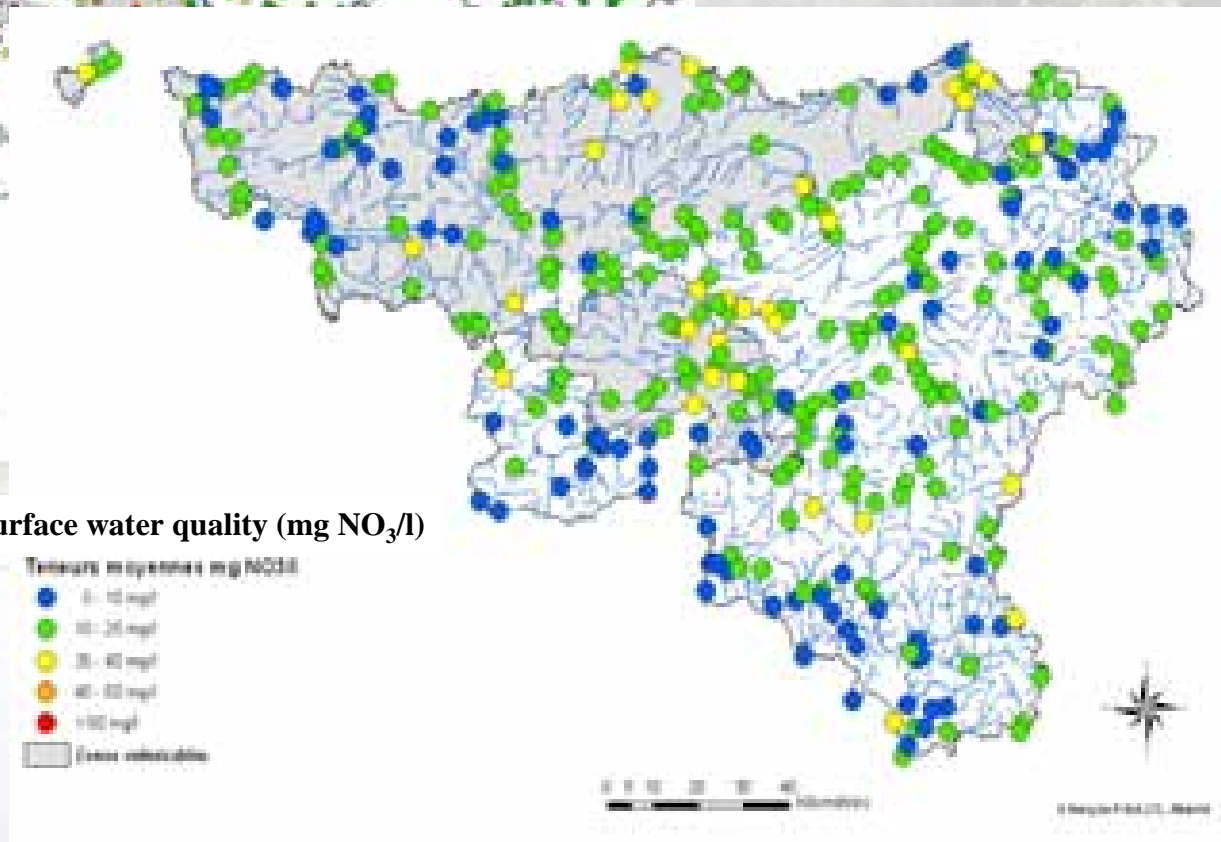
Source : SPW

Surface water quality (mg NO₃/l)

Teneur moyenne mg NO₃/l



Zones vulnérables





Action Programme

2. Code of good agricultural practices

- the storage and handling of manure from livestock rearing,
- the application of fertilizers (conditions and quantities) and
- the principle of the binding rate to the soil

Manure
production

Abilities
of use

{
230 kg Norg/ha on pasture land
115 kg Norg/ha on arable land
170 kg Norg/ha at farm scale

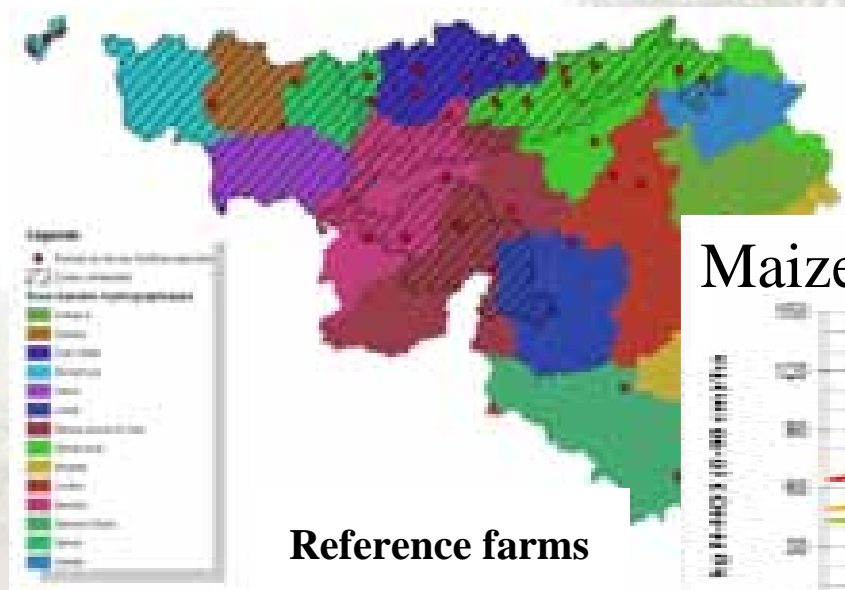




Action Programme

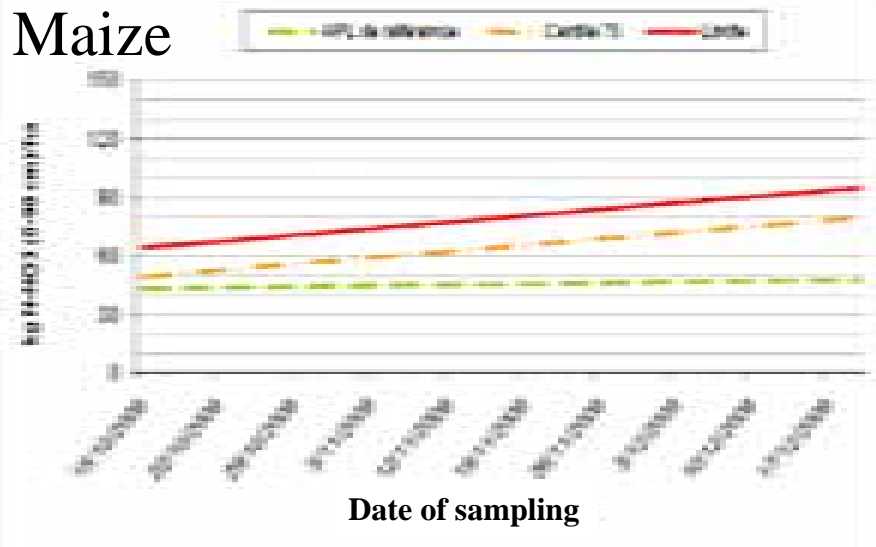
3. Monitoring : PLN(*) control

- Each year
- 3% of the farms in vulnerable zones
- 3 parcels / farm
- Nitrate nitrogen in the soil (0-90 cm)
- Comparaison with annual references



Reference farms

Maize



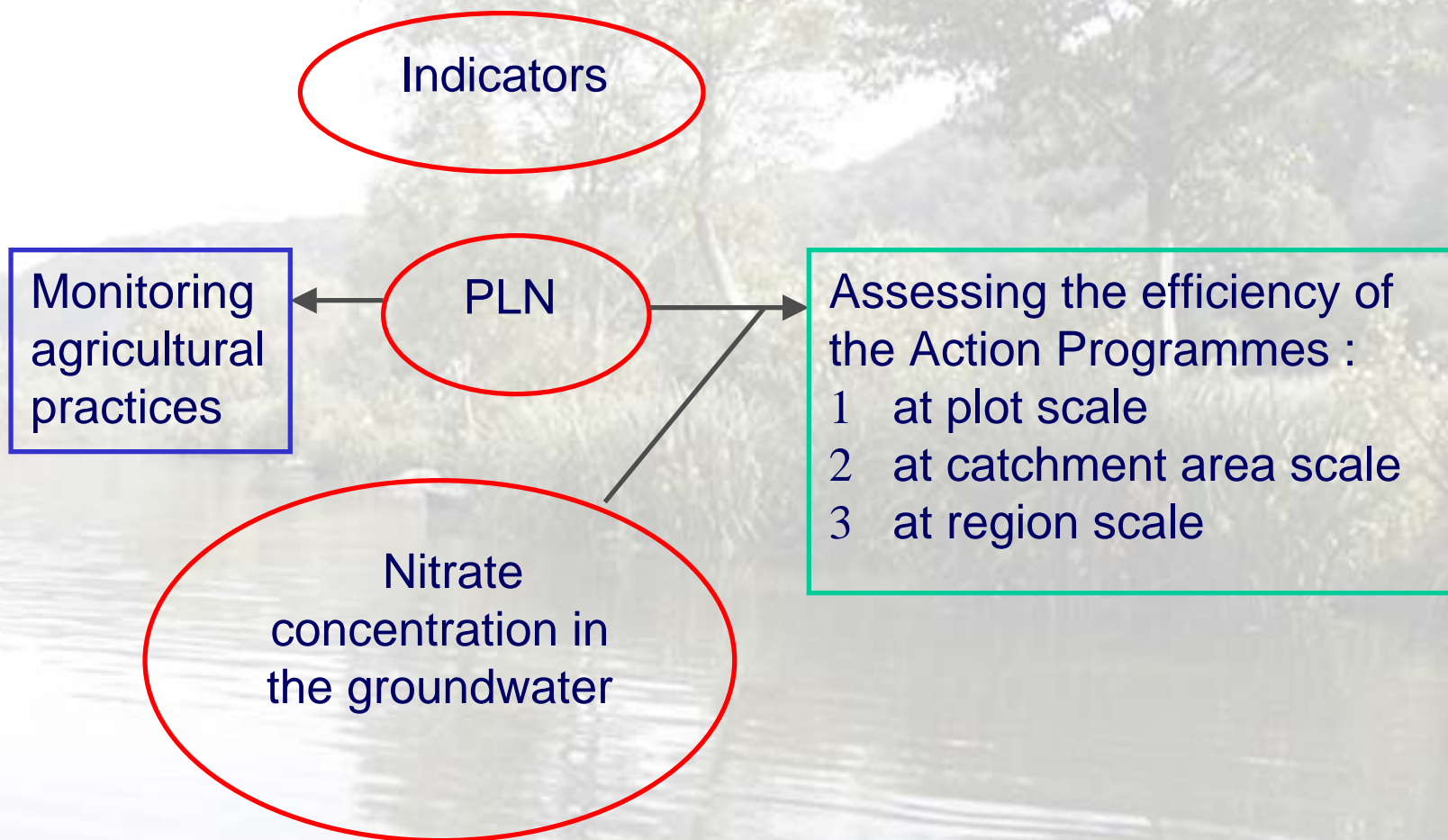
Results of the control (2009) :
(897 parcels)

annual crops : 73 %
pasture : 96 %

* : Potentially Leachable Nitrate nitrogen
(APL in french)



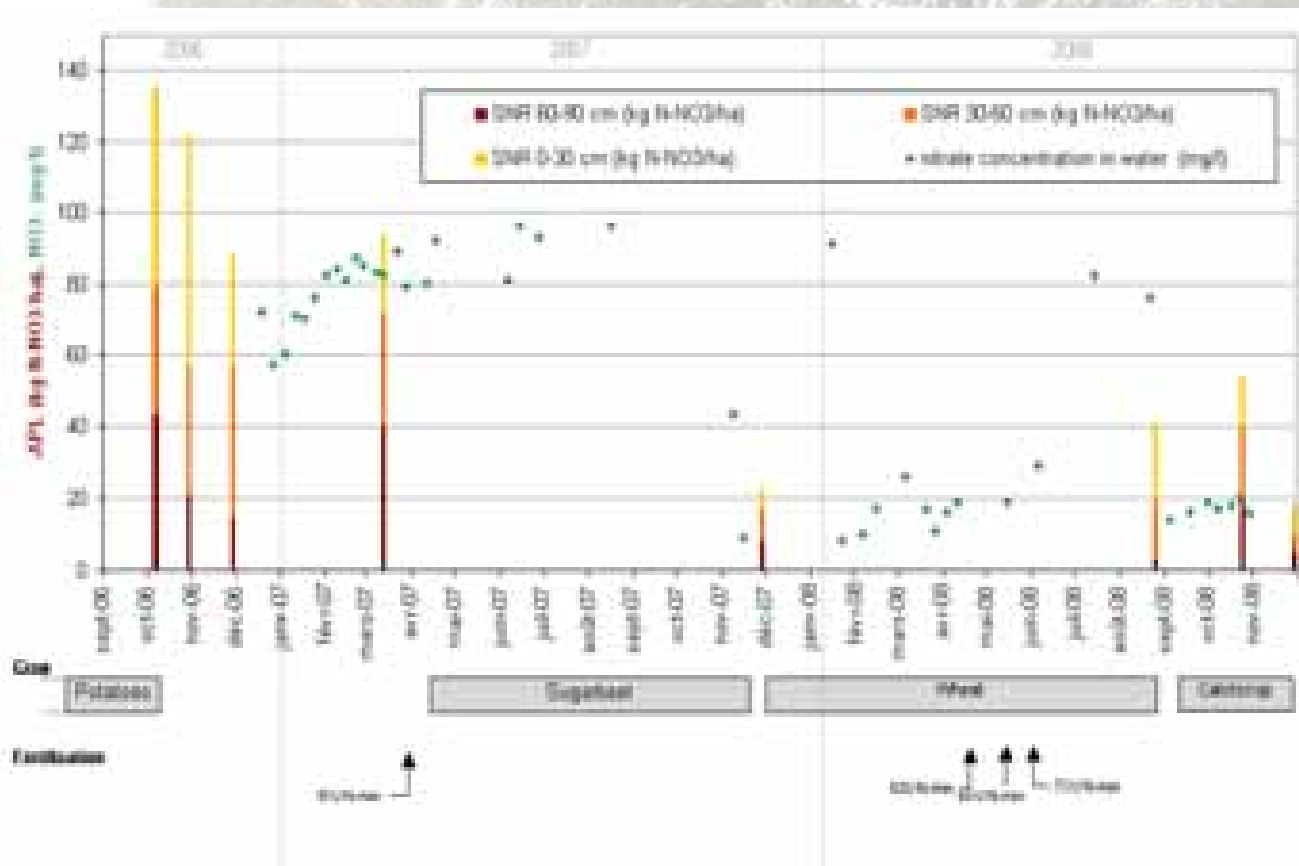
Efficiency of the action programmes



PLN : Potentially Leachable Nitrate in the soil



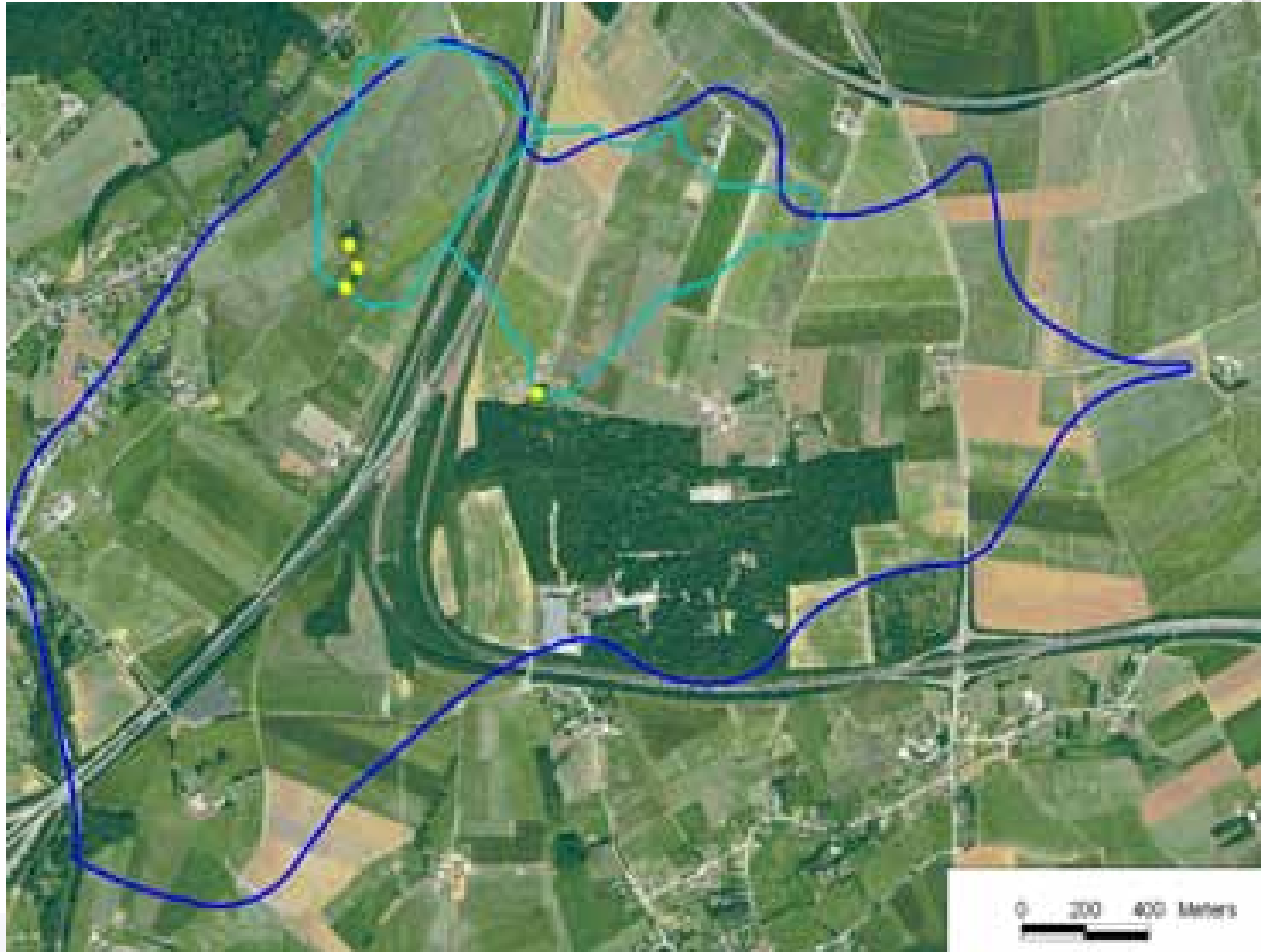
Lysimetric plots (6 in the Meuse District)



Allow the evaluation of :

- PLN as environmental indicator
- Effectiveness of the action programmes

Reference agricultural watershed



Research Support

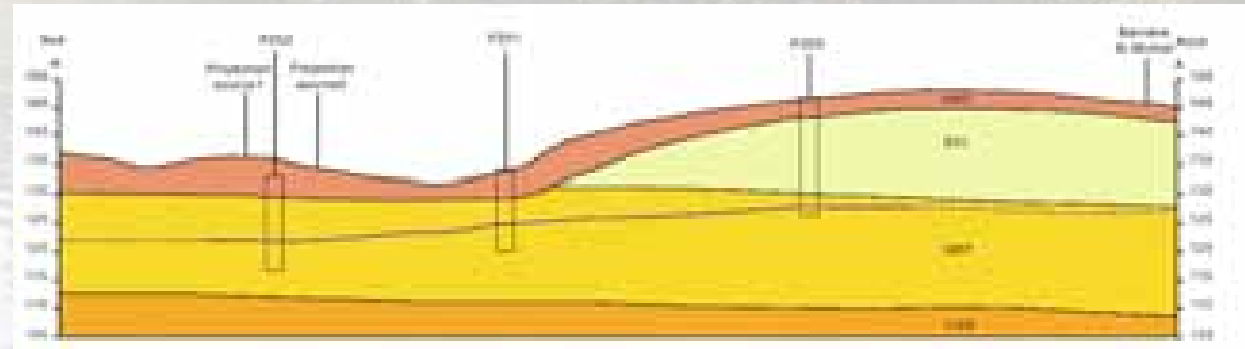
Groundwater monitoring



Piezometric surface

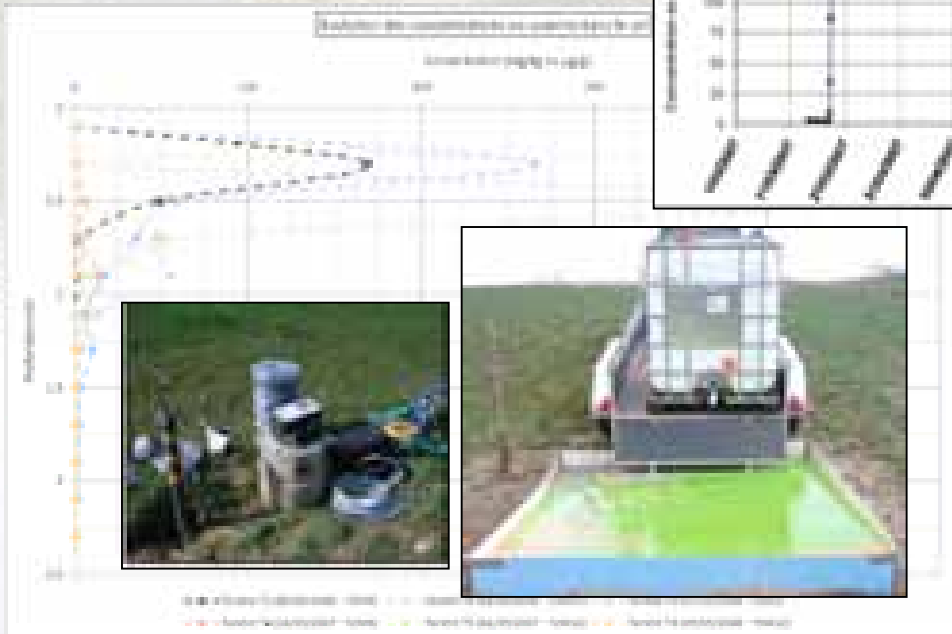
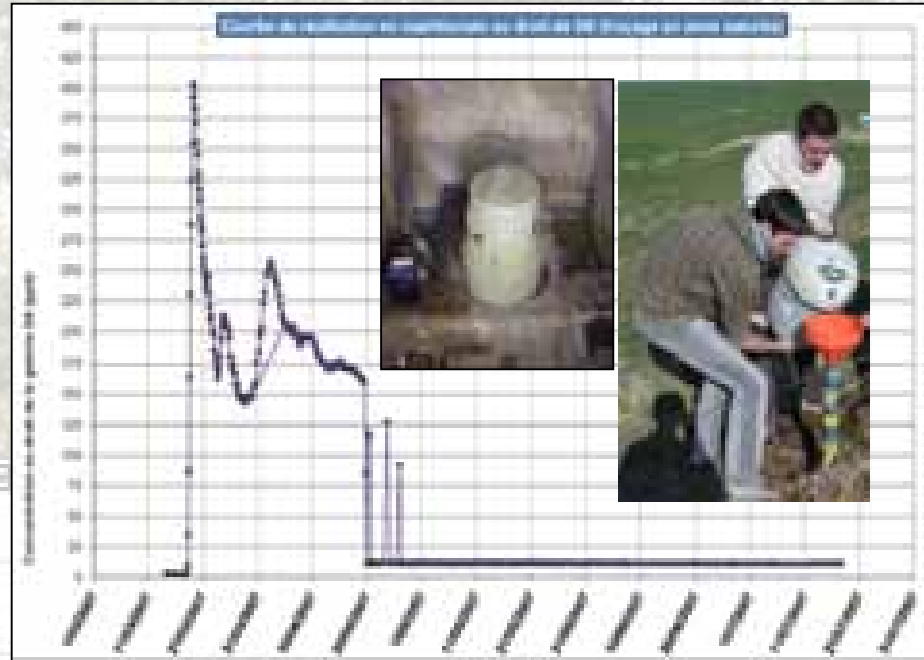


Quality



Experimentations

Saturated zone →

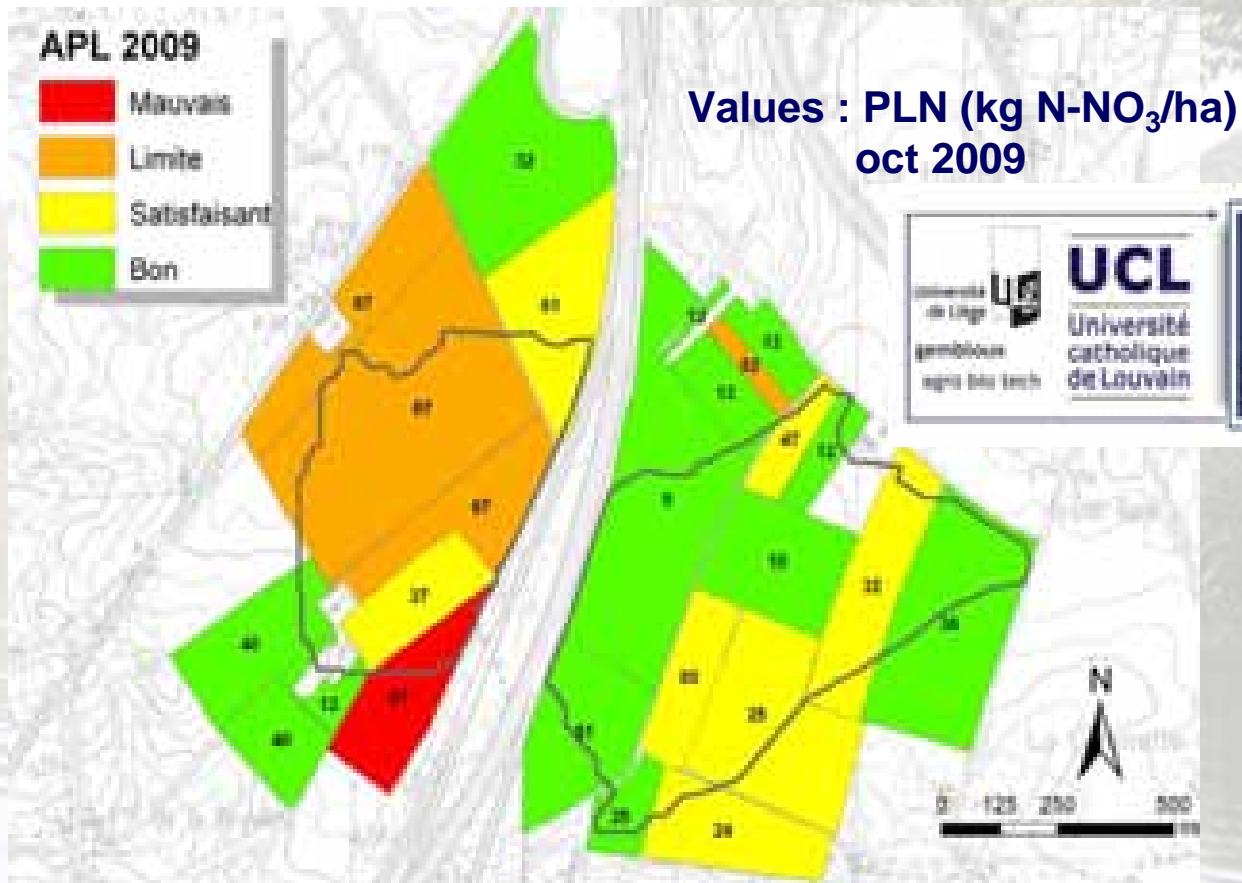


← Unsaturated zone

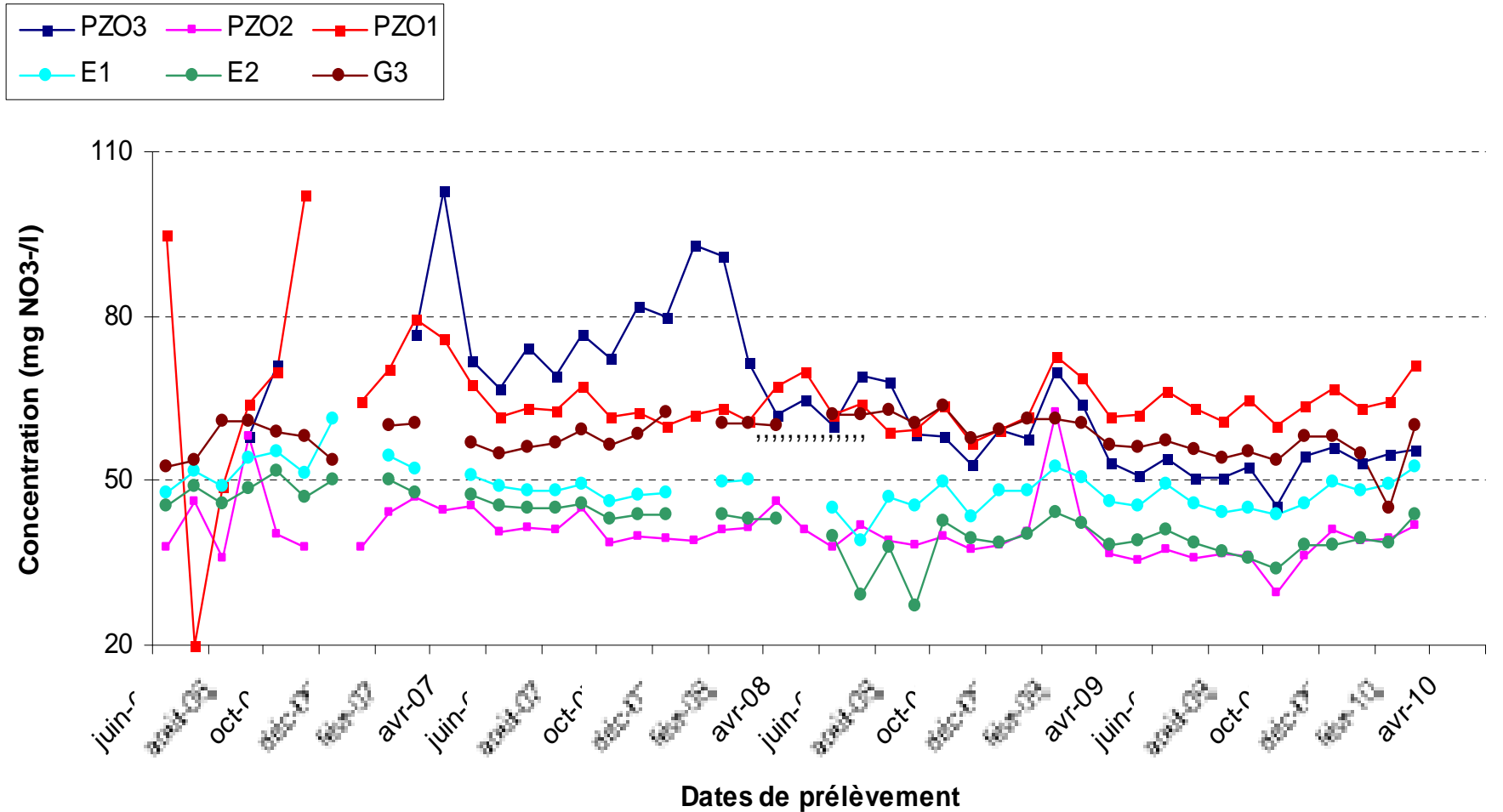
Research Support

Agricultural practices monitoring

- Farmers advised by Nitrawal
- Actual good practices

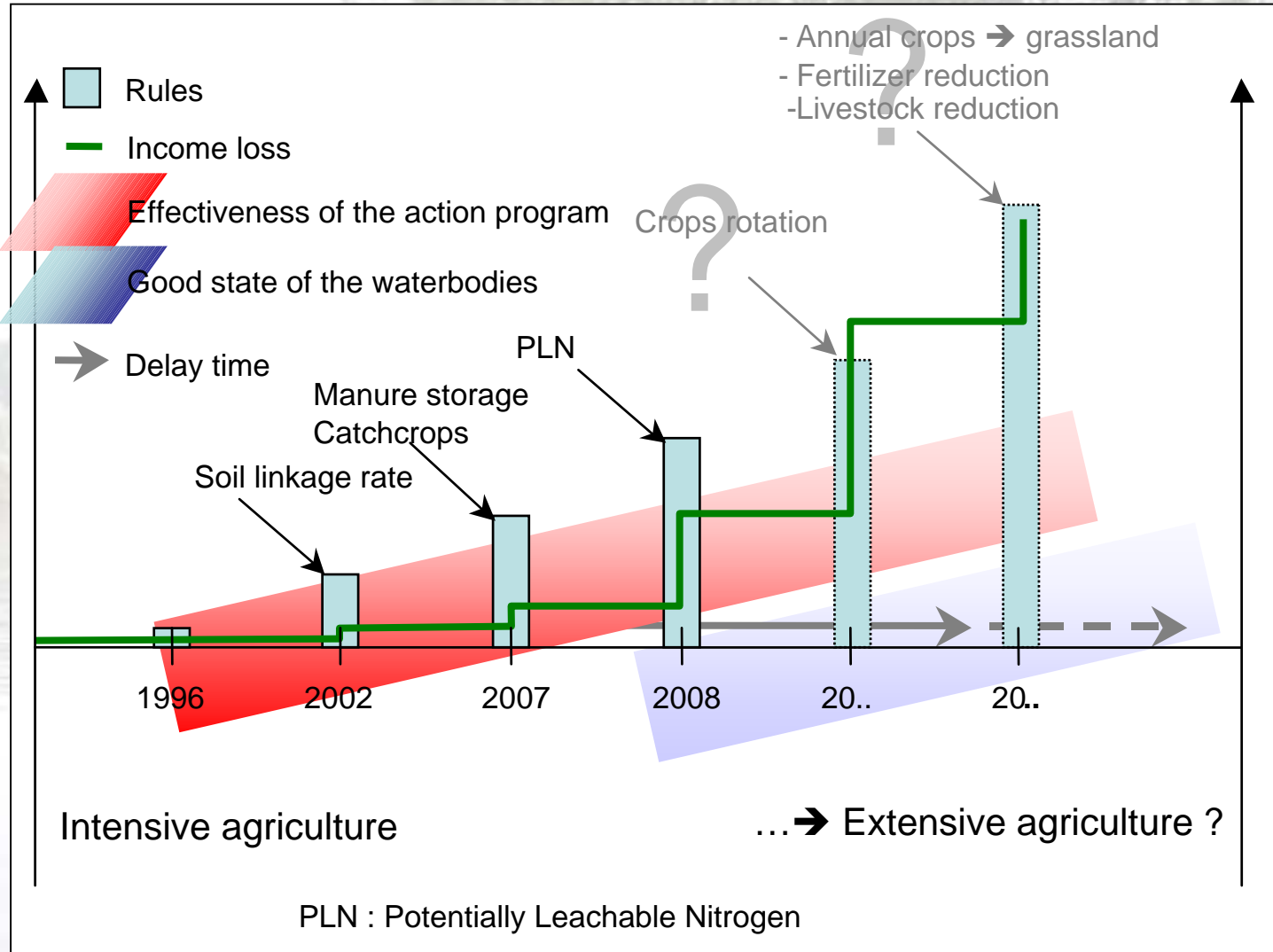


Groundwater quality : trend towards improvement



The challenge : to stop the inflation of rules at the right time !

How ?





The challenge

Scientific based propositions for the next Action Programme

-
- CRAw
 - Gx-ABT
 - UCL
 - ULG
- To improve on
- Crops and pasture fertilization
 - Catch crops
 - PLN (vegetables)
 - Nitrogen excretion by dairy cows
 - Accurate nitrogen content of manure and slurry
 - ...

cf Proceedings of the « Nitrate – Water » Workshop (2009) :

<http://www.bib.fsagx.ac.be/base/content/v14ns1.html>