

ASTE 96th Annual Conference – June 6 to 9, 2017

Liège, Belgique

# Improvement of the water quality in the water catchment of Arquennes

Results after 12 years of actions and follow-up



# Introduction

## The Nitrate Directive

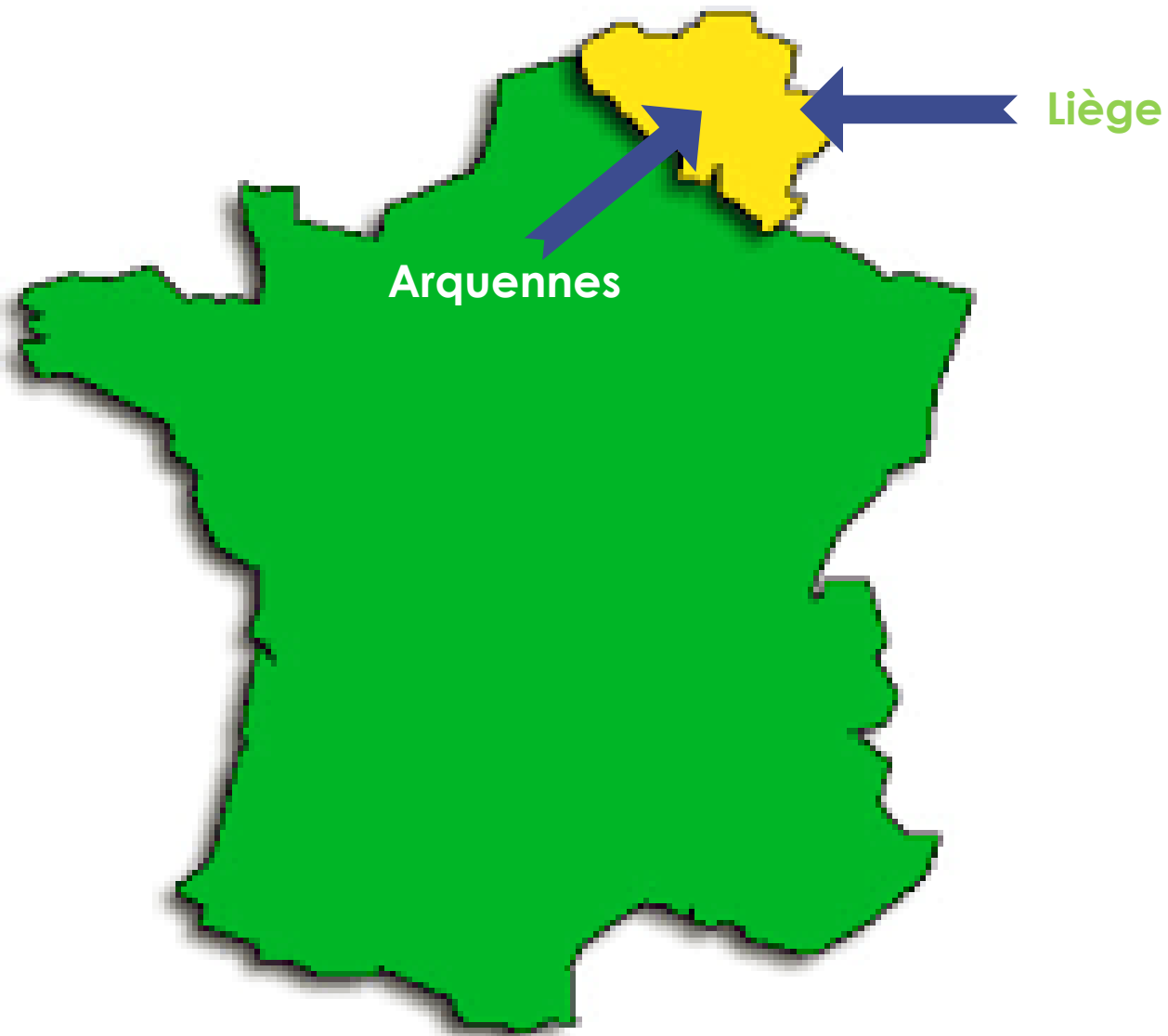
**December 1991 : vote of the Directive 91/676/CEE on the protection of waters against pollution caused by nitrate from agricultural sources**

- Designation of the nitrate vulnerable zones
- Establishment of action programmes and codes of good agricultural practice
- Monitoring of the water quality
- Assessment of the impact of action programmes
- 4-yearly reports



# Introduction

## The water catchment of Arquennes



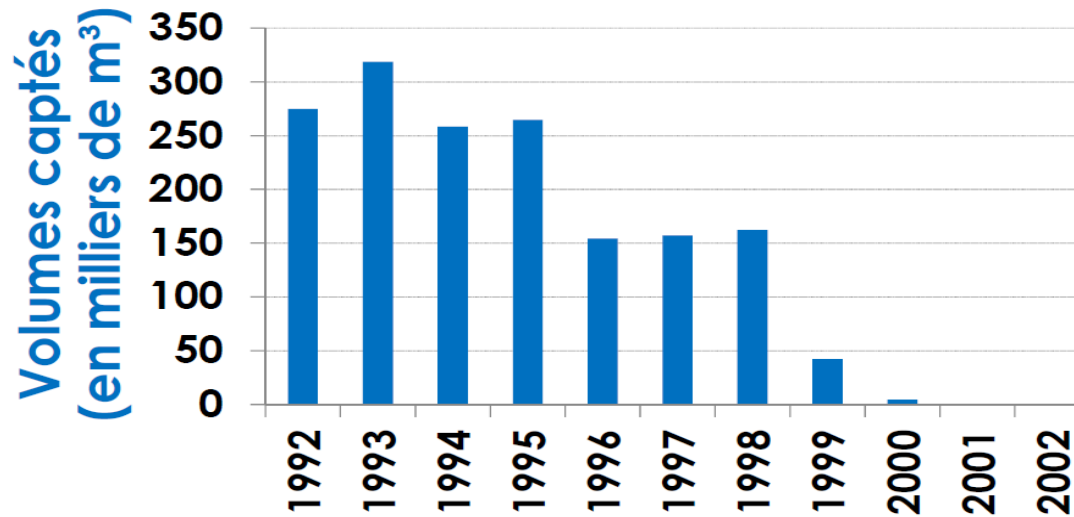
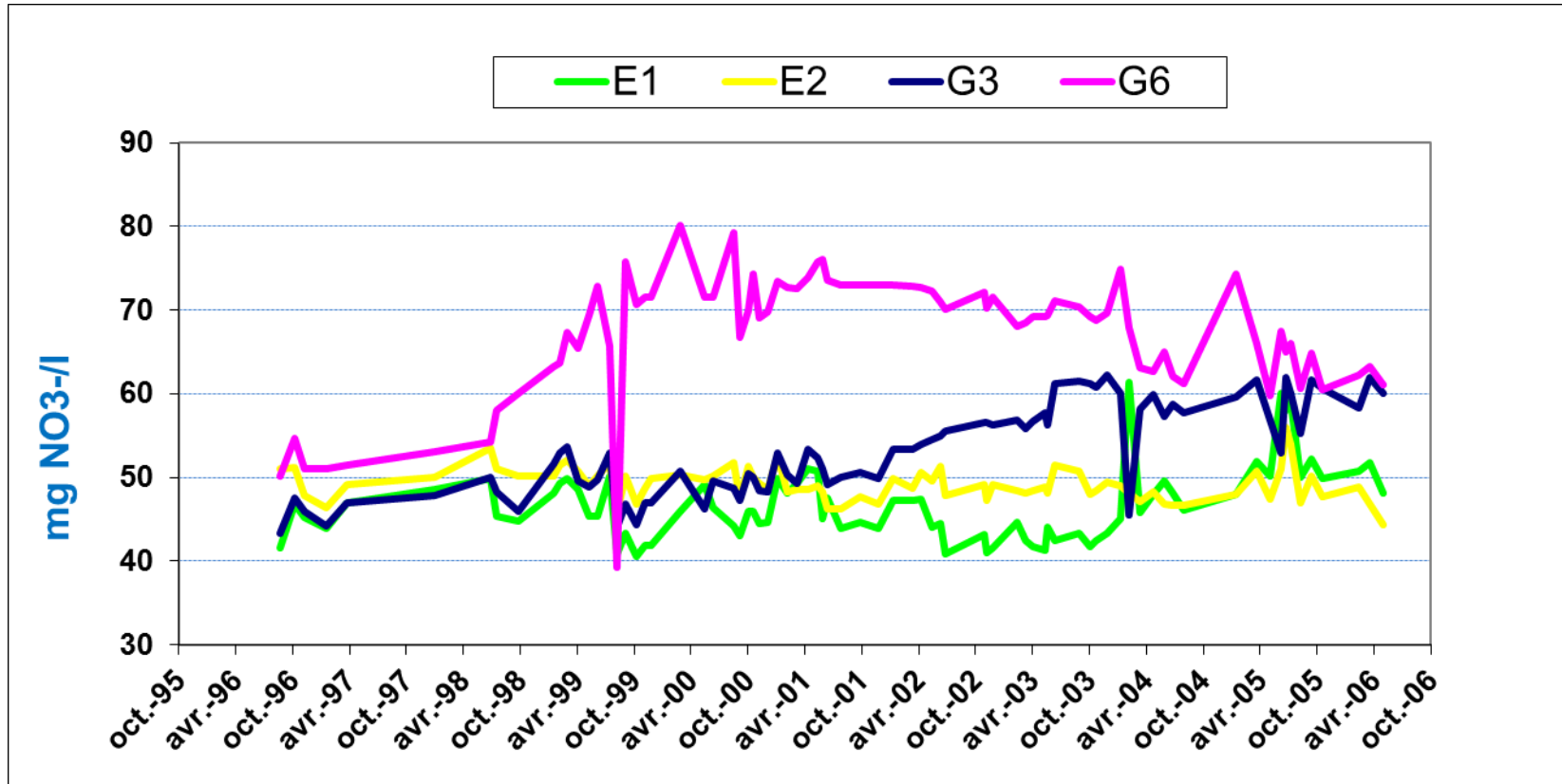
# Introduction

## The water catchment of Arquennes



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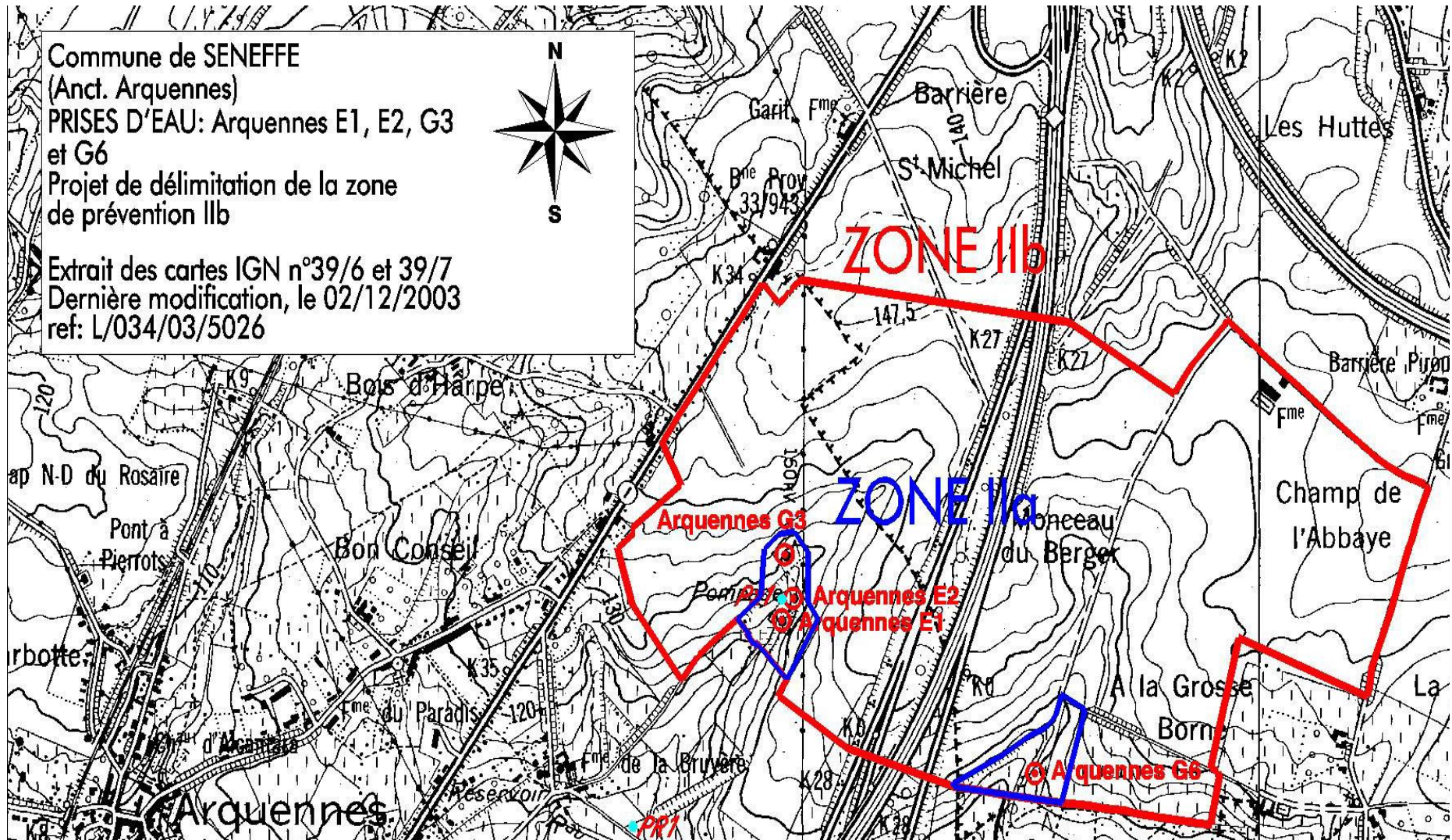
## The water catchment of Arquennes





# Introduction

## The water catchment of Arquennes

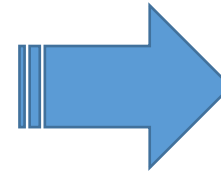


# 1st stage : understanding and advise

2004 - 2010

## Multidisciplinary Partnership

- Agricultural advisors
- Scientists
- Water producer



PROTECT'eau



Gembloux Agro-Bio Tech  
Université de Liège

**AQUALE** sprl  
ECOFOX Développement



## Objectives

- To advise the farmers for application of the PGDA (the Nitrate Directive in the Walloon region)
- To assess the effects of PGDA on water quality
- If needed to propose solutions.





# 1<sup>st</sup> stage : understanding and advise

## Advise part

### Subjects

- Soil linkage ratio and transfer of manure between farms
  - Amount of N-manure produced by the farm
  - Maximum amount of N-manure spreadable
- Catch crops
- Manure storage capacities
- N fertilization
- Soil nitrogen residue (APL in french)



# 1<sup>st</sup> stage : understanding and advise

## Scientific part

### Objectives

- To assess the PGDA (Walloon implementation of the Nitrate Directive)
- If needed, to propose solutions

### Tool : modelling

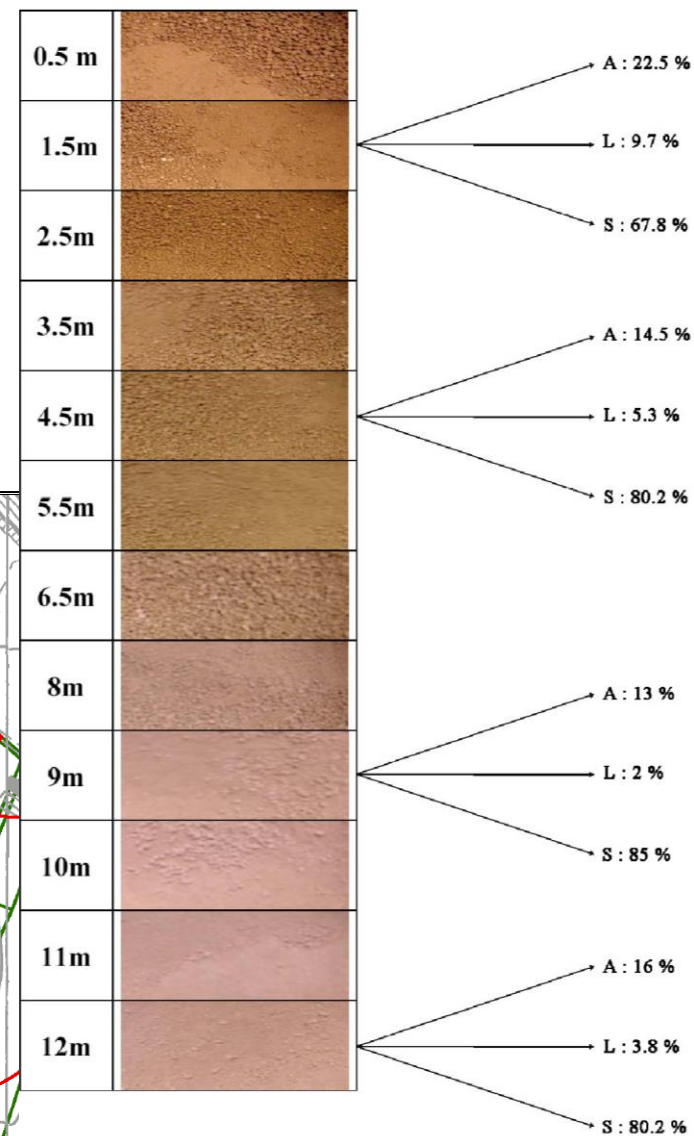
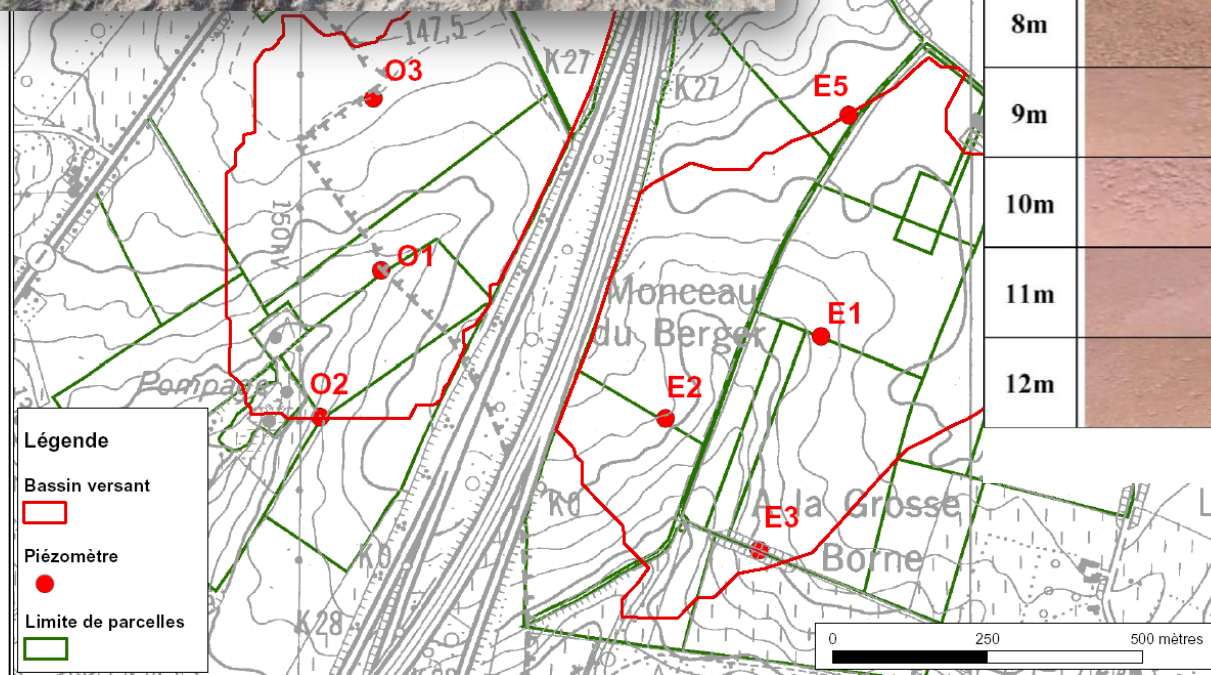
- → characterisation of the water catchment (calibration)
- → experimentation (validation)





# 1<sup>st</sup> stage : understanding and advise

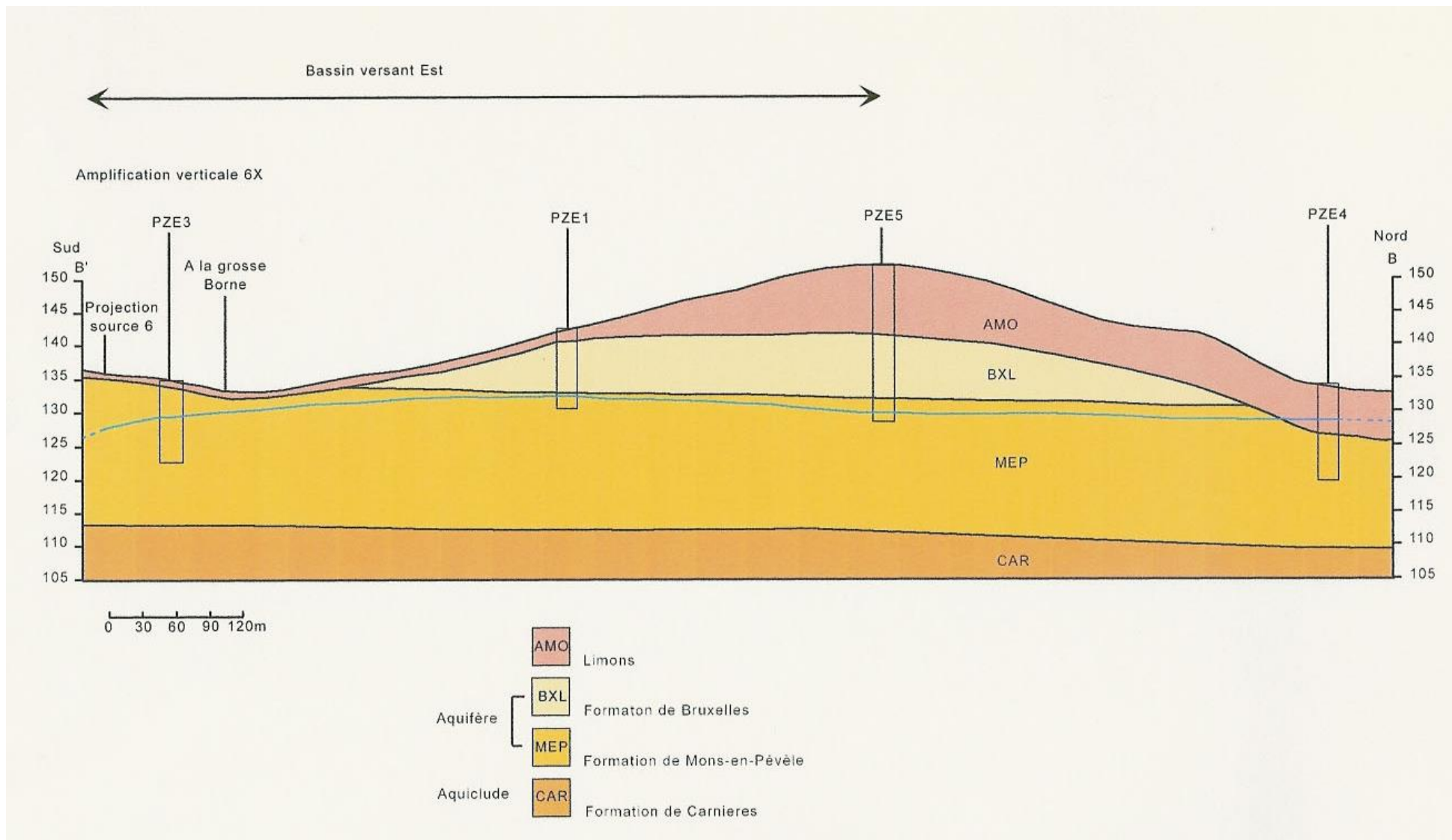
## Scientific part





# 1<sup>st</sup> stage : understanding and advise

## Scientific part

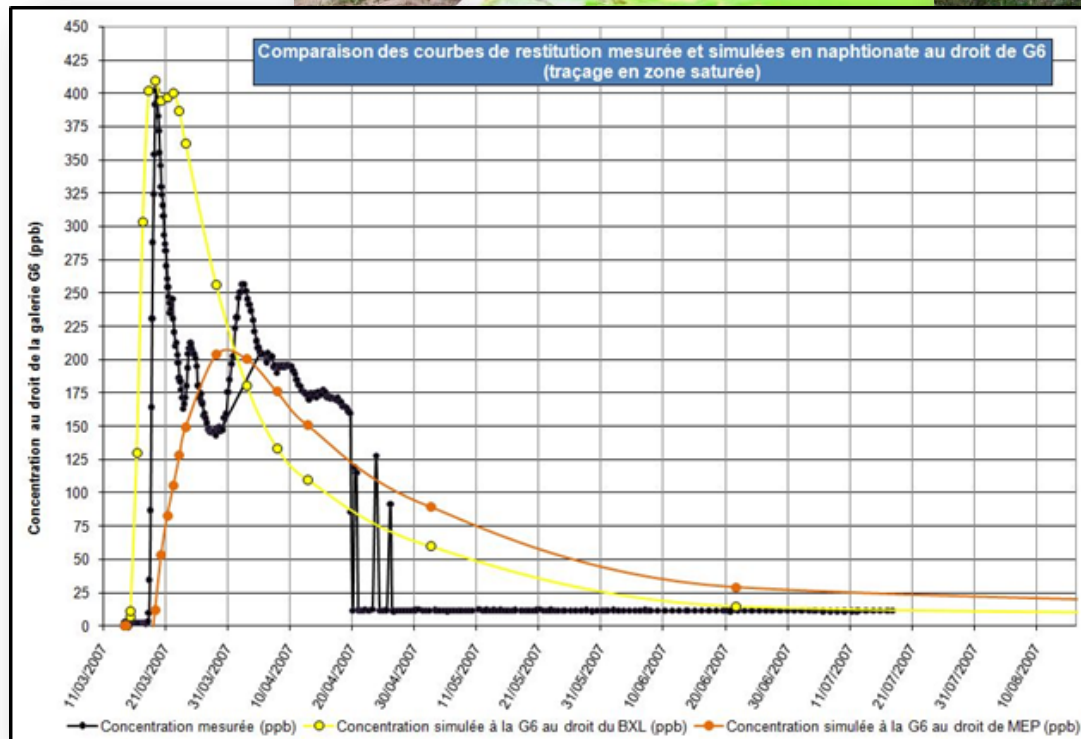


# 1<sup>st</sup> stage : understanding and advise

## Scientific part

### Evaluation of the nitrate flows

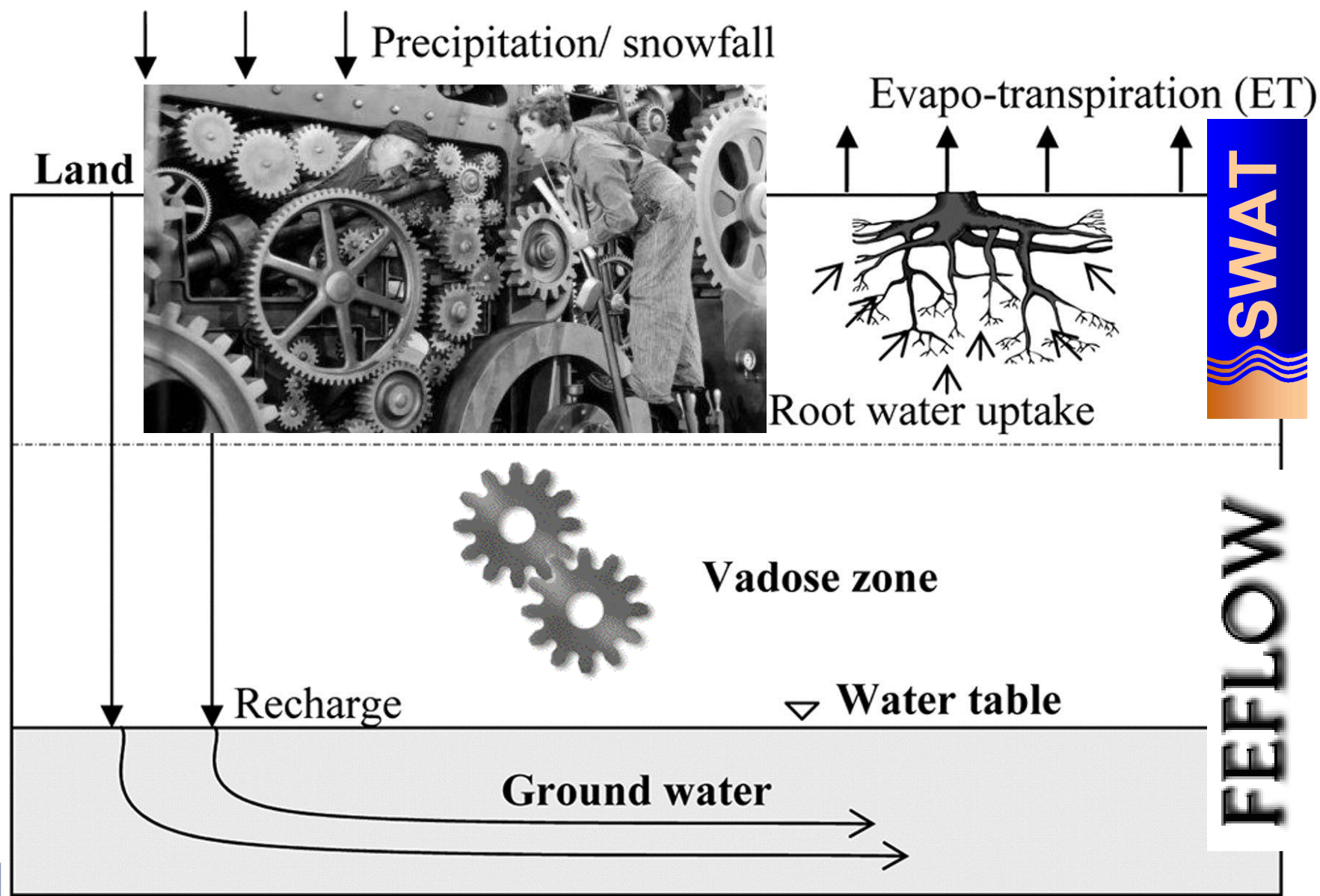
- Vadose zone
- Saturated zone





# 1<sup>st</sup> stage : understanding and advise

## Scientific part





# 2<sup>nd</sup> stage : follow-up

## 2011 - ...

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### Objectives :

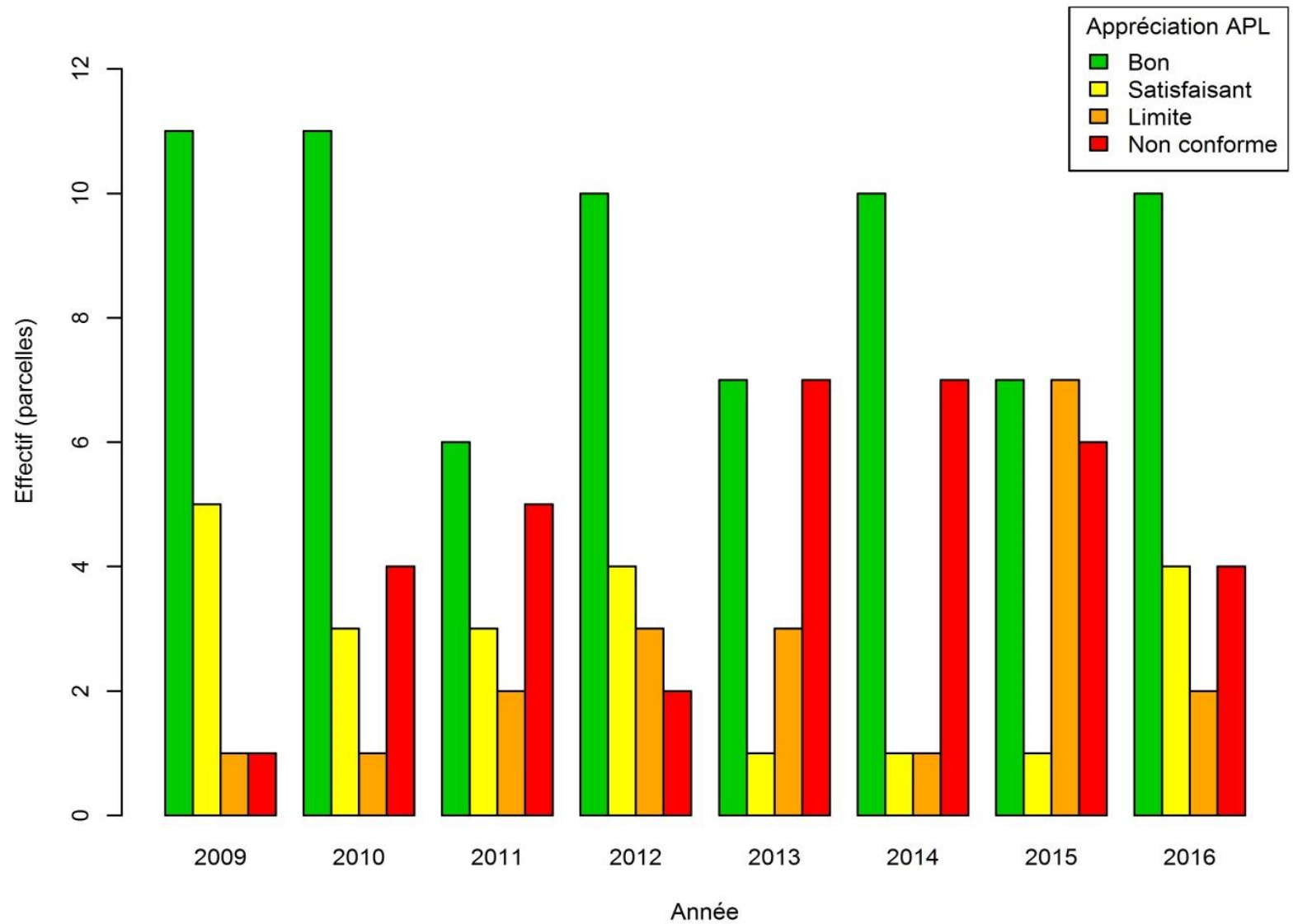
- Agricultural practices after the “advise period” ?
- Trend of the water quality ?
- Relation between soil nitrogen residue (APL) and nitrate concentration of the water ?



# 2<sup>nd</sup> stage : follow-up

## Agricultural practices?

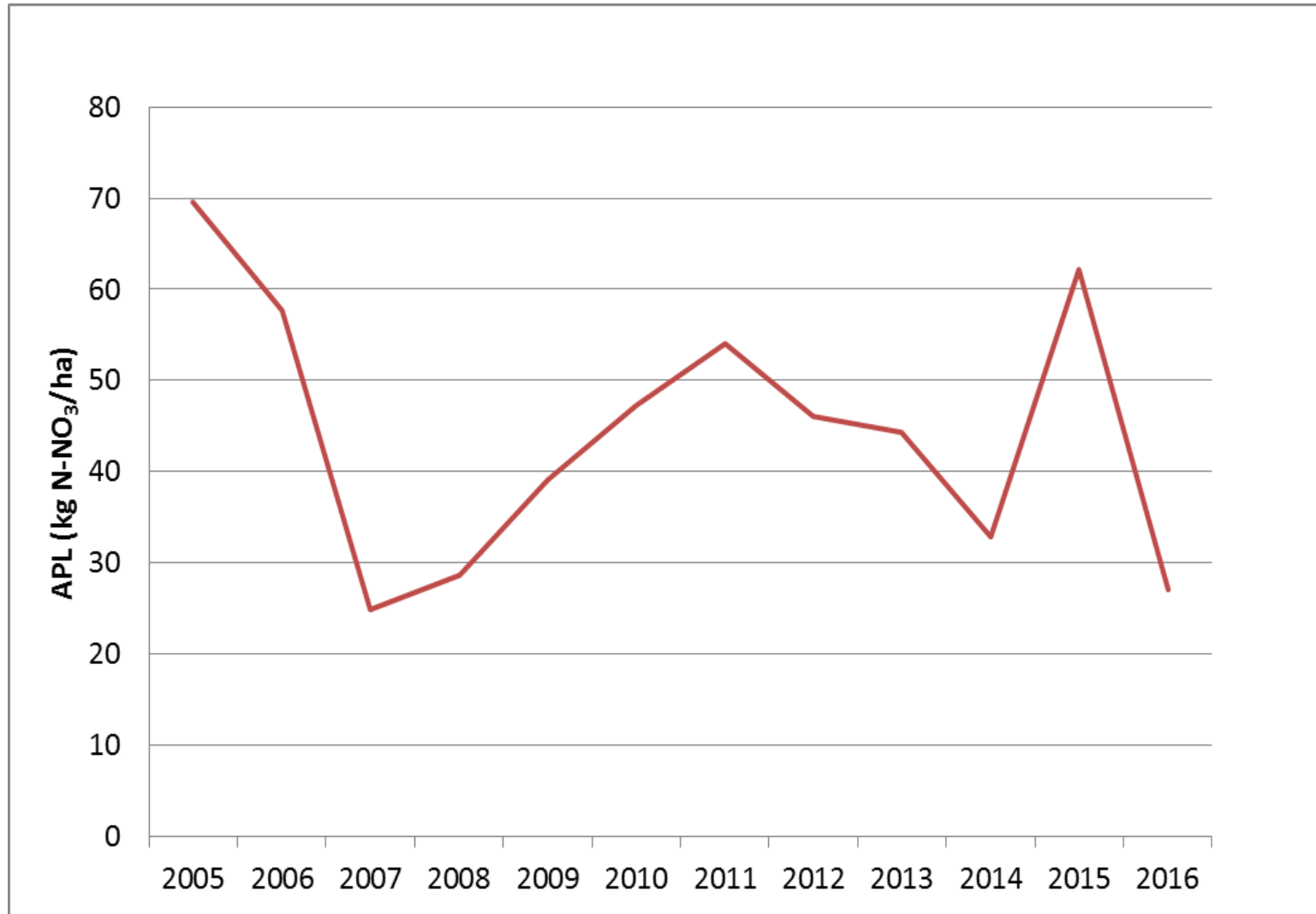
- Yearly soil sampling of all the parcels of the water catchment
  - Comparison to references
- ➔ Assessment of the nitrogen management



# 2<sup>nd</sup> stage : follow-up

## APL – water quality

Mean Soil nitrogen residue (APL) at water catchment scale

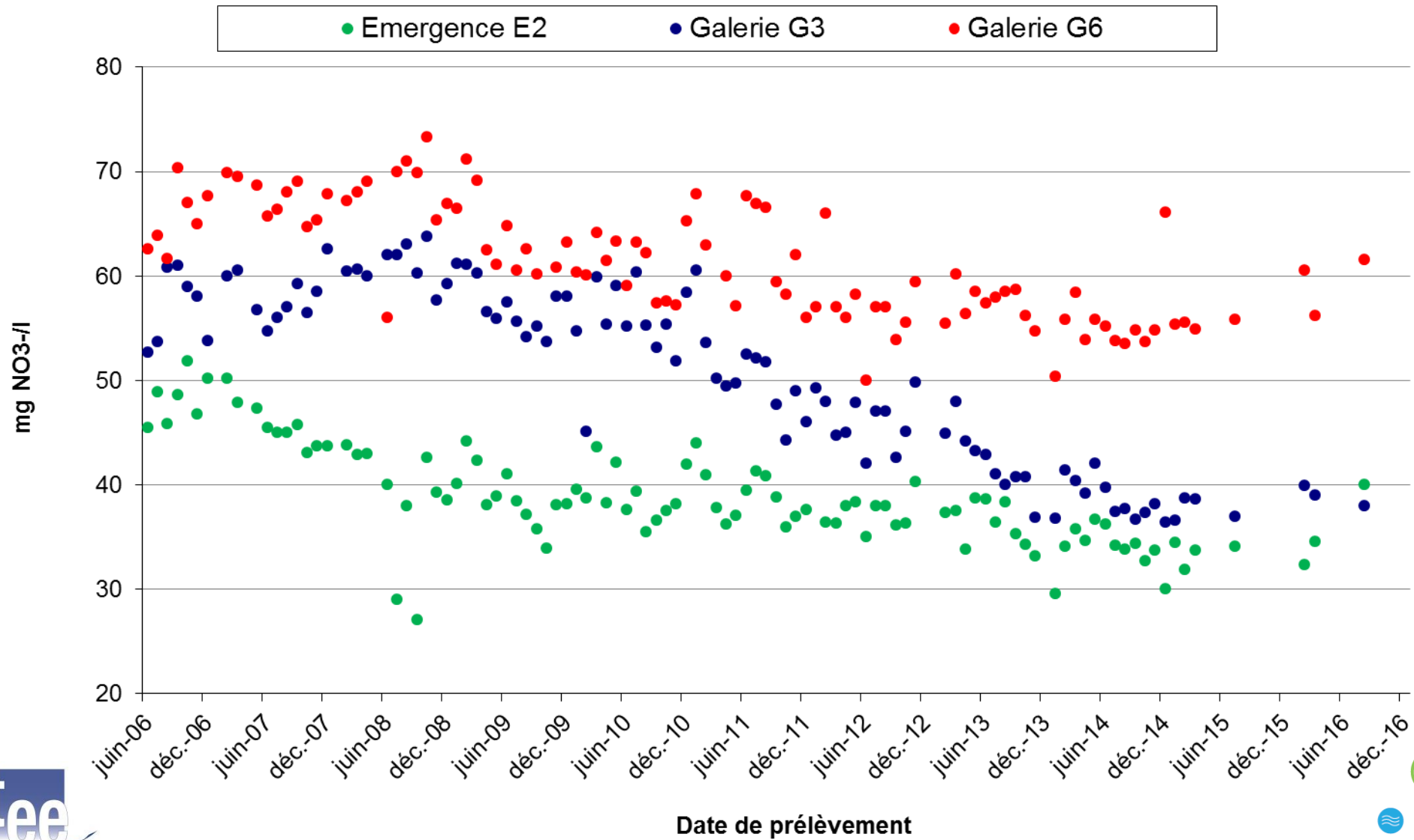




# 2<sup>nd</sup> stage : follow-up

## APL – water quality

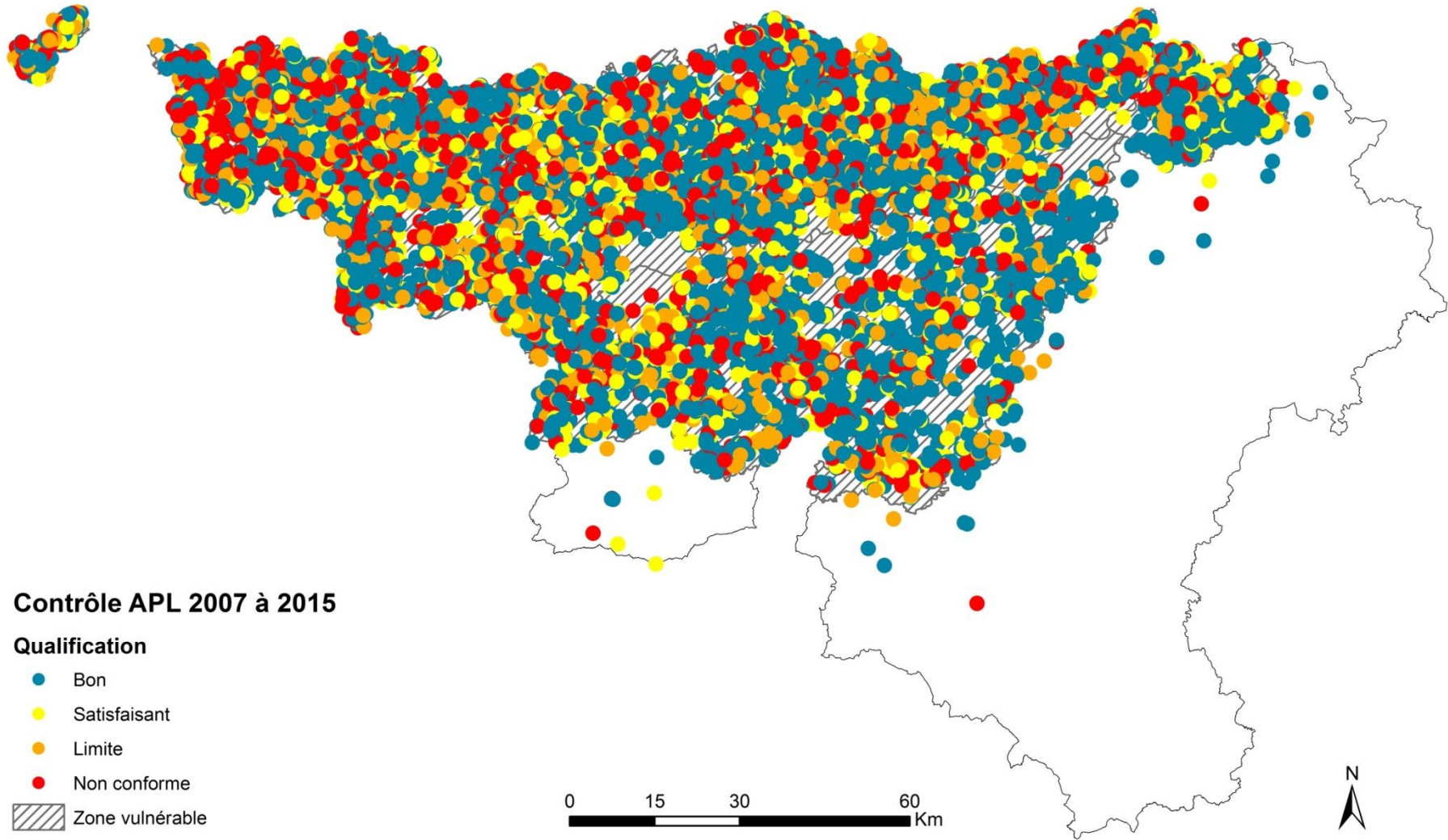
### Trend of the nitrate concentration in the groundwater



# At nitrate vulnerable zone scale

## APL – water quality

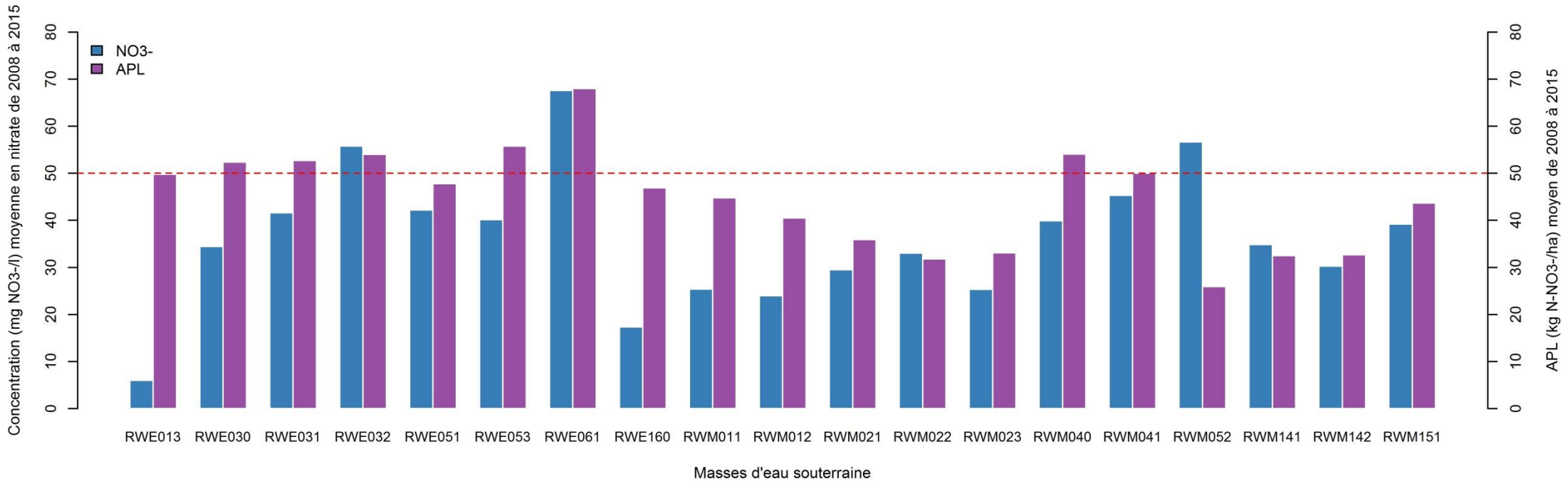
### APL controls in the nitrate vulnerable zone



# At nitrate vulnerable zone scale

## APL – water quality

### Mean APL by groundwater body





# Improvement of the water quality in the water catchment of Arquennes

## Results after 12 years of actions and follow-up

### Conclusions

- Good acceptance of agricultural advisors
- PGDA applied → Sufficient water quality
- APL : indicator related to water quality



# Improvement of the water quality in the water catchment of Arquennes

Results after 12 years of actions and follow-up

on fèl mèrcî di m'awè bin choûté !

