

# Multi-stakeholder design to change water quality at catchment level

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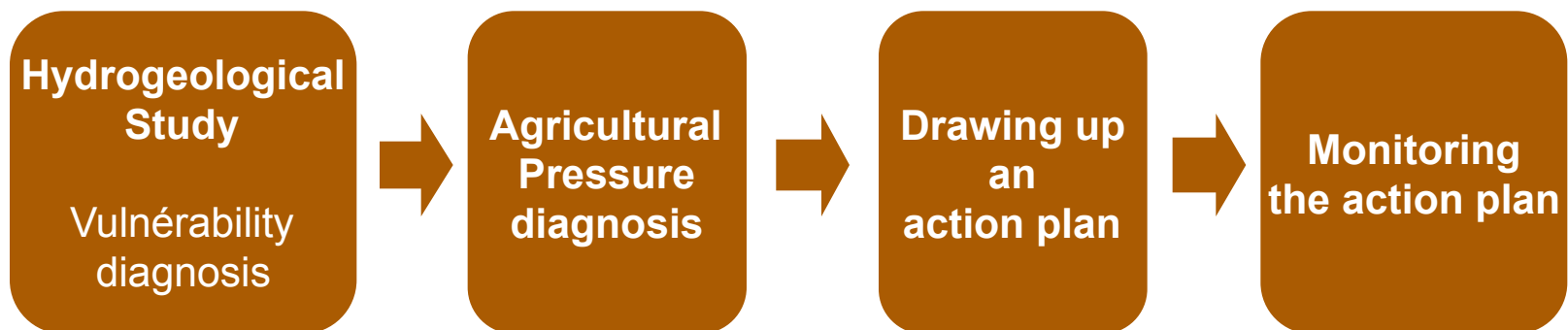




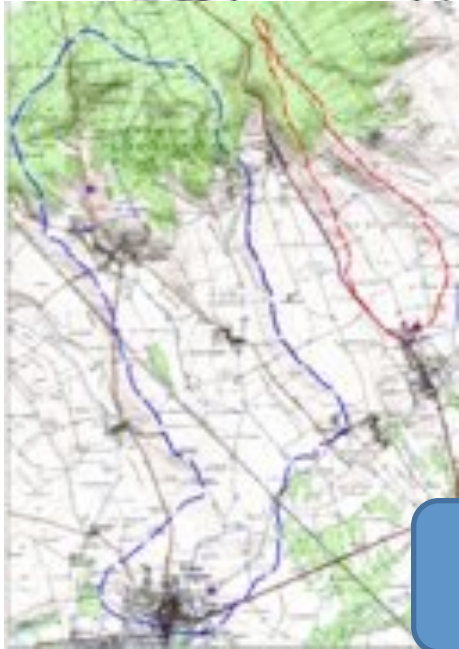
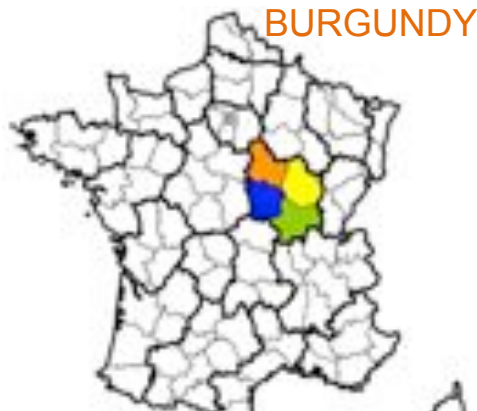
# Quality of drinking water from catchment areas

## Inventory of the french situation

- Between 1998 and 2008, 1958 catchments were abandoned because of quality problems, 878 of them due to pollution from agricultural sources (SE Santé, 2012).
  - Tomorrow, water quality must be improved in 2500 catchments (Water Framework Directive)
- A failure of advices based on diffusion of single agricultural good practices. Need for change of the agricultural systems, thinking out of the box, and need for change of the organisation of the projects



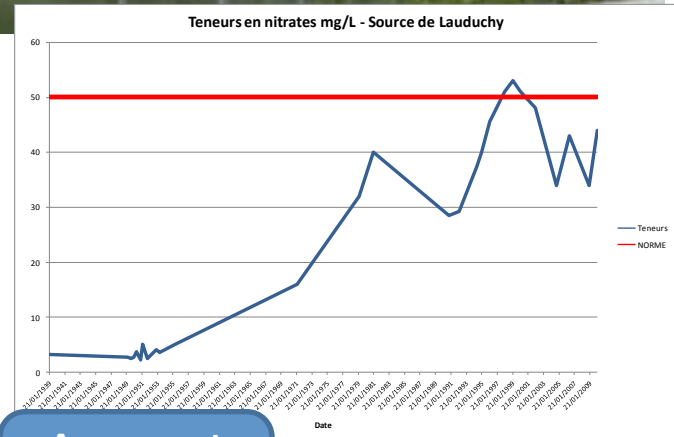
BURGUNDY



# Groundwater catchment area of Briennon (89)

A nitrate problem  
Agricultural area : 1700 ha

Main crop.system : **OSR-W Wheat – W Barley**



Agricultural pressure  
**DIAGNOSIS**

Choice of the water quality target

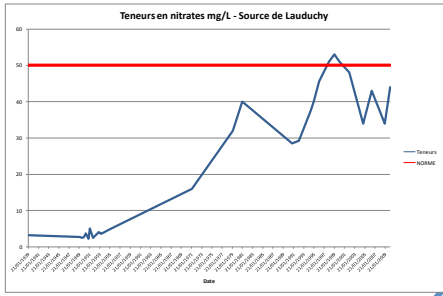
Agreement on the Action plan



**DESIGN WORKSHOP**

First Potentially leachable soil Nitrogen

**START**



Groundwater catchment area of Briennon (89)

6. **Discussing the proposal** and adopting the action plan

7. **Annual monitoring** of the action plan

Interviews of water drinkers and other local stakeholders



**Steering Committee**



0. Analysis of **stakeholders' demands et expectations**

1. Choosing the **target**

5. **Drafting an action plan** after a democratic vote between local farmers (23)

2. Gathering and exchanging knowledges: **diagnosis, inventory**

**Local Farmers**  
(8, then 23)



4. Assessing the **farmers' supply / stakeholders' s demands**

3. Designing **cropping systems**





Choosing the target  
Creating a vision

Drafting  
an action plan

Annual monitoring  
and evaluation

## Creating and sharing a vision of the water quality

### « Shift in thinking » into the Steering Committee

- A future for mid and long term
- Criteria : nitrate concentration ...
- **Negotiation of thresholds** : Nitrate 37 mg/l ...

### « Shifting of thinking » among the farmers

- **Negotiation of agricultural thresholds**  
Nitrate losses < 30 kg N/ha, Indigo Iphy > 8  
Involving all the agricultural area + all the farmers
- **Gathering and exchanging knowledges**  
Complex links between practices and water quality  
Water friendly practices of actual cropping systems

## Thinking out of the box : *de novo* design

*(Meynard, Bos et Dedieu., 2012)*

**Who** : 8 farmers + 3 agronomists

**4 steps from nov. to dec. 2011**

1. Diagnosis of the actual cropping systems into the area
2. Proposal of innovative cropping systems (**farmers**)
3. Ex ante assessment of sustainability (**agronomists**)
4. Tuning and improvement of the innovative cropping systems

**Output** : new cropping systems

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# Interactive conception (C)

Managing  
nitrogen (N) ?

**IN ORDER**  
to deal with N  
alimentation

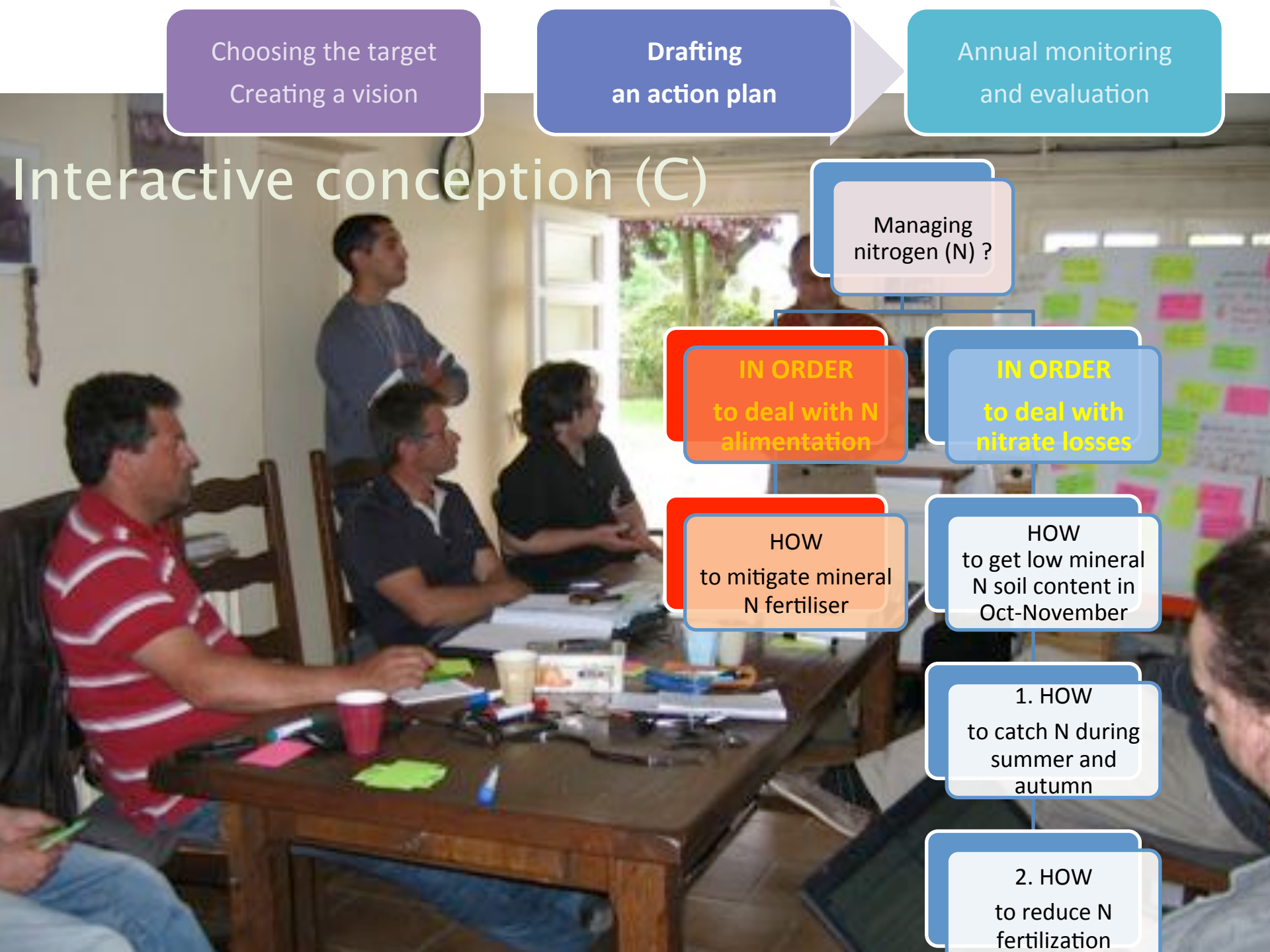
**IN ORDER**  
to deal with  
nitrate losses

**HOW**  
to mitigate mineral  
N fertiliser

**HOW**  
to get low mineral  
N soil content in  
Oct-November

1. **HOW**  
to catch N during  
summer and  
autumn

2. **HOW**  
to reduce N  
fertilization



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## Designing cropping systems with local farmers Choosing a scenario able to reach the target

### **De novo design of 24 different cropping systems, before their assessment**

- Need for forgoing the actual cropping system
- *De novo design and assessment of ambitious cropping systems*
- Tuning a generic cropping system to different farms

### **An timetable of practices' changes open to future developments**

Output : spatio-temporal scenarios for the area

### **Presentation of the project to 23 local farmers**

Vote : 22 YES/23 , 1 NO/23

Diversifying the crop sequences,  
Performing successful catch  
crops





Choosing the target  
Creating a vision

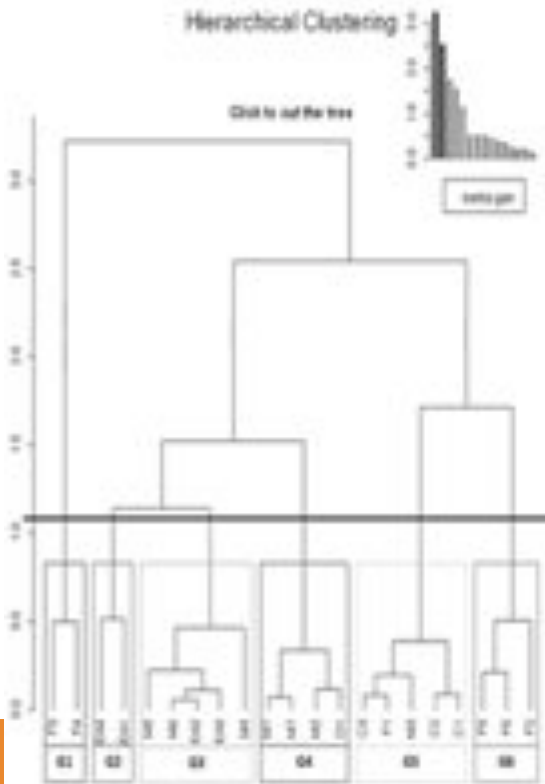
Drafting  
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and evaluation

# How farmers' supply could satisfy the stakeholders' demand ?

An original method to share sustainability's visions  
enabling tensions among stakeholders to be eased

## Ex ante assessment of 6 groups of stakeholders' satisfaction



GROUP Crop. systems	N° 5	N° 1	N° 6	N° 4	N° 3	N° 2
Actual 0	++	++	++	+	+	+
Actual 1	++	++	++	+	+	+
B1 S.Barley	++	++	++	+	+	+
B2 S.Barley	++	++	++	+	+	+
B1 S.Pea	++	++	++	++	++	++
B2 S.Pea	++	++	++	++	++	++
B1 Sunflower	++	++	++	++	++	++
B2 Sunflower	++	++	++	++	++	++

# First socio-technical innovation's results

one year after beginning of the action plan

## First success

- A first societal anchorage with stakeholders' demand analysis
- Learning activity with farmers
- Farmers' vote : YES 22/23
- Agreement of the Steering Committee
- High increase of the catch crops realisation and success (50% with volunteers after OSR)
- Dynamic reflexive activity of field analysis of Potentially Leachable Nitrogen

# CONCLUSION

## Strengths

- Learning through interaction between people is useful for acquisition of knowledge, knowhow and skill (Brunet, 1994)
- Knowledge (K) is useful to define step by step unknown objects (Concept C) (Hatchuel, Le masson, Weill, 2012) inside the **design activity**
- Co-design of scenarios based on **local stakeholders** rather than their representatives, through a territorial dialogue
- An original method in order to realize **multicriteria and multiactor assessment** enabling tensions to be eased (Ravier at al., accepted)

## Weaknesses

- How to work in a larger area ?
- What to do, when the sustainability performances of the farmers' proposals are not sufficient : new co-design, or system generation or optimisation ?
- Lack of knowledges, uncertainty about pesticides impacts
- Need for new competencies & skills among the territory managers

*Thank you  
for your attention !*