

A scientific project funded by the **French National Research Agency (ANR)** within the frame of the « **Agriculture and Sustainable Development** » Program

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### Rationale

**Water scarcity and water pollution questions the sustainability of present uses of water resources.**

- in rural areas, agriculture is the main user of water and land resources
- links between agrosystems and water resources are to be considered at a regional scale
- sustainable development implies multi-criteria and participative evaluations

**Spatial Water Management** (Narcy and Mermet, 2003) & **Integrated Catchment Management** (Gorredale, 1992)

- aim at considering jointly land and water management at a regional scale
- promote the use of models and scenarios to support decisions for allocating water and land between all users

### Objective of the project:

Developing **tools and methods** based on **mathematical modelling** to evaluate **scenarios** for a better **planning of both agricultural activities and water resources**.

### Organisation of the project

#### 3 kinds of activities &

- building scenarios
- developing models
- evaluating scenarios

#### 2 approaches

- participative
- with targeted partners

#### 3 work packages

##### WP1

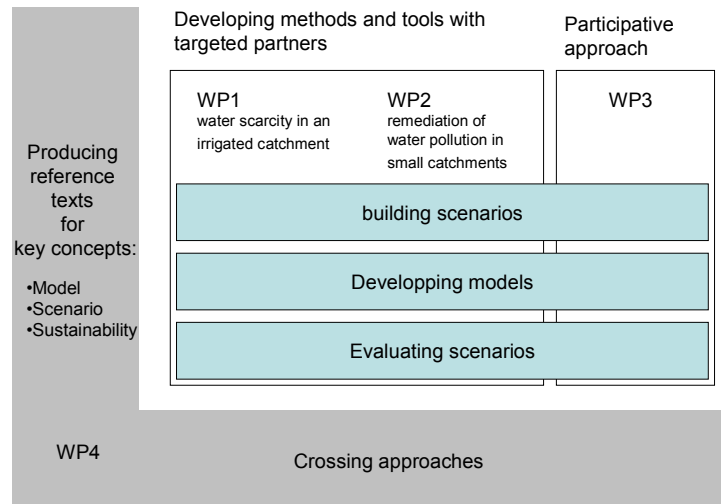
**Problem:** water scarcity  
**Area:** south-western France (Neste System)  
**Objective:** Modelling water allocation between uses

##### WP2

**Problem:** diffuse pollution of surface water (nitrate & pesticides)  
**Area:** Brittany (France)  
**Objective:** Assessing impact of agrosystems on water pollution

##### WP3

**Problems:** water scarcity and water pollution  
**Areas:** South-western and South-eastern France  
**Objective:** Developing a participative approach for building integrated models adapted to evaluate scenarios emerging from collective organisations



#### + 1 work package (WP4)

- handling common methodological problems
- crossing approaches

### First results

#### 1. Models

- A conceptual **model for water allocation** between uses : MOGIRE (☞ [Reynaud and Leenhardt](#) - this conference)  
 → it integrates : models in agronomy and economy; all water uses (agricultural, domestic, industrial, environmental)
- Two models to study the **effect of landscape structure and agricultural management practices on water quality**: TNT2 for nitrate, SACADEAU for pesticides; TNT2 has been validated in Brittany and used to compare scenarios ([Salmon-Monviola et al., 2008](#)) It is modified to extend its application domain to south-western France

#### 2. Scenarios

The word "scenario" is extensively used. For us, a scenario is a set of (biophysical or agro-economical) model input data.

**Agricultural scenarios** are descriptions of land use, including management techniques.

- We study the use of remote-sensing techniques for improving the construction of scenarios
- We develop a method for building and evaluating scenarios proposed by stakeholders ([Clavel and Leenhardt, 2008](#))
- We study artificial intelligence methods to improve the usability of scenario results by stakeholders

To build **economic scenarios**, we are developing a new pricing device (☞ [Terreaux and Tidball](#) - this conference)

#### 3. Interaction with stakeholders

- Methods and techniques for improving interaction with stakeholders are studied
- A whole participative approach is currently implemented (☞ [Le Grusse et al.; Gonzalès-Camacho et al.,](#) - this conf.)