


1- Introduction

Context
 Development of large scale distributed hydrological modelling (*J2000*) integrating representations of agricultural uses of water.
 Requirement of spatialised data on **irrigation**, **farm dams** and **water abstraction origin**.

Challenges
 Spatialised data are imperfect, with various issues:
 Availability -- Partial nature of data -- Lack of documentation -- Varying or overly coarse resolutions.

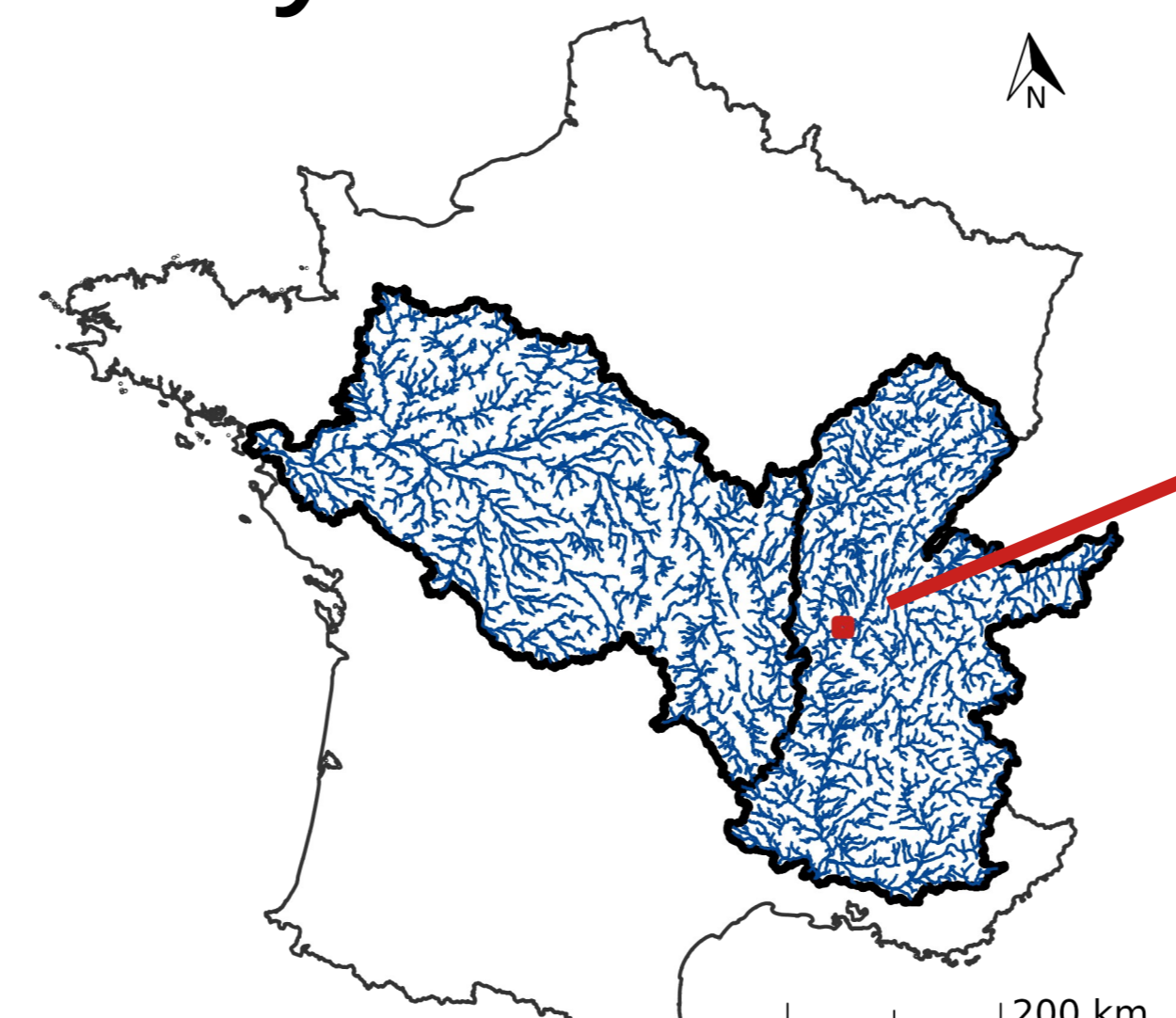
How to exploit these imperfect databases and to optimise the representation of the territories heterogeneity for hydrological modelling ?

Objectives
 To develop a methodology to parameterise irrigation and farm dams in a distributed hydrological model and evaluate the model with observed abstracted volumes for irrigation.

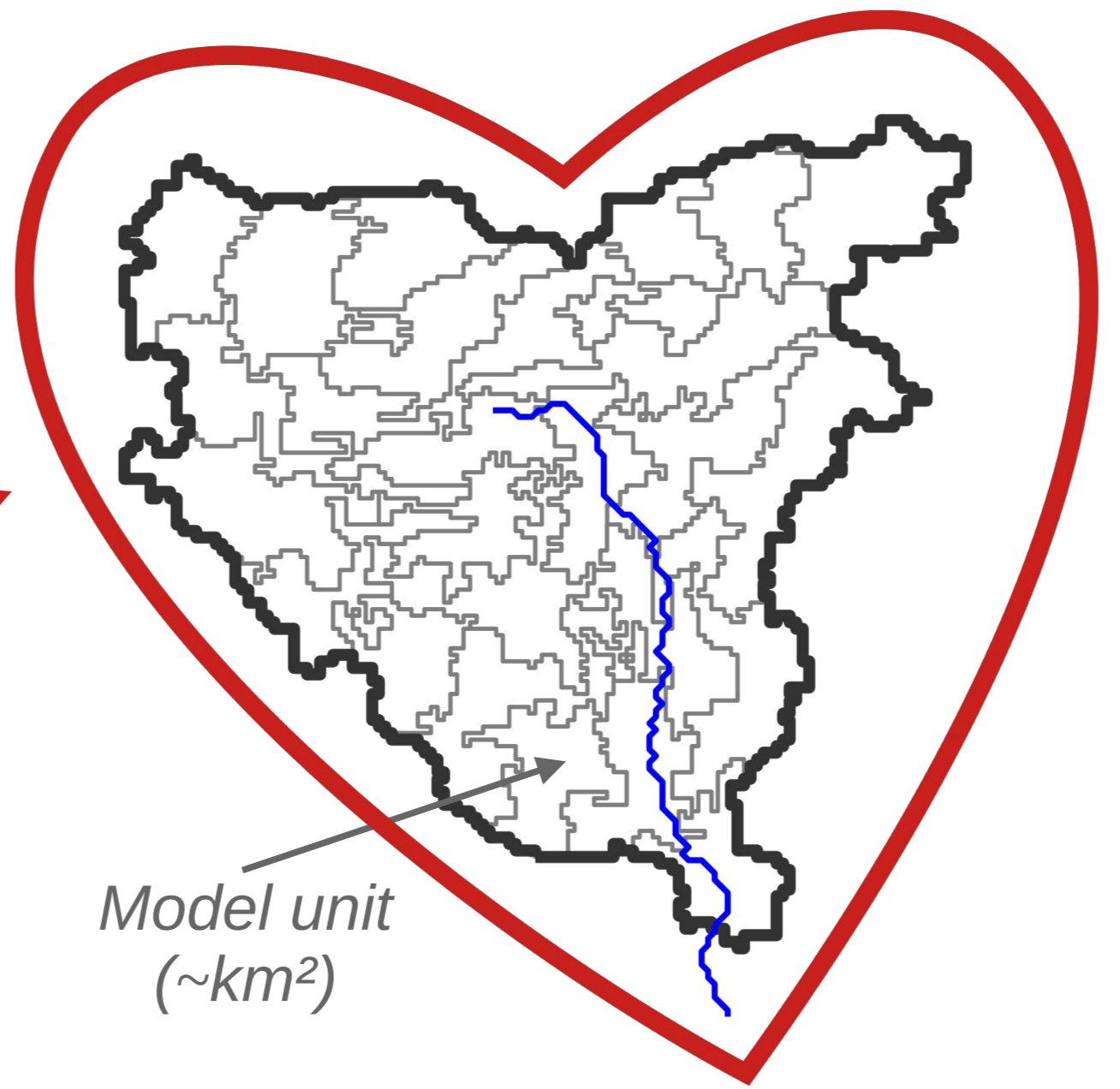


Landscape (A.-L. Borgna, 2026)

2- Study area



Loire & Rhône catchments (FRANCE) modelled in *J2000*



Zoom on a Rhône sub-catchment (88 km²)

Model unit (~km²)

4- Farm dams

Data
National water bodies inventory

How to **make use and integrate** farm dams data in the model units ?

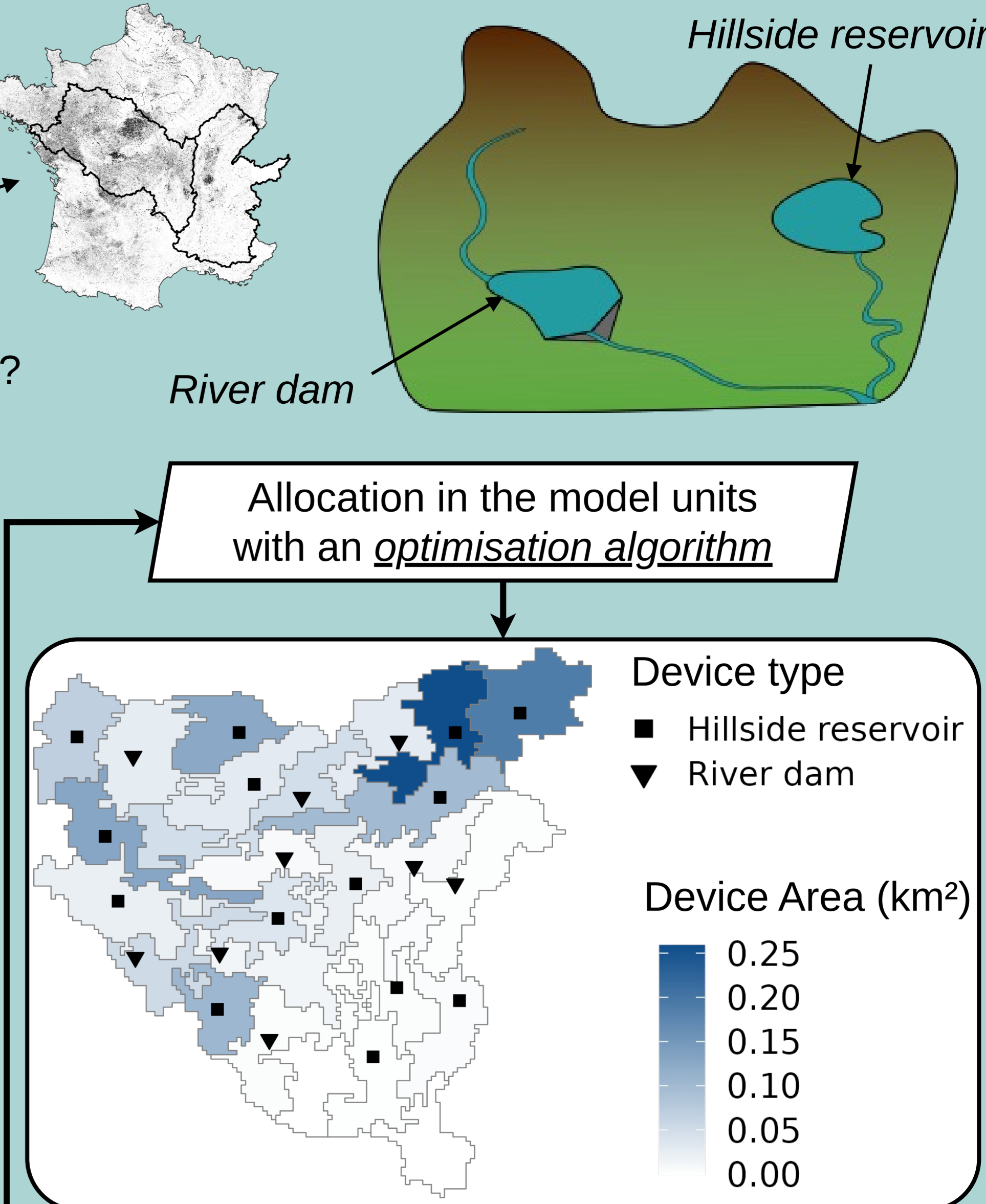
Selection of water bodies used for agriculture or available for agriculture purposes

Allocation in the model units with an *optimisation algorithm*

Classification into two categories based on the distance of water bodies to the river :

Hillside reservoir & River dam

Aggregation by sub-catchment



Distribution of farm dams in J2000

Device type
 ■ Hillside reservoir
 ▼ River dam

Device Area (km²)
 0.25
0.20
0.15
0.10
0.05
0.00

3- Irrigation

Data
Agriculture census (2010, 2020) at different spatial resolution.

The data published online are available at the level of **spatial entities (SE)** of varying sizes (in order to protect statistical confidentiality). In our case, these are administrative areas.

How to **make use and integrate** irrigation data in the model units ?

Available Data

Cultivated areas - +
 Irrigated areas - +
 Total irrigated areas - +

Crops classification & database creation

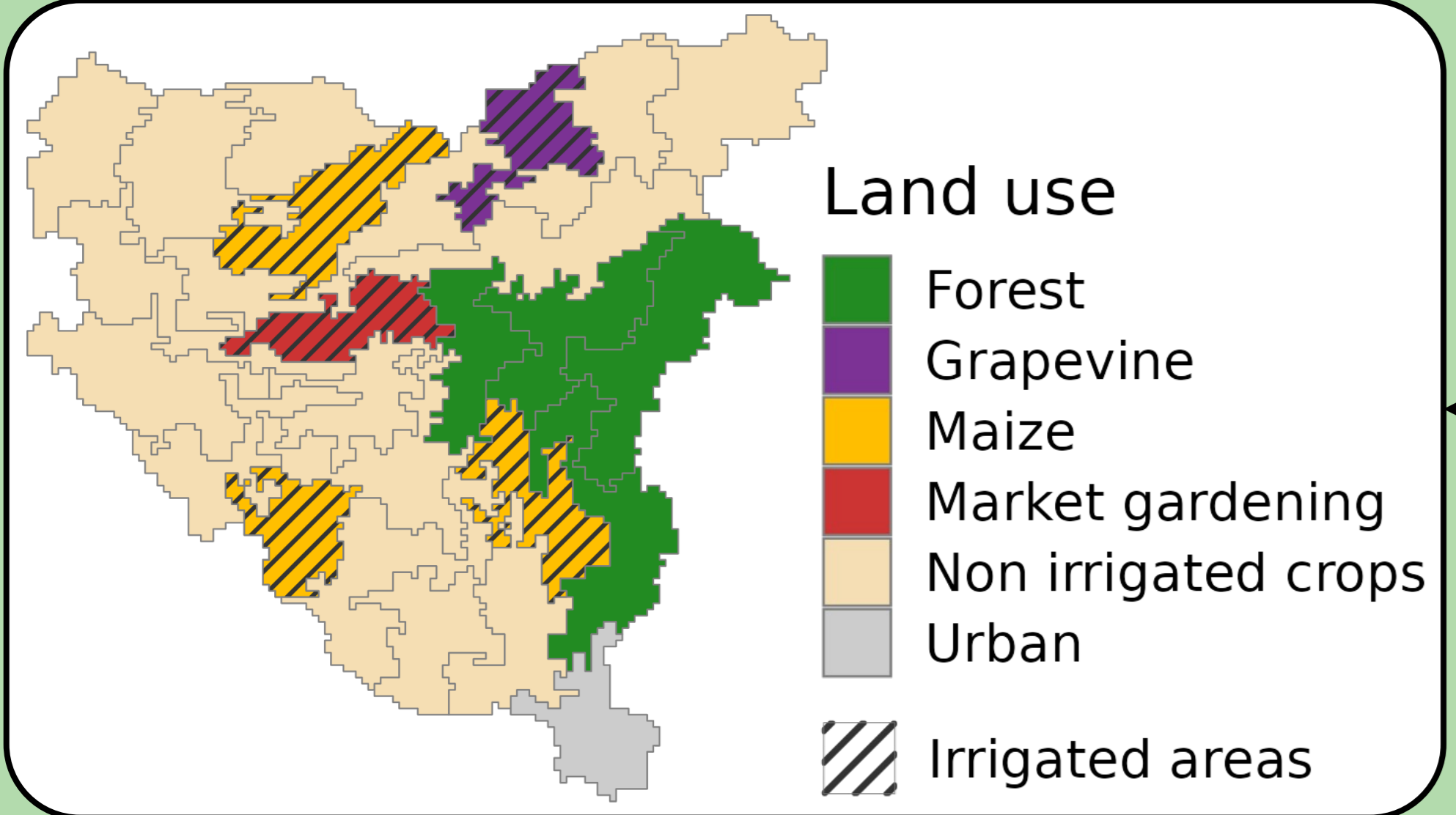
SE2 irrigated areas reconstruction

Reconstructed data

Allocation of irrigated areas in the model units with an *optimisation algorithm*

A **combinatorial problem** with multiple constraints that is equifinal

Distribution of irrigated areas in J2000

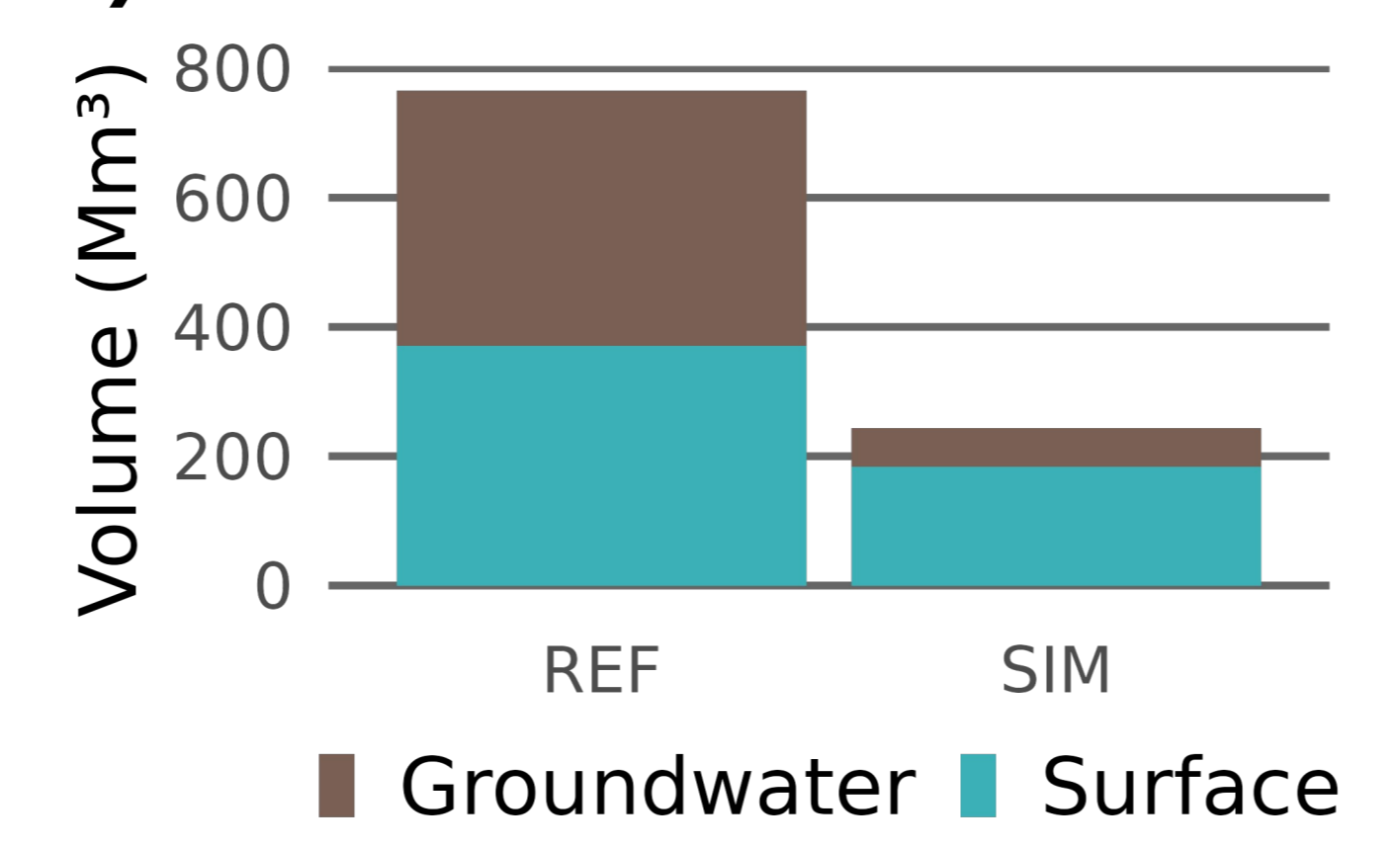


Land use
 Forest
 Grapevine
 Maize
 Market gardening
 Non irrigated crops
 Urban
 Irrigated areas

6- Model evaluation with observed data

Data
National Water abstraction database: annual abstracted volumes during 2012-2018 period, consider as reference (REF).

a) Absolute extracted volumes

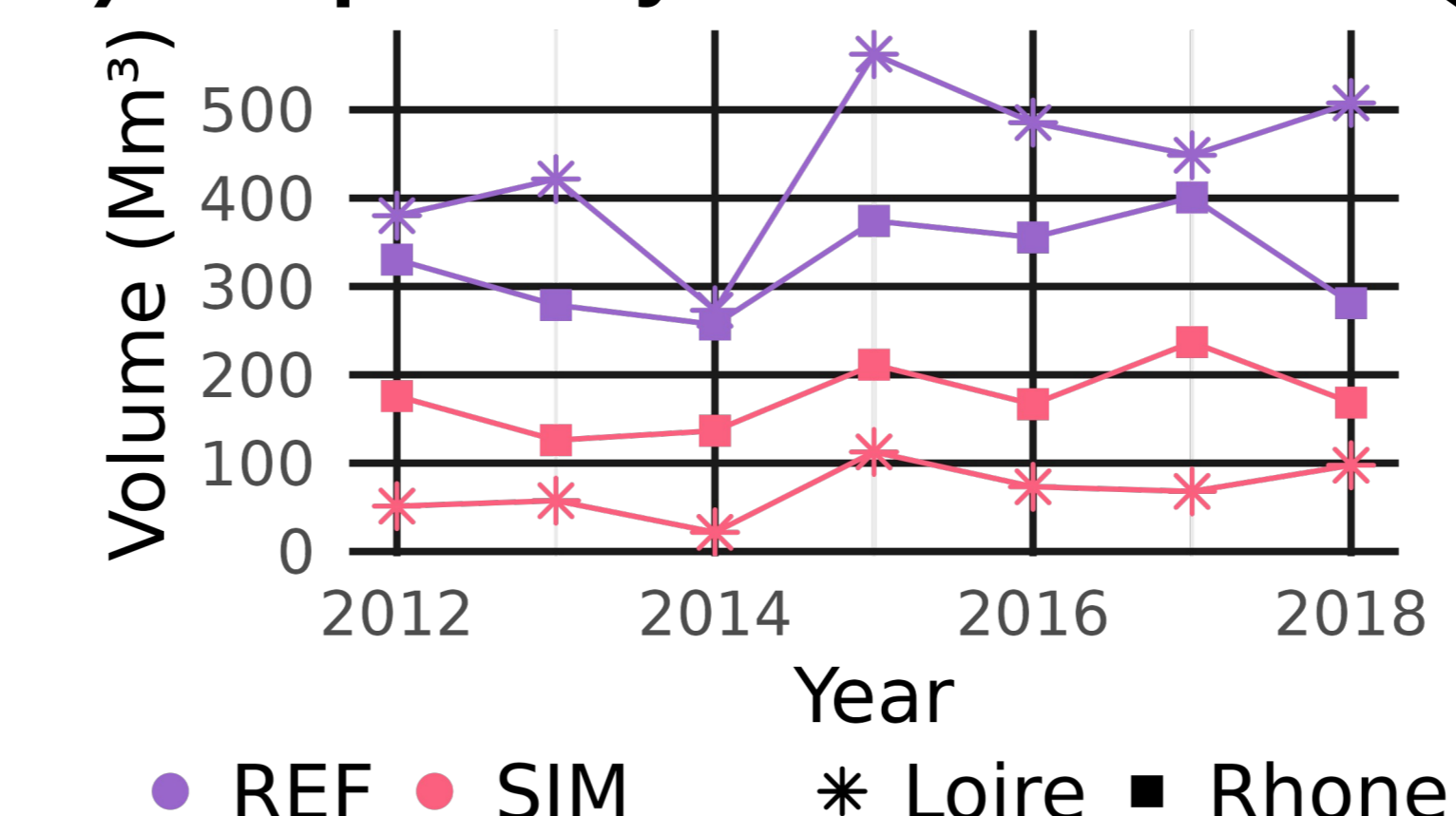


Volume (Mm³)

REF SIM

■ Groundwater ■ Surface

b) Temporal dynamic

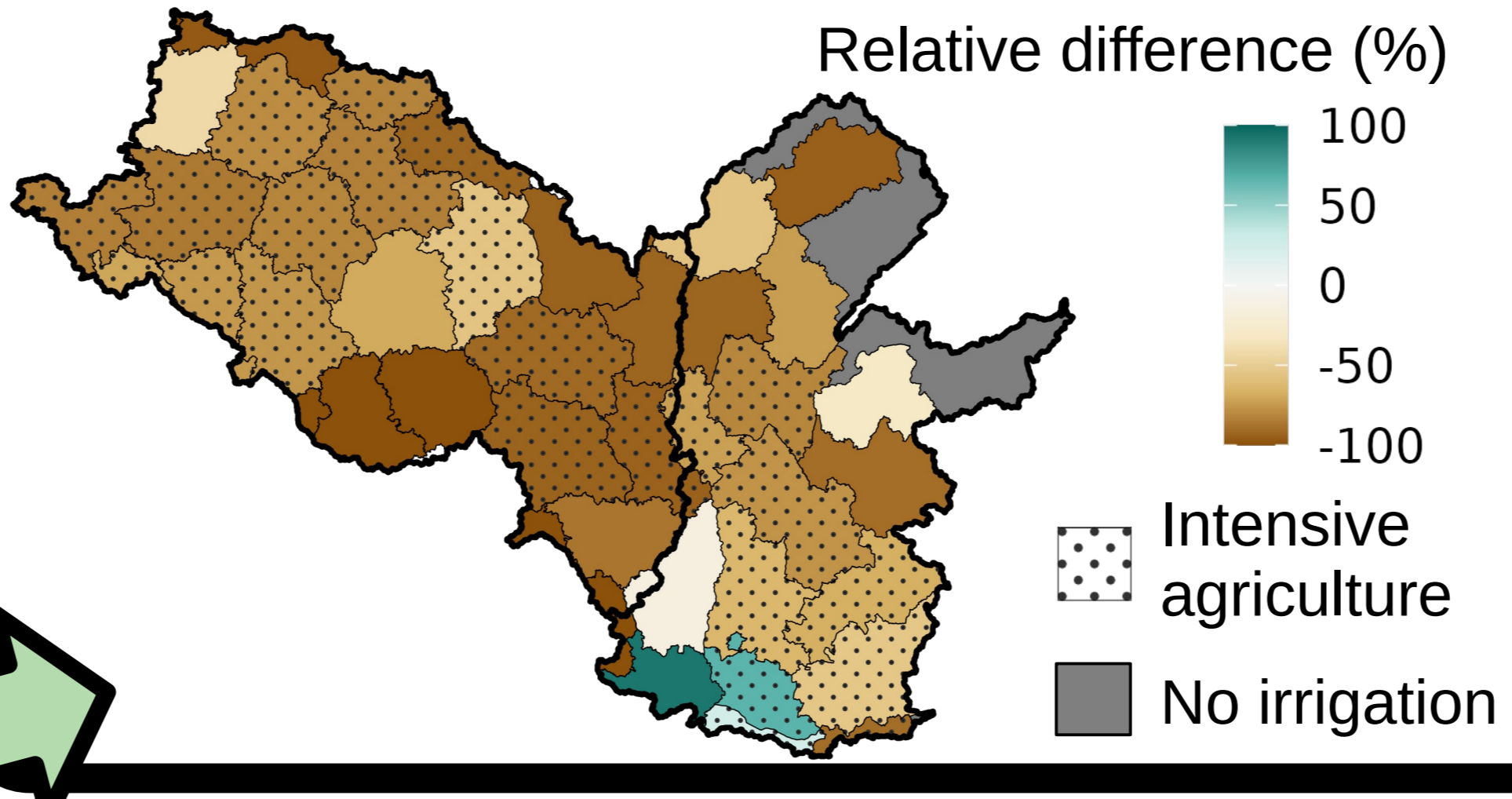


Volume (Mm³)

Year

● REF ● SIM * Loire ■ Rhone

c) Spatial distribution at SE1 resolution



Relative difference (%)

100
50
0
-50
-100

Intensive agriculture
 No irrigation

a) Challenges associated with groundwater extraction
b) Accurate representation of abstraction trends during dry and wet years
c) Water abstraction is well distributed across the study area

5- Water abstraction origin

Data
Agriculture census (2020) at SE1 resolution.

Water abstraction origin data are classified into 4 categories:
 River -- Groundwater -- Farm dam -- Multiple sources

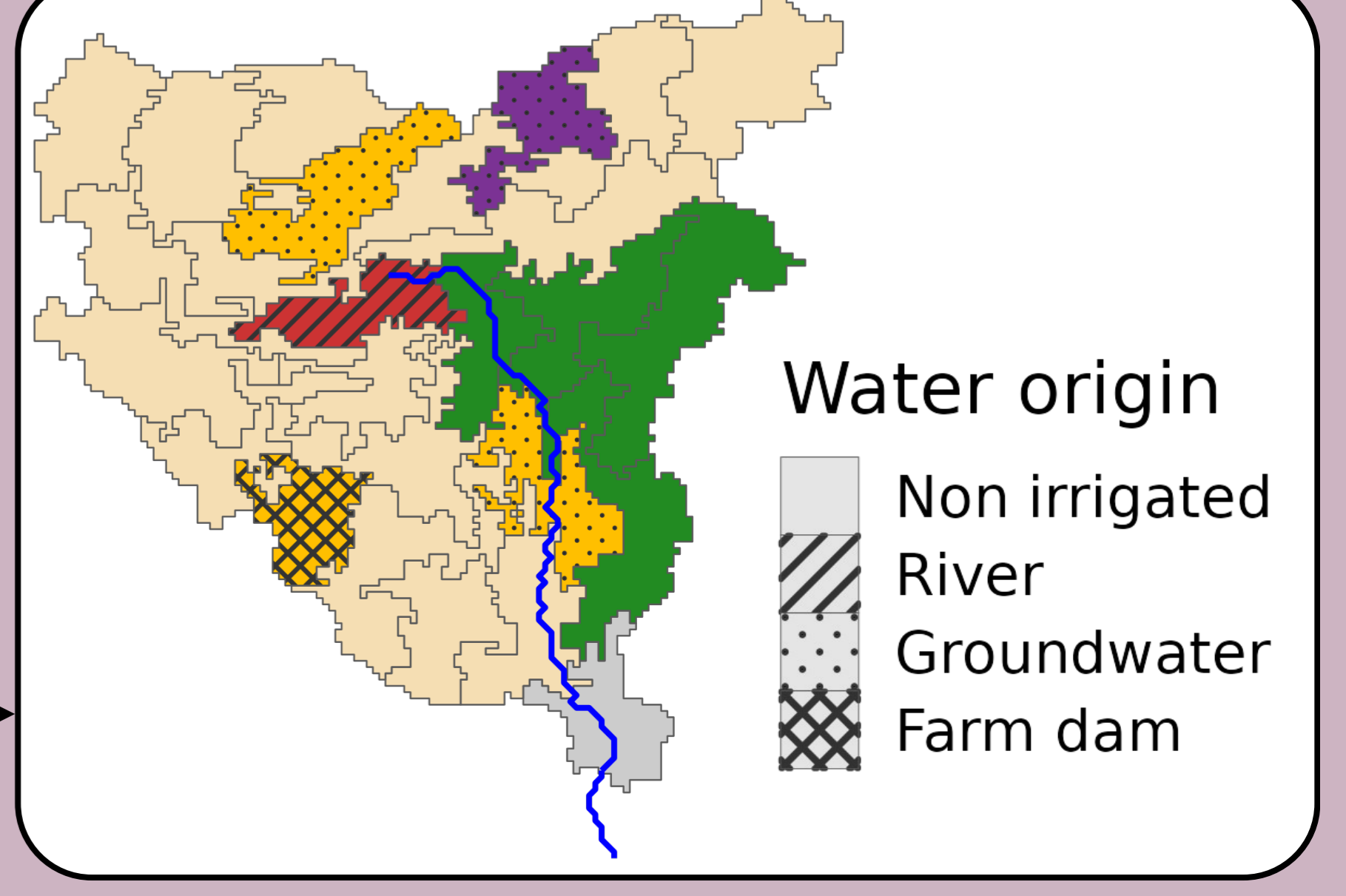
How to **make use and integrate** water origin abstraction in the model units ?

Search and request for public data

Hypothesis regarding multiple origins data
 Rhône : Surface
 Loire : Groundwater

Allocation of water abstraction origin for irrigated model units with an *optimisation algorithm*

Distribution of water origin abstraction in J2000



Water origin

Non irrigated
 River
 Groundwater
 Farm dam

7- Conclusions & Perspectives

- Collecting and using data is an adventure
- Generic methods that can be used in various contexts (data / models)
- Improving farm dams and irrigation representations using a **sensitivity analysis approach**
- Assessing **impacts of farm dams** and their uses on catchment hydrology