

The INRAE logo is displayed in a bold, teal, sans-serif font. The letters 'A' and 'E' are stylized with a circular element that loops around them. The background of the slide features a hand holding a small green seedling with soil, set against a sunset sky and a modern industrial facility with large blue domes.The logo for Interreg North-West Europe Phos4You is located in the top right corner. It includes the text 'Interreg' in a large, dark blue font, followed by 'North-West Europe' in a smaller, dark blue font, and 'Phos4You' in a green font. Below this, it says 'European Regional Development Fund'. To the right of the text is the European Union flag logo, which consists of a circle of twelve gold stars on a blue background.

## **GIS-based Decision Support Tool**

Phos4You final conference, Essen & online, 22 – 23 September 2021

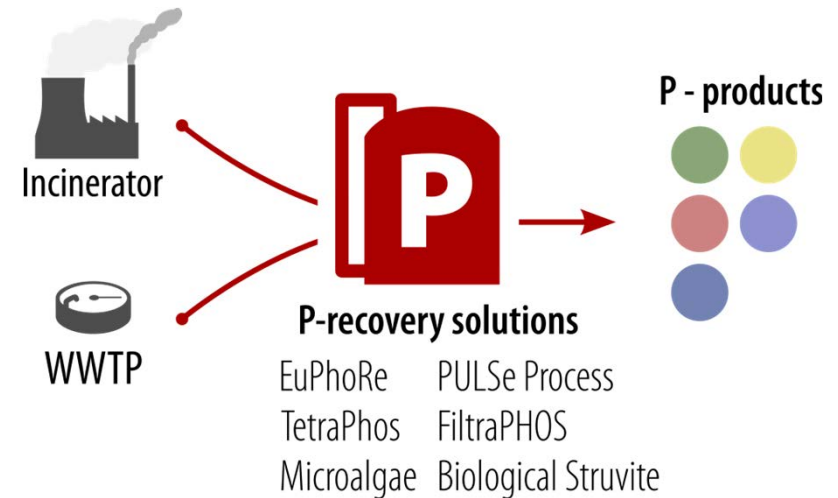
Thiriet Pierre / Thierry Bioteau, INRAE

For a better understanding of the issues related to P-recovery

# **PRESENTATION OF A WEB MAP DECISION-SUPPORT-TOOL (DST)**

## Diversity of solutions

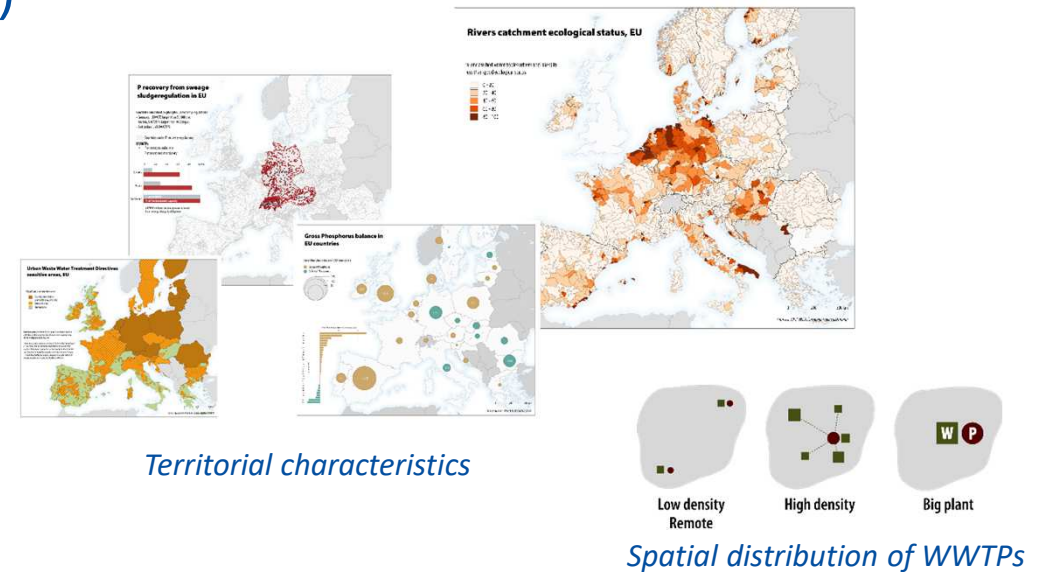
- **6 P-recovery solutions**
  - Several inputs targeted
  - Wide range of processing scales
  - Several output products
  - ...



- Where are the suitable locations (contexts) for each solution ?
- What is the **potential demand** for each solutions?

# Diversity of contexts

- Partners in 6 countries (EU scope)
- Territorial specificities
  - WWTP & related regulations
  - Environmental issues
  - P balance at the regional level
- UWWT system organization
  - WWTP characteristics
  - Use of incinerators
  - Spatial distribution of WWTPs



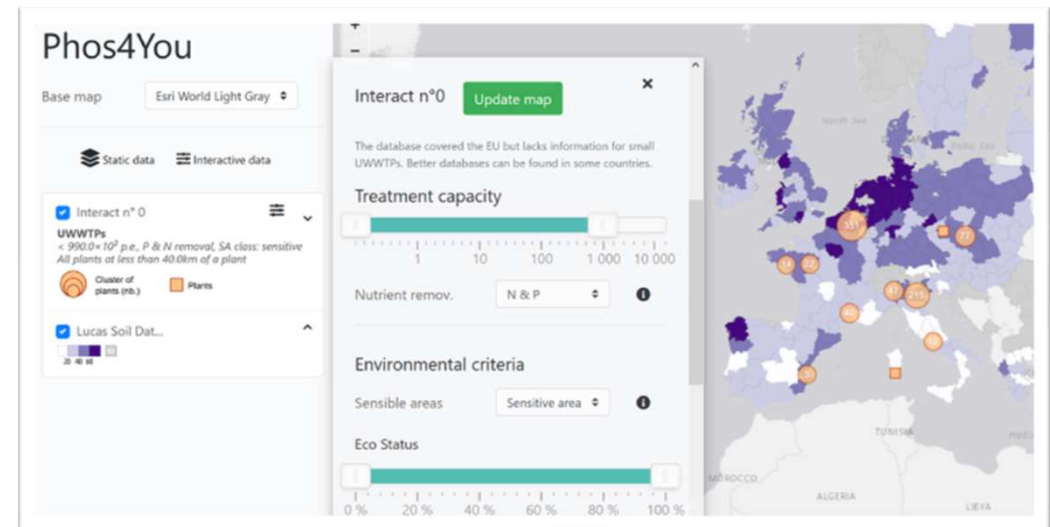
- Better understanding of the **territorial context**
- Which P-recovery solutions could be suitable for each context

## # Objectives

# Linking context and P-recovery solutions

- Development of a **dedicated web tool**

- Showing P-related spatial data  
*Census data, sensitive areas, water quality status...*
- Identifying UWWTPs according to their characteristics  
*Treatment capacity, nutrient removal, located inside sensitive area...*
- Shaping the results according to stakeholders needs (scale)  
*Disaggregated or aggregated at different scales (region, watershed)*
- Covering EU extent
- Accessible and interactive  
*Scenario defined by each user*

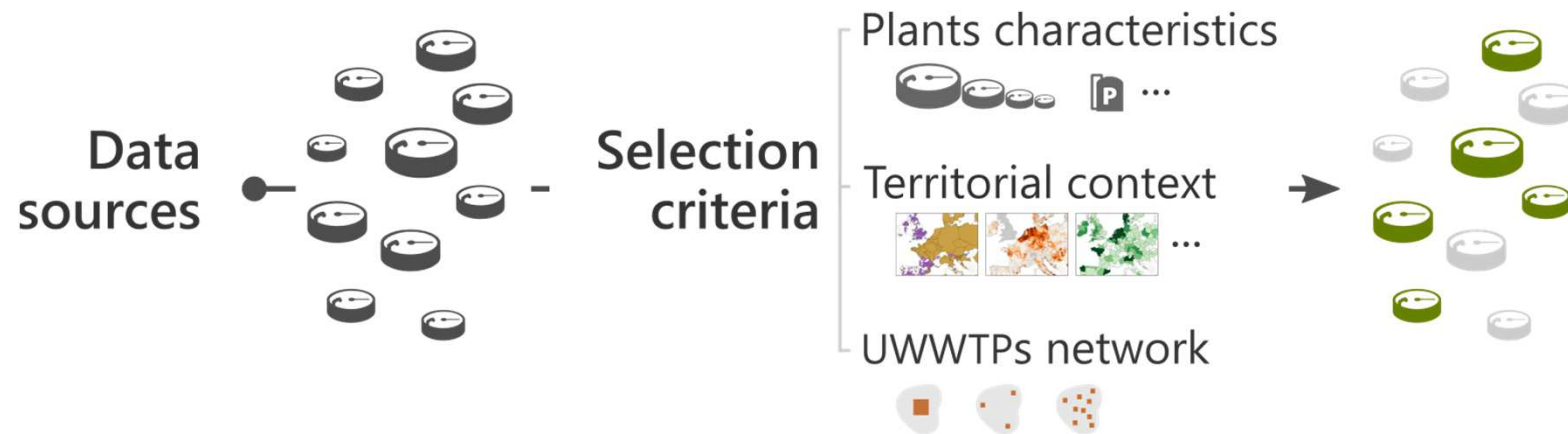




# Decision support tool

# Exploring WWTP data in multiple dimensions

- Step 1 - **Selection** of treatment plants
  - UWWTPs characteristics
  - Territorial context - *Regulation and eco-environmental context*
  - UWWTPs network (cluster or isolated plants)



# Decision support tool

## Exploring WWTP data in multiple dimensions

- Step 2 - Data **aggregation**
  - Administrative limit: *Nuts 0, 1, 2, 3*
  - Watershed: *Basins and sub-basins*
  - Regular grid: *50km grid*



*UWWTP*



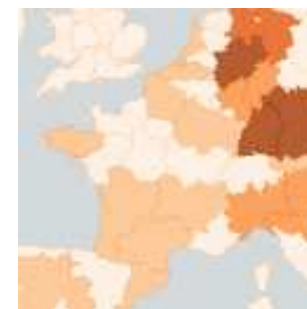
*Regular grid*



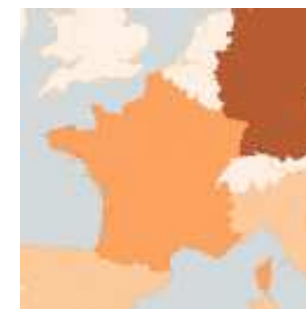
*Nuts 3*



*Nuts 2*



*Nuts 1*

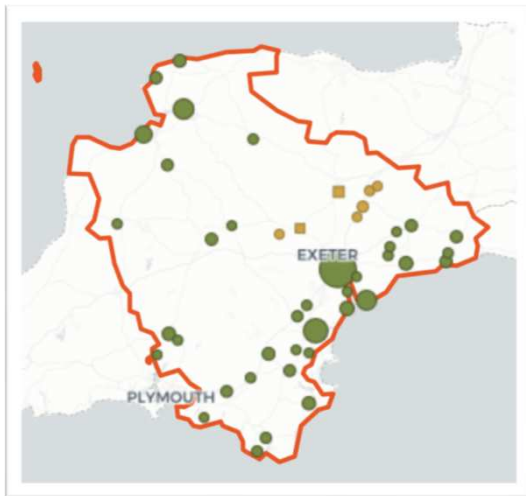


*Nuts 0*

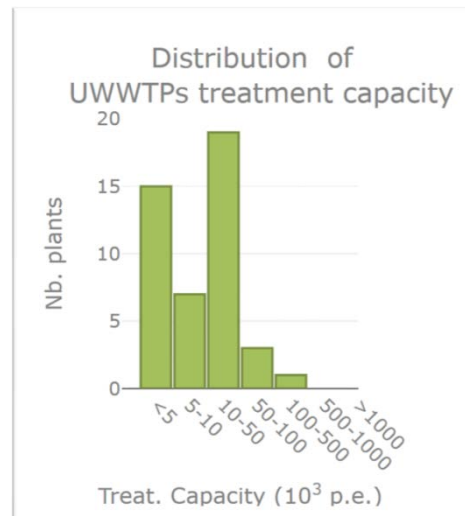
# Decision support tool

# Summary of UWWTPs system by territory

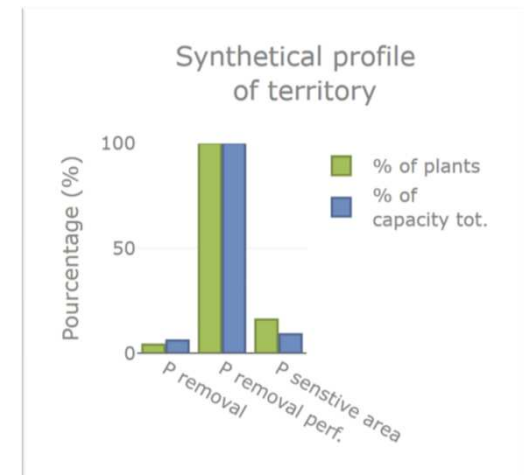
- Provide keys information for a selected area
  - UWWTPs location and characteristics (Treatment capacity, etc.)
  - Distribution of UWWTPS treatment capacities



Map of a target area with location and characteristics of the UWWTPs



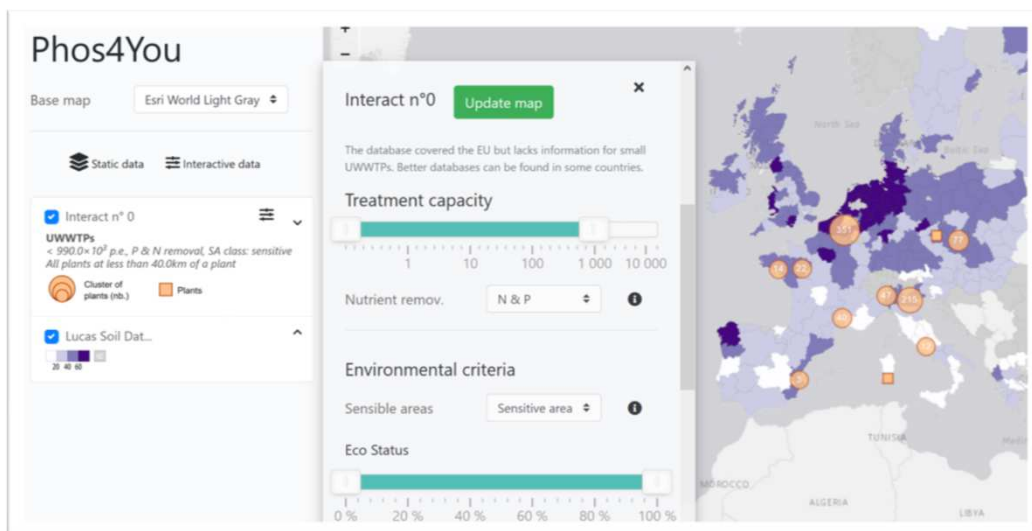
Distribution of UWWTPs treatment capacities



Complementary info about UWWTPs



# # Decision support tool Demonstration



## Time for action

# # Decision support tool Demonstration




**Interreg**   
North-West Europe  
**Phos4You**

## Decision Support Tool

**Experimental tool**

-  Treatment plants
-  Focus on area
-  Additional data

To begin, click on the buttons above:

-  **Treatment plants**  
to display and explore information about UWWTPs and incinerators.
-  **Territory**  
to explore UWWTPs at territory level.
-  **Additional information**



# Publications

- DST publication
  - Web application hosted on a commercial server
  - <https://dst.p4y.web-maps.fr/>
  - Add link to Phos4You official website (?)
- DST reporting
  - Reports on data collection/processing and DST architecture
  - DST user guide

The DST offers two approaches to the wastewater treatment data. The first and main one is based on the UWWTPs themselves as an entry point. The second use areas (administrative areas, watersheds, or regular grid) to interact with databases.

1.1 Treatment plants approach

The treatment plants approach is based on two essential components, summarized in Figure 1.




Figure 1: Scheme of the "treatment plants" approach of the DST.

– The selection of treatment plants

The website provides a user-friendly tool for exploring wastewater treatment data in multiple dimensions. The underlying database contains information for both UWWTPs and incinerators. For UWWTPs, several data sources are available to combine spatial coverage and data accuracy. The parameters for filtering the data are organized in three groups (Table 1): UWWTPs characteristics, the territorial context, and the UWWTPs network.

Table 2: List of criteria used in the DST to filter UWWTPs data:

Topic	Description	Criteria
UWWTPs characteristics	Main characteristics of the UWWTPs	- Treatment capacity (g.d.)
		- Phosphorous removal
Territorial context	Regulation and eco-environmental local or regional context of the UWWTPs and their discharge points	- Phosphorous removal performance
		- P recovery obligation
		- Sensitive areas for phosphorous
		- Ecological water quality of watersheds
UWWTPs network	Spatial organization of the UWWTPs network based on their proximity for cluster identification or isolated plants	- Livestock density (units 2)
		- Number of plants located within a specific radius distance of each plant
- Sum of capacities of the plants located within a specific radius distance of each plant		

– The data aggregation

By default, the DST returns a simple map of the location of the plants selected. An additional aggregation step allows summarizing information at a different spatial scale and with different variables. The DST provides three groups of spatial aggregation further divided into several scale level:

- Administrative limit: Nuts 0, 1, 2, 3
- Watershed from Socio: Basins districts and sub-basins
- Regular grid: 50km hexagonal grid

Figure 2 shows an example of data aggregated at different scales:

Decision Support Tool User Guide 2/13

# Conclusions

## Still a proof of concept

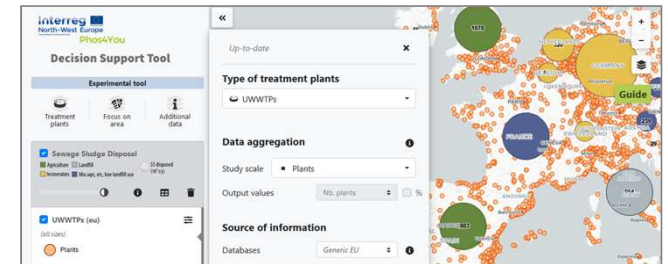
- DST show numerous limitation
  - Sparse regional data (France, Scotland)
  - Limited data on incinerators
  - Tool infrastructure/code needs to be upgraded
- **For production** the DST would require
  - An update of web architecture
  - The inclusion of partners remarks
  - Addition of datasets (other countries)
  - Keep dataset updated

# Conclusions

## But a concept proof validated (?)

- The DST concepts **seem to be relevant**
  1. Demonstration of the need of a dedicated tool
  2. Demonstration that the current tool could (partially) fit that need
- Concepts mature enough to be transferred from **research to the private sector** (?)
- Development / maintenance model (business model)  
*Paid as service, Public subsidies?*





# Thanks for your attentions

