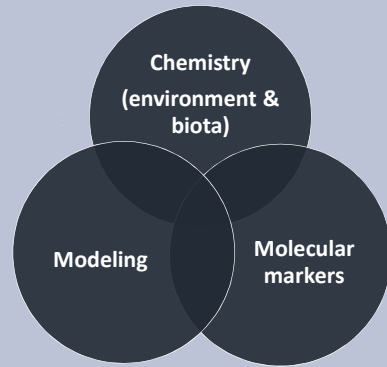


# Development of an Integrated Approach for the Diagnosis of Water quality in the Meuse Basin

**Municipal wastewater treatment plants (WWTPs)** represent one of the main and chronic point sources of contamination in water resources today, and particularly in emerging molecules such as **pharmaceutical drugs** whose the ecotoxicological risks have been poorly investigated. The project DIADeM proposes to develop and deploy an **interdisciplinary, cross-border approach** in order to improve the diagnosis and monitoring of the water quality in the Meuse river and two affluents. To this purpose, the project gathers chemical and biological analyses (biomarkers) carried out on enclosed organisms of species representative of cross-border hydrosystems and mathematical models to predict the effect at a population level.

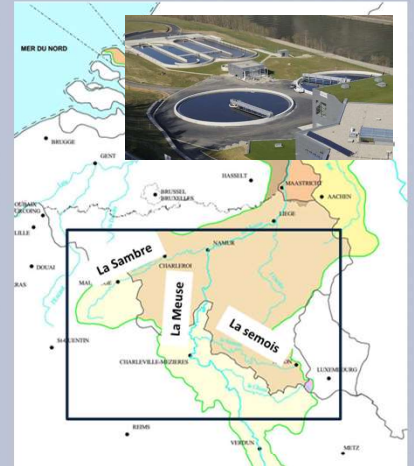


## Plurispecific approach



5 organisms representative of the cross-border hydrosystems

## Active approach



## Selection of biomarkers following exposure to pharmaceutical drugs

## Active approach in WWTPs of the Meuse River Basin

### Laboratory approach

#### Experimental controlled conditions

#### Exposure to a **pharmaceutical mixture**

- Paracetamol (Analgesics)
- Irbesartan (Hypertension - Diabete)
- Carbamazepine (Neuroleptics)
- Diclofenac (NSAID)
- Naproxen (NSAID)

#### 4 doses

- Dose **zero** (control)
- Dose **1X** (environmental)
- Dose **10X**
- Dose **100X**

#### Exposure time: **2 to 4 months**



### Field approach

#### Caging of organisms

#### Crossborder stations

- Meuse
- Sambre
- Semois

#### Exposure time: **1 to 2 months**

#### Autumn 2018

#### Exposure to **WWTP release**

- **Upstream/downstream strategy**



### Biomarkers

#### Bioconcentration

#### Energetic status

#### Growth

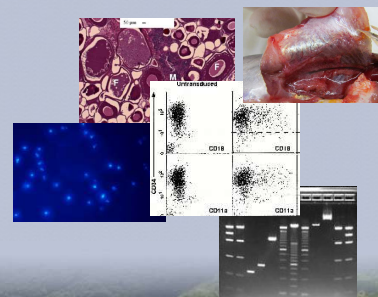
#### Neurotoxicity

#### Reprotoxicity

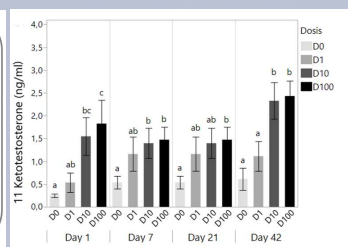
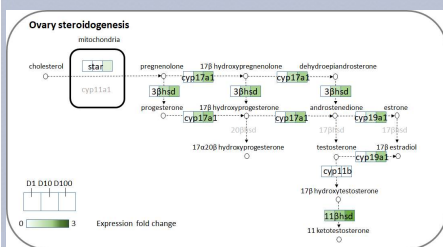
#### Immunotoxicity

#### Detoxification

#### Antioxydizers



Effect of the mixture on the expression level of genes involved in steroidogenesis and the 11-KT level on all-female rainbow trout juveniles



Un consortium alliant recherche, acteurs de l'eau et culture scientifique