

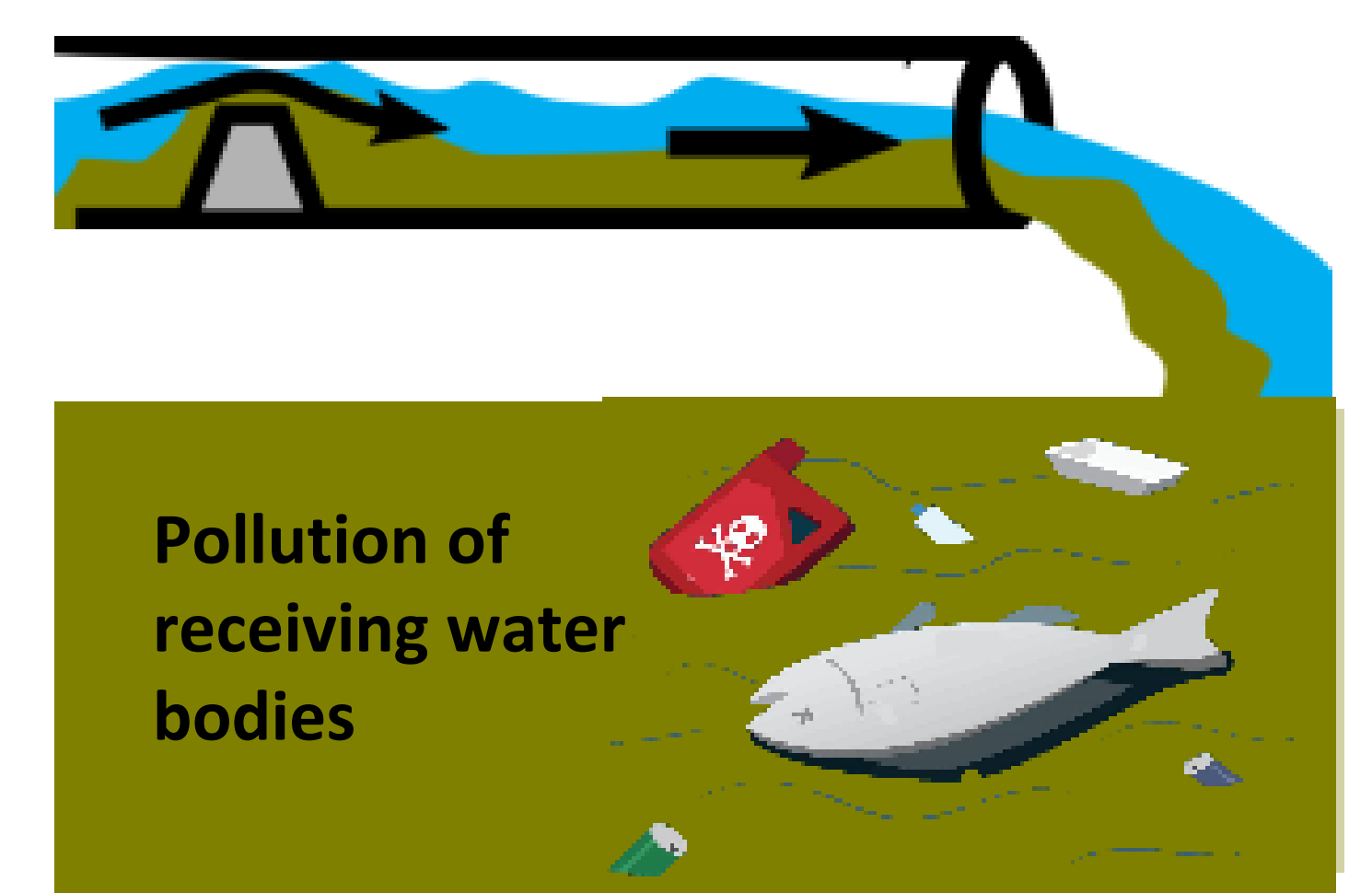
# Data-driven approach for modelling pollutant discharges from combined sewer overflows (CSO)

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## CONTEXT

- Combined sewer system convey stormwater and domestic wastewater through a single network. Under dry weather conditions, the flow is routed to wastewater treatment plants. During rainfall events, the volume can exceed the system's capacity. To prevent urban flooding or system failure, **excess water is discharged directly into receiving water bodies via CSO structures, often without any treatment**
- These CSO discharges contribute to significant environmental degradation, releasing a variety of pollutants into aquatic environments, including suspended solids
- A promising approach to reducing such pollution is to use urban planning and models to better understand the production, transport, and fate of pollutants. In this project, turbidity data will be used as a proxy for suspended solids in order to develop and test a data-driven pollution model

Combined Sewer Overflow (CSO) impacts



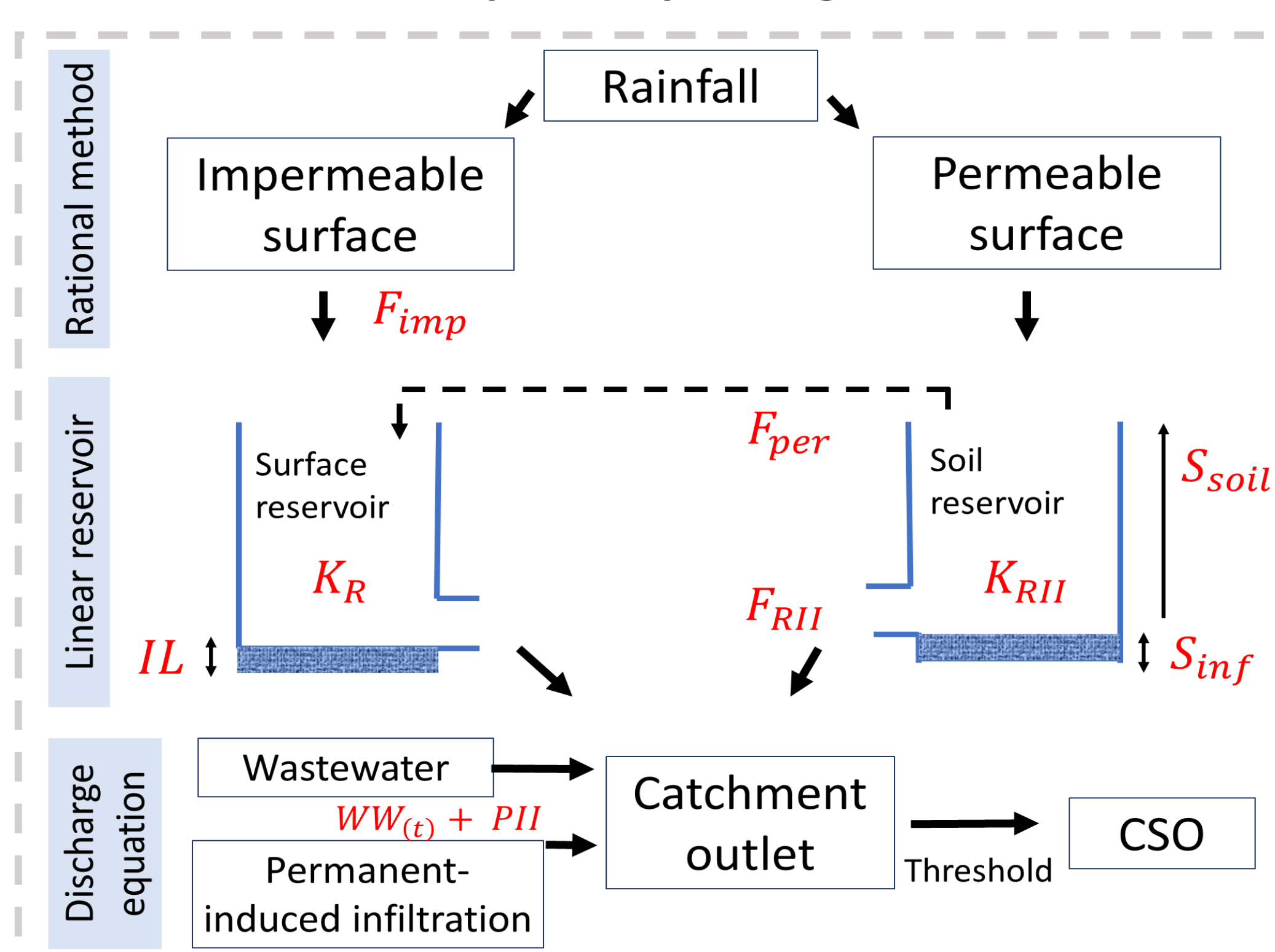
## SCIENTIFIC OBJECTIVES

- Develop a data-driven model to estimate suspended solids loads in CSO discharges from turbidity data couple it with a hydrological model
- Test the model on a real case study: the Ecully catchment in Lyon
- Evaluate potential pollutant fluxes at the catchment scale and compare them with French regulatory thresholds
- Produce a synthesis of the spatial and temporal data required for further development of a pollutant transport model

## THE MISSION

- Conduct an extensive literature review on pollutant modelling in combined sewer systems, focusing on suspended solids and turbidity-based approaches
- Process and analyze monitoring data from the Ecully catchment to calibrate and validate the data-driven model
- Implement the model for the Ecully case study to simulate suspended solids fluxes at the urban catchment outlet
- Prepare a final report and a conference abstract for NOVATECH, including the internship results

### Conceptual hydrological model

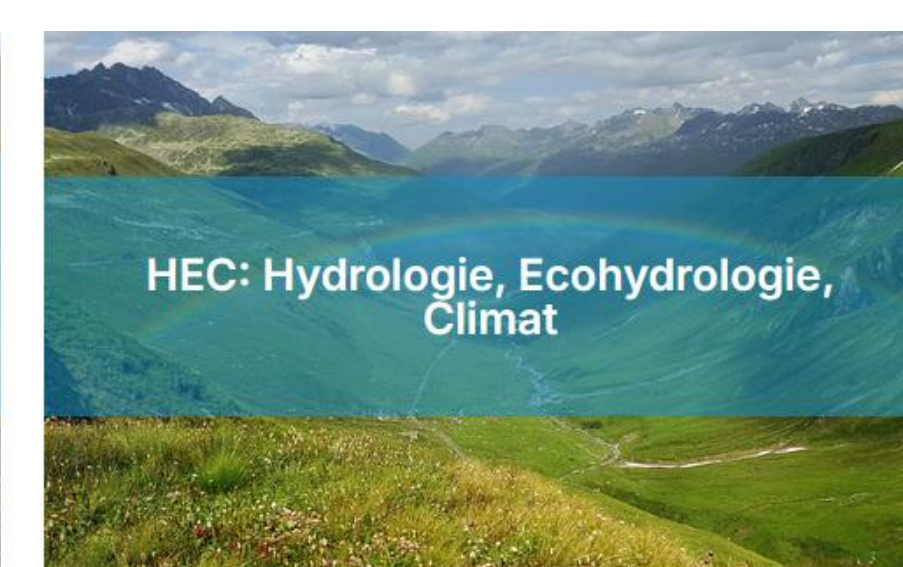


### References

- Y. Jia, F. Zheng, H.-R. Maier, A. Ostfeld, Enrico Creaco, D. Savic, J. Langeveld, Z. Kapelan. Water quality modeling in sewer networks: Review and future research directions. Water Research.
- C. Lacour, C. Joannis, G. Chebbo. Assessment of annual pollutant loads in combined sewers from continuous turbidity measurements: Sensitivity to calibration data. Water Research.
- Bertrand-Krajewski, J. L., Barraud, S., Lipeme Kouyi, G., Torres, A., & Lepot, M. (2008). Mesurages en continu des flux polluants particuliers en réseaux d'assainissement urbains : enjeux, méthodes, exemple d'application. *La Houille Blanche*

## THE RESEARCH UNIT: HYDROSCIENCES MONTPELLIER

- Interdisciplinary research unit located at Hydropolys (Faculty of Pharmacy, Montpellier)
- The student will be immersed in a scientific environment focused on multidisciplinary topics and issues related to water, the environment and health
- This diversity of water-related topics will give the successful candidate a broad overview of the scope of urban hydrology, programming and modelling skills



Welcome activities will support the student' integration into HSM, including the coffee-cake on Monday mornings!