

SCOREwater Barcelona Case Study: Deployment of the Poblenou Sampling Station

The main aims of the Barcelona Case Study are to

- 1) Predict and prevent sewer disturbances such as blockages
- 2) Monitoring the habitants' lifestyle habits in order to promote healthier alternatives
- 3) Better understand the consumption of antibiotics and how to reduce misuse
- 4) Explore relationships between socio-economic status and lifestyle habits

This is being carried out by applying a “sewage sociology” approach and studying, in detail, three neighbourhoods of Barcelona. Sewage can be thought of as an aggregate of biological excretion samples (urine, faeces). In these excreta, numerous biomarkers are found, which can reveal a great deal of what the inhabitants are exposed to such as consumption of pharmaceuticals, and indicators of diet and health status.

Central to the Barcelona Case Study, is the design and deployment of the sampling stations. These have been designed specifically for this Case Study of the SCOREwater Project (H2020 #820751) through the collaboration between The Catalan Institute for Water Research (ICRA), Barcelona Cicle de l'Aigua, SA (BCASA), Barcelona Institute of Regional and Metropolitan Studies (IERMB) of the Autonomous University of Barcelona, s::can Iberia and Eurecat - Technology Centre of Catalonia.

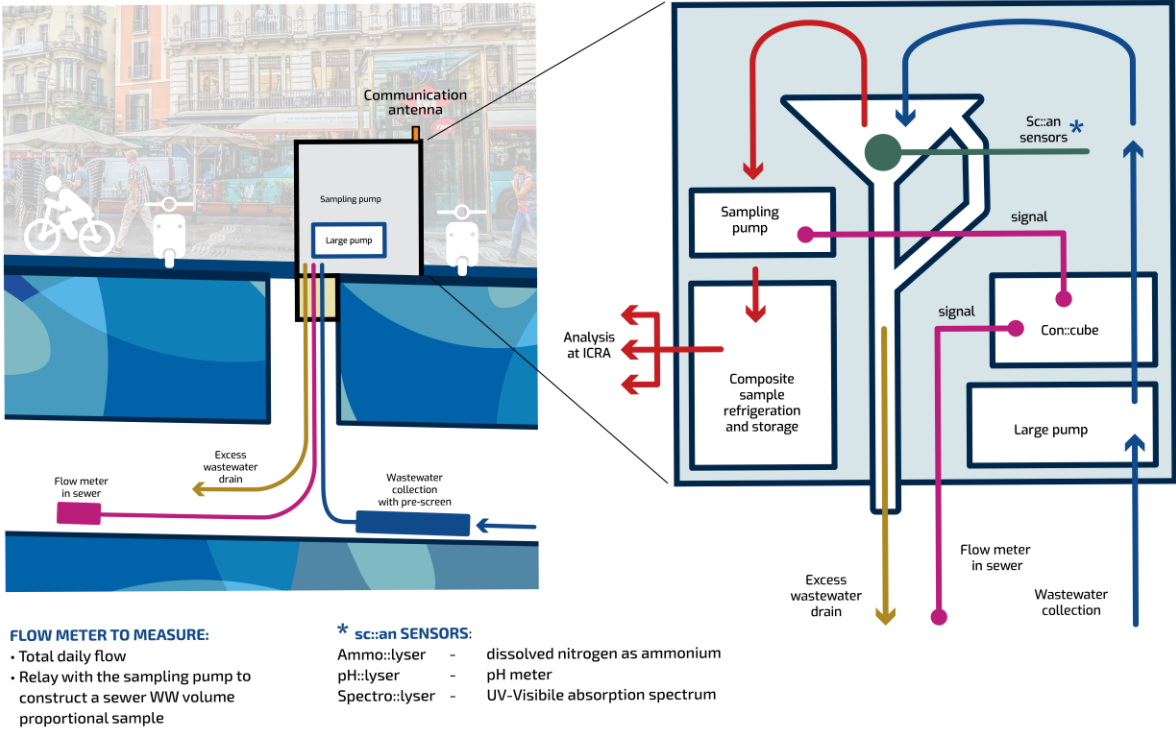
The Sampling Stations have been designed to run online and in a highly automated fashion. The first of three stations has been deployed in November 2020 and will start to collect both online and offline data in order to analyse the sewage. Using s::can sensors, online data on pH, nitrogen content and the UV-Visible absorption spectrum of the wastewater are being collected and fed to the SCOREwater platform. Other parameters such as sewage flow rate, volume and water column height are also being generated and will be used both for volume proportionate sampling as well as as part of a model — that will be developed by Eurecat — to predict sewer sedimentation rate and detect anomalous events. Flow parameters will also be used to produce a sewage volume proportionate water sample in real time. This sample will then be processed for offline chemical and biological analyses at ICRA's laboratories. Neighbourhood selection was led by BCASA and IERMB and took into account both infrastructural requirements as well as socioeconomic parameters of the areas. IERMB will also survey the inhabitants of the three neighbourhoods in order to be able to relate and validate sewage derived parameters to the lifestyles of the inhabitants.

The main components are exemplified in the figure ‘monitoring & sampling station’ below. A large peristaltic pump continuously pumps sewage water from the sub-terrain to a reservoir within the sampling station at street level. Within this reservoir, s::can sensors take online measurement of a number of parameters. Data management and control of other peripherals is managed by s::can con::cube, which logs data from all the sensors and uploads to the SCOREwater platform. The sampling station produces sewage volume proportionate water samples for offline analysis by a ultrasonic sensor installed in the sewer canal which records the speed of the sewage flow as well as the depth. con::cube relays this information to a second high-accuracy peristaltic pump that samples sewage water from the reservoir to a refrigerated chamber over a pre-set period of time. This sample is then processed at ICRA where a wide variety of chemical analytes can be quantified. Offline chemical analysis will be evaluated in conjunction with other data, including medical prescriptions and health data from the Catalan Public Health System. This will help us better understand the habits of the

inhabitants, the health status and how these factors differ in the different neighbourhoods that entail different socioeconomic conditions.

MONITORING & SAMPLING STATION

Barcelona case study of SCOREwater



Read more about the SCOREwater project on www.scorewater.eu