

## What are EPs?

Emerging pollutants (EPs) are compounds of diverse origin and chemical nature which are present in the environment. Since they were not considered in the past, they have not been studied in depth at a scientific level. For this reason, they are more accurately referred to as contaminants of emerging concern. In many cases, it is still not known whether they pose an ecological risk or present potential adverse health effects (Dulio et al., 2018; Water JPI, 2018).

They include a wide range of chemical, pharmaceutical, personal care and flame-retardant compounds, as well as surfactant, plasticizers and industrial additives. Most of these compounds are still unregulated. However, they may be candidates for future regulation depending on the research conducted on their occurrence and impact on the environment, as well as on their possible harmful effects on health.

In 2015 the European Union launched a "Watch List" (Decision 2015/495) to monitor, within the scope of the Water Framework Directive (WFD), these and other pollutants with a view to their possible future regulation.

## The norwater project

NOR-WATER is aimed at identifying the main emerging pollutants (EPs) and their sources in the hydrographic basins of northern Portugal and Galicia. In addition, it is focused on developing, implementing and harmonizing a set of innovative multidisciplinary tools to minimize the impact of emerging pollutants on these water bodies. The project will also contribute to the improvement of water quality and will enhance the implementation of the Water Framework Directive (WFD) in this cross-border area.

The project has been co-funded by the European Regional Development Fund (ERDF) through the Program INTERREG V-A Spain-Portugal (POCTEP) 2014-2020 with a total budget of 579.475,41 € (ERDF Contribution: 434.606,56 €). Duration: 04/2019 – 12/2021.

# The four main objectives

**1 Identifying** the main emerging pollutants (EPs), including fire-related runoff compounds in rivers, as well as their sources and transformation products (TPs), in the hydrographic basins of northern Portugal and Galicia.

**2 Developing** new analytical methods and ecotoxicological tools, as well as prediction and modeling tools, for those EPs which pose the highest potential risk to ecosystems.

**3 Assessing** the efficiency of wastewater treatment plants (WWTPs) in removing EPs, as well as developing tools to improve treatment systems and increase their efficiency in EP removal.

**4 Transferring** the results to the entities that are responsible for the implementation of the WFD in the management of inland and coastal water bodies, as well as to the technology companies in charge of water treatment. In parallel, cross-border activities focused on environmental education are intended to be carried out, thus contributing to a behavioral change in civil society.

# Working streams and expected results

## 1 DEFINITION OF STUDY AREAS FOR EMERGING POLLUTANTS (EPs)

**Identifying** the sources of EPs in the selected areas.

**Developing** analytical tools for the study of EPs and their

**Transformation** Products (TPs). Prioritizing the EPs to be studied.

## 2 DESTINATION AND TRANSFORMATION OF EPs AND MODELING OF THEIR BEHAVIOR: MONITORING TOOLS

**Studying** the transformation of prioritized EPs.

**Studying** the concentration of EPs and their disposal rates in WWTPs.

**Studying** the dissemination and modeling of EPs and of those compounds derived from the runoff and leaching of soils affected by fires.



## 3 DEVELOPMENT OF NANOTECHNOLOGIES FOR WASTEWATER TREATMENT

**Developing** functionalized membranes with antifouling properties.

**Developing** electrocatalytic/photoelectrocatalytic membrane reactors to remove EPs from domestic wastewater collected at WWTPs.

## 4 DEVELOPMENT OF NEW MODELING AND ECOTOXICOLOGICAL TOOLS TO ASSESS THE ENVIRONMENTAL RISK OF EPs

**Conducting** bioaccumulation, metabolic and toxicokinetic studies.

**Assessing** the toxicity of the prioritized EPs to be studied and identifying those that pose a high risk.

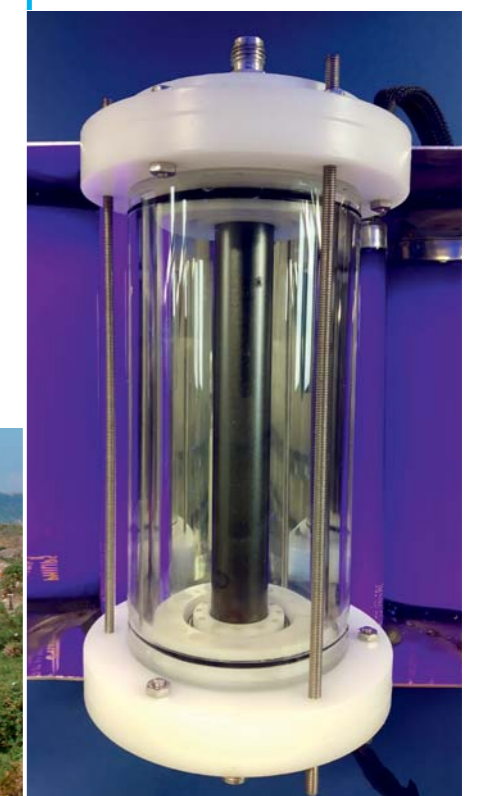
**Studying** the mode of action of EPs in order to improve the risk assessment of these compounds.



## 5 ENVIRONMENTAL TRAINING AND AWARENESS ACTIVITIES AND TRANSFERENCE OF KNOWLEDGE AND TECHNOLOGY

**Creating and implementing** a public-private partnership structure on the subject of emerging pollutants.

## 6 ORGANIZING CROSS-BORDER ENVIRONMENTAL EDUCATION ACTIVITIES TO RAISE AWARENESS AMONG SOCIETY



# Partners



CIIMAR (Centro Interdisciplinar de Investigação Marinha e Ambiental), Univ. do Porto (Coordinador)



USC Universidade de Santiago de Compostela



Laboratório Associado LSRE - LCM (Laboratório de Processos de Separação e Reação - Laboratório de Catálise e Materiais), Univ. do Porto



INTECMAR Instituto Tecnológico para o Control do Medio Marinho de Galicia



CETMAR Centro Tecnológico del Mar Fundación CETMAR



APA, IP - ARH do Norte (Agência Portuguesa do Ambiente, IP - Administração da Região Hidrográfica do Norte)



CM - Viana do Castelo - CMIA Câmara Municipal de Viana do Castelo - Centro de Monitorização e Interpretação Ambiental



CMVNC-Aquamuseu Câmara Municipal de Vila Nova de Cerveira - Aquamuseu do Rio Minho

With the collaboration of



ANABAM Associação Naturalista "Baixo Miño"

# Advisory board



EFACEC



Águas do Norte



Augas de Galicia



Confederación Hidrográfica del Miño-Sil, CHMS



Dirección Xeral de Saúde Pública. Consellería de Sanidade (Xunta de Galicia)



**Interreg**  
España - Portugal



UNIÃO EUROPEA  
UNIÓN EUROPEA

Fondo Europeo de Desarrollo Regional  
Fundo Europeu de Desenvolvemento Regional

## Contact

**Miguel Santos** (Coordinator)

Endocrine Disruptors and Emergent Contaminants Team  
CIIMAR - Interdisciplinary Centre of Marine and Environmental Research  
Universidade do Porto

Av. General Norton de Matos s/n · 4450-208 Matosinhos · Portugal  
Phone +351 22 340 1812 · Contact email: santos@ciimar.up.pt

## Social Networks



@NorWater



@proyectorwater

**norwater**

**EMERGING POLLUTANTS  
IN THE HYDROGRAPHIC BASINS OF  
NORTHERN PORTUGAL AND GALICIA  
NEW TOOLS FOR RISK MANAGEMENT**