

Abstract

In the shadow of climate change, the increasing water scarcity makes it important to use water sparingly and judiciously, including irrigation. At the same time, in the European Union (EU-27) and the UK, more than 1.4 billion tons of manure are produced annually. In compliance with the circular economy concept, the slurry can be reused with separation technologies, dividing the raw material into a liquid and a solid fraction for irrigation and soil fertilization.

However, without treatment, chemical, biological, and hormonal contamination would pose significant anthropogenic pressure on the environment, which often disables direct use. One of these factors is the presence of natural and synthetic steroid hormones originating from the manure of farm animals with a possible impact on the agroecosystem and through environmental transport on human health.

To ensure the safe and sustainable use of slurry-based liquid and solid fractions, the issue of hormonally active compounds should be managed with newly developed, efficient, bio-based technologies and simultaneously monitored with effect-based tools.

BioTreatED provides a new concept for mitigating steroid hormones and hormonally active compounds in slurry-based separated fractions by applying a hormone-degrading microbial consortium and a comprehensive toolkit for monitoring agri- and aquatic ecosystems.

The multidisciplinary research proposal brings together seven research partners from Hungary, Norway, Poland, Portugal, Spain, and Turkey with complementary expertise from different fields to work jointly to increase the quality and availability of Aquatic Ecosystem Services by improving the safety of slurry-based irrigation water originating from the circular economy.

The project is strongly connected to the Water4All Joint Transnational Call as it aims to understand and predict multiple anthropogenic pressures in ecosystem services, performs comprehensive monitoring and mapping with advanced methods to increase our knowledge about the impact-response relationships and develop new tools and solutions for management of water resources.

The applied methods will strongly rely on Aquatic Ecosystem Services and, simultaneously, will improve these services with the insurance of a xenoestrogen-free natural aquatic environment, preserving and increasing biodiversity and protecting wild fish populations.

BioTreatED features a high degree of originality and novelty through the newly developed biotreatment methods and new approaches beyond the state-of-the-art methodologies for analysing hormonal activity. The project's expected outcome is not just the development of functional bacterial consortia but to further improve our knowledge about the environmental transportation and fate of steroid hormones and validate the biotreatment's success.

The safe and sustainable reuse of slurry-based materials would allow the spare of valuable freshwater resources for other (residential, industrial, agricultural) use; therefore, the proposed project could improve the adaptation capacity and resilience of the European community for extreme hydroclimatic events and would simultaneously decrease the anthropogenic pressure on arable lands, groundwaters and surface waters.

The new collaborative network can reach a high scientific, social and economic impact in compliance with the EU Biodiversity Strategy for 2030, the Circular Economy Action Plan, the EU Water Framework Directive, and the EU Habitats Directive.



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► Project partners

- NIBIO - NORWAY
- INSTITUTO POLITÉCNICO DE VIANA DO CASTELO - PORTUGAL
- FUNDACIÓN UNIVERSITARIA BALMES - SPAIN
- INSTYTUT UPRAWY NAWOŻENIA I GLEBOZNAWSTWA - PAŃSTWOWY INSTYTUT BADAWCZY - POLAND
- DOKUZ EYLÜL UNIVERSITY - TURKEY
- MIDDLE TISZA DISTRICT WATER DIRECTORATE - HUNGARY

► Funding organisations

NKFIH (HUNGARY) / RCN (NORWAY) / FCT (PORTUGAL) / AEI (SPAIN) / NCBR (POLAND) / TUBITAK (TURKEY)

► Duration

3 years

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animal husbandry; dairying
livestock raising; agricultural waste
irrigation management
microbiology
nature-based solutions
water and soil pollution

KEYWORDS