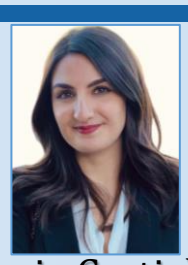
Applications of innovative solutions for risk mitigation in drinking water and wastewater treatment plants related to climate change

Multi-hazard approach and analysis



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Concept

Water has always been considered a vital asset for human beings due to multiple aspects concerning both drinking water and wastewater, the improper management of which, in addition to causing damage to the environment and ecosystems, can have direct implications on public health. Climate change is progressively increasing the magnitude and recurrence of natural events its trends could significantly increase damage to critical infrastructure in Europe. Recently the European Commission has issued Directive 2022/2557 on the resilience of critical entities, by requiring Member States to identify their risks, emphasizing the influence of all relevant natural hazards that might result in incidents. WWTPs and DWTPs are a recognized critical section within industrial plants. They provide a service to society and their vulnerability to the impacts of climate change endangers the health and sanitation of many communities.
Literature that examines the relationship between climate change adaptation and critical infrastructures is, however, just emerging and the interaction between DWTPs, WWTPs and natural and spatial hazards is often overlooked.

Scientific approach

The research activities is divided into 4 phases:
1) Detection of signals within multi-hazard contexts where treatment plants (TP) are located. In particular, geolocalization of assets of interest (Wastewater treatment plants and Drinking water treatment plants) as punctual elements and identification of natural hazards in the area of interest. Subsequently multi-hazard consequences contextualization against TPs of interest.
2) Functional Deployment of TP as a representative case study. Analysis of background criteria in the TP and vulnerability identification by items and components of TP.
3) Interaction between functional and territorial factors: methodological adaptation and vulnerability assessment.
4) Preparedness and Recoverability with an evaluation of robust and recoverability strategies.

Research objectives

In this regard, the aim of the research is to evaluate the risks associated with drinking water and wastewater treatment plants following natural events intensified by climate change and subsequently evaluate robust and recoverable strategies. The methodology could help to address a gap in the existing planning and risk instruments, increasing the awareness of the local planners about the unexpected effects of multiple risks and providing an essential indication of the priority areas to address technical studies and financial resources.