

Abstract

Enteric viruses arising from human sewage spill-over into water catchments represent a threat to human health through water-using food production or water-based recreational activities. Despite continuous efforts in wastewater treatment and microbiological monitoring of water bodies, viral contamination of food during production still occurs in Europe, with adverse health effects on consumers and economic consequences on food producers. Filtering large amounts of their growing waters, shellfish are both a food, and a sentinel of the microbial quality of their environment. Shellfish contamination by norovirus, an enteric virus, is indeed the most frequent setting in viral foodborne outbreaks in Europe and an important global problem as well. Importantly, while this contamination is known to be affected by rainfall, the exact impact of weather events, and especially extreme hydroclimatic events, is not known. Additionally, shellfish farmers and stakeholders using water for recreation require information to enable adaptation to the events.

Here, we aim at contributing to the safe and sustainable use of water, especially for shellfish production, by

- I. acquiring new knowledge of the viral contamination in catchments, and
- II. co-developing an early-warning tool helping end-users to mitigate the impact of this contamination upon extreme hydroclimatic events.

b) Indeed, although water quality and quantity are known to affect the transport or persistence of infectious enteric viruses, the impact of extreme hydroclimatic events on the viral contamination of watersheds is not well understood. Thus, we identified key scientific and technological questions that were only partially addressed by previous studies. How do floods and droughts alter the dynamics, diversity, and infectivity of enteric viruses in water catchments up to shellfish beds? Can the contamination of shellfish be predicted from water quality, meteorological or other parameters, under normal conditions and during extreme events? Finally, how does this translate to an infectious risk? By answering these questions, we will generate new knowledge that we will use to develop process-based and machine-learning models of viral contamination and viral infectious risk in shellfish and coastal waters. Through contacts already established with stakeholders and the organization of dedicated workshops in multiple countries, we will co-construct an early-warning tool answering the needs of European end-users.

c) The project addresses the second topic of the call “Tools for water management – in the context of hydroclimatic extreme events”, by developing an early-warning, decision-support tool, based on new data and risk models, that will help the shellfish industry and coastal communities to enforce mitigation measures against contamination by enteric viruses. It adopts a catchment-to-sea perspective, necessary for this anthropogenic contamination diffusing from land to sea through watersheds. It will focus on the impact of floods, storms and droughts to ensure adequate adaptation of the mitigation strategies to climate change and increasing frequencies of these extreme events. Moreover, through building new models and using advanced computing technologies like neural networks, it will also contribute to smartening the water system. Our trans-European consortium gathers complementary expertise in environmental virology, virus epidemiology, water quality and modeling, that will be enriched through our contacts with stakeholders, to contribute to the management of the water resource contamination by enteric viruses.»



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- ECOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE - SWITZERLAND
- MARINE INSTITUTE - IRELAND

► Funding organisations

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