



Flowing from land to sea: developing innovative strategies for detection, prevention and collection of land-based plastic waste in European rivers

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Different sources and pathways contribute to the plastic waste inputs into rivers, such as inadequate waste management in the river basin, insufficient water treatment of urban wastewater and rural/industrial discharges, and stormwater runoff. The plastic polluting rivers can then be transported downstream and reach the ocean, expanding the impacts of the land-based sources of plastic pollution from riverine to marine environments. Thus, the detection and collection of plastics and other waste in the rivers is instrumental in mitigating the pressing marine litter issue. In parallel, preventing the current inputs of plastic waste into the river allows for a reduction of the pollution at the source and of its impact on the riverine environment. The Innovative Solutions for Plastic Free European Rivers (INSPIRE) project's primary objective is to contribute to the reduction of plastic litter by implementing a holistic strategy that focuses on detecting, collecting, and preventing waste in river systems. For that, we are currently testing and evaluating 20 technologies and actions that enable us to: i) detect litter in rivers through sampling with different devices or through observations with monitoring apps, drones and bridge-mounted cameras; ii) collect litter from rivers (water surface/column, riverbed and riverbanks) using different cleanup technologies and manual cleanups organized with the engagement of local citizens; iii) prevent litter by removing it from the waste streams with different plastic removal technologies installed in urban infrastructure (e.g., in wastewater treatment plants); iv) develop sustainable alternatives for existing non-degradable polluting products (e.g., plastic packaging and agricultural films). The 20 technologies and actions are being implemented in 6 demo river sites across Europe and in other prevention sites to test agricultural applications and to reduce single-use plastic waste associated with events (e.g., music festivals). The data collected is being used to

create a database of plastic pollution levels in the European rivers, and to feed riverine models that will be used to estimate the transported and accumulated plastic in the rivers and to support the selection of the optimal solutions through a decision-support tool. The sustainability of the solutions is evaluated with a techno-economic analysis, which will enable the creation of action plans towards upscaling and replication. Together, the cost-benefit sustainability analysis and tools created culminate in a master plan for achieving the project primary goal and to protect and restore the health of our ocean and waters through research, innovation, blue investments, and increased awareness with the involvement of local citizens and stakeholders.