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Monitoring floating riverine pollution by advanced technology

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Rivers act as pathways to the ocean of significant but unquantified amounts of plastic pollution. Measuring with precision the quantities of riverine plastic inputs is crucial to support and ensure the effectiveness of prevention and mitigation waste management actions. However, there is a lack of technological tools capable of monitoring and, consequently, assessing accurately plastic abundances and its temporal variability through river water surfaces. Within the LIFE LEMA project, two videometry systems were installed at the river mouths of two European rivers (Oria in Spain and Adour in France) and a detection algorithm was developed to monitor litter inputs in near real time. The objective of these developments was to detect riverine pollution at water surface, with the goal of quantifying the number and providing data on the travel speed and size of the floating items. Between 2018 and 2020, the system was tested under different environmental conditions. These tests have led to develop a second version of the algorithm that improves the results reducing false positives. After these improvements, a new validation has been carried out consisting in detailed analysis of more than 300 short videos of 5 minutes duration recorded in Orio's station under different river flows, weather conditions and plastic loads. The validation results highlighted the operational reliability of the system. In a scale of 1 to 5 scoring (being 1 very bad and 5 very good) over 70% of the recordings scored 4 to 5. This also demonstrated the great potential of the videometry system in harmonizing visual observations of floating riverine litter. The data provided by the systems is currently being used in the LEMA TOOL, a tool designed to guide local authorities on managing, monitoring and forecasting marine litter presence and abundances in coastal waters of the SE Bay of Biscay. Furthermore, the data provided is key to evaluate the sources of the pollution and the efficiency of waste management measures within the river basins, towards a successful reduction of plastic inputs into the ocean.