Assisting stakeholders in their choice of riverine and estuarine plastic clean-up technologies with the aid of Bayesian Belief Networks

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Plastic clean-up technologies deployed in rivers and estuaries can be fundamental to assist in plastic litter management and collection and to mitigate plastic pollution. However, it is vital to supply stakeholders with tools to monitor and minimize possible bycatch, as organic debris and biota provide essential functions to riverine and estuarine environments. Currently, even though some of the clean-up technologies companies perform environmental impact assessments, an independent and objective tool is still missing to assist stakeholders in deploying clean-up mechanisms with a minimal impact on biota. To support stakeholders in making informed decisions about which clean-up technology is best deployed under specific conditions, we suggest using Bayesian Belief Networks (BBNs) as a support tool that would ensure an effective plastic clean-up removal and minimum unintentional bycatch. We have identified four clusters of parameters that account for multiple conditions influencing the chances of bycatch and will form the basis of the BBN. To feed the model, we will acquire data from scientific and grey literature, expert knowledge, and experimental work. The data will include information on (i) the environmental conditions of the river (e.g., river flow), (ii) plastic debris characteristics such as size or buoyancy, (iii) biota traits (e.g., size, buoyancy, adhesiveness), and (iv) mechanism of clean-up technologies (e.g., river booms with conveyor belts, curtains of air bubbles). After the training and validating stages, the model can then be used in different river systems to suggest what type of plastic clean-up mechanism is best suited for the local parameters. This model will enable stakeholders, such as river managers and policymakers, to obtain information on the optimal trade-off between plastic removal and minimal collateral bycatch.