

## **In-Stream Marine Litter Collection Device Location Determination Using Bayesian Network**

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### **Abstract**

Increased generation of waste, production of plastics, and poor environmental stewardship has led to an increase in floating litter. Significant efforts have been dedicated to mitigating this globally relevant issue. Depending on the location of floating litter, removal methods would vary but usually include manual cleanups by volunteers or workers, use of heavy machinery to rake or sweep litter off beaches or roads, or passive litter collection traps. In the open ocean or streams, a common passive technique is to use booms and a collection receptacle to trap floating litter. These passive

traps are usually installed to intercept floating litter; however, identifying the appropriate locations for installing these collection devices is still not fully investigated. This paper utilized five common criteria and sixteen sub-criteria to determine the most appropriate setup location for an in-stream collection device (i.e., Litter Gitter - Osprey Initiative LLC). The Bayesian Network technology has been applied to analyze these criteria comprehensively. A case study composed of multiple sites across the U.S. Gulf of Mexico Coast was used to validate the proposed approach, and propagation and sensitivity analysis were used to evaluate performance. Results showed that the summarized sixteen criteria combined with Bayesian Network approach could aid location selection and have practical potentials for in-stream litter collection devices in coastal areas.

### **Keywords**

Marine debris, marine litter, Litter Gitter, Site selection, Coastal, Decision network, Prevention