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Analysing Plastic Pollution: A Case Study of Coastal Pollution from Inland Urban Waterways in Galle City, Sri Lanka

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Abstract

The coastal stretch of Galle city is currently facing an acute pollution with the aggregation of various types of waste on beaches due to malpractices of the community living around the coastal as well as inland areas of the country. Rivers or canals play a key role in the transport of wastes from source to sea and are estimated to emit around 1 metric ton of plastics into the ocean annually. Mainly five sea outfalls are existing along the Galle coastal zone and those transfer various waste towards the beaches. The present case study aims to identify the coastal pollution caused by inland waterways in Galle municipal council area and to detect the main plastic pollutants flow into coastal zone through inland waterways from month of April to June 2023. The waste trap constructed at the main inland waterway located at Galle municipal council area, the Moda Ela trapped different types of waste and the CCTV camera fixed directing to the above-mentioned canal, captures images, uploaded to a cloud system and feed the data to an Artificial Intelligence model to detect the litter type and their counts which flows along the canal daily and get recorded in the smart plastic litter monitoring web-based system using feature extraction techniques in AI. This smart system has mainly identified the count of plastic fragments, plastic bottles, Styrofoam, and trash bags separately, as the main pollutants of this canal and has interpreted graphically and numerically in the smart system which can be freely accessed. Weights of waste were taken manually. Finally, recorded counts of waste in the smart system emphasis that most abundant causative agent affected on pollution of Moda Ela was plastic bottles (58%) while effect of Styrofoam and trash bags were 34% and 8% respectively. Further, average weight of plastic bottles was recorded highest during the study period (130 kg) when compared to other waste categories. According to the results, plastic bottles have become the main source of pollution comes through inland canals which contribute to coastal pollution. Visual observations further convince that the highest pollution source was Moda Ela while less contribution was from Mahamodara canal. The present study highlights plastics as the main pollutants in inland waterways which effect on coastal pollution. Therefore, it is necessary to identify the polluters and need to implement proper rules and regulations while suggesting any alternatives for plastics.

Keywords: Coastal pollution, Inland waterways, Waste trap, Galle Municipal Council area, Artificial intelligence technology