



The ecological fate of microplastics in delta and marine environments in South-East Asia

Freija Mendrik, Daniel Parsons, Christopher Hackney, Cath Waller, and Grigorios Vasilopoulos
University of Hull, Energy and Environment Institute, Hull, United Kingdom

The Mekong River is one of the top global contributors to marine plastic pollution with more than 37,000 tonnes of plastic being discharged from the Vietnamese Mekong Delta per year. This will undoubtedly increase with population growth and a lack of recycling facilities or available alternative materials. Plastic pollution is found globally in marine and freshwater systems, harming wildlife through entanglement and ingestion. Yet microplastics (<5mm) pose an even more serious threat, entering primary levels of food webs, causing ecological harm which is poorly understood. Microplastics are known to be easily ingested by numerous organisms, altering behaviour, reducing fecundity and survival in addition to acting as a vector for pathogens. However, there is a key knowledge gap regarding the nature of the flux, the behaviour of microplastics in transport and its pathways from rivers into the ocean. This prevents major sources of microplastic being determined, despite it being known that approximately 80% of plastic originates from land. As the Mekong is one of the main sources of plastic pollution in the ocean, estimates of particle flux and transport of plastic throughout the delta and riverine system must be determined in order to understand the dispersal and distribution of microplastics and their fate in the oceans. This will allow a better understanding of what ecosystems are particularly under threat from microplastic pollution.

Here, we determine the flux, composition and concentrations of microplastics throughout the Vietnamese Mekong Delta. We report concentrations and polymer type found in suspended and bed samples taken throughout the Delta. Combined with concurrent and historical flow data taken throughout the Delta, microplastic flux is determined in addition to the main sources of microplastic throughout the Delta systems. Polymer type and concentration is also determined to understand the relationship between microplastic flow and distribution within the water column, which may have ecological implications.