Evaluating Microplastic Presence in the Vicinity of Citarum River Dams, West Java: A Comprehensive Analysis

Hazel Beaumont[1], Samuel Holmes[2], Amy Gough[3] and Hilmi Putra[4]

[1] *School of Engineering, University of the West of England, UK*

[2] *Department of Earth Sciences, Royal Holloway University of London, UK*

[3] *Southeast Asia Research Group, Herriot Watt University, UK*

[4] *Geodynamics and Sedimentology Group, Institute of Teknologi, Bandung, West Java*

The Citarum River travels north westwards from the source in the Wayang-Windu Mountains into the Jakarta Bay and the Java Sea. Once considered the most polluted river in the world the communities around the Citarum River have been involved in the Citarum Harum '*Fragrant Citarum*' scheme starting in 2018 to clean the river and a successful reforestation scheme; this represents the world's largest investment to clean a single waterway. A population of 50 million rely on surrounding agriculture, irrigation, and fisheries from the Citarum so keeping it clean is essential for these communities. The river itself is 270 km in length and has a watershed of 6614 km^2, with over 1000 industries in this area. Many of these industries are powered by three large run-of-river hydroelectric power plants, the Saguling, Cirata, and Jatiluhur. In addition to low-carbon energy generation, the hydroelectric dams are a hub for waste, as the velocity of flow decreases, it leads to a natural sink for macroplastics and members of the community are employed to remove plastic waste as these points.

Despite this, it is argued that the amount of plastic will continue to increase by 9% each year and that half of the plastic waste generated in the Citarum River is incorporated into the river during the rainy season- where current research indicates that the lower 5 km of the river contains at least 5.62 m^{-3} of plastic waste. Therefore, this research aims to understand the intensity of microplastics throughout the entirety of the Citarum River. Samples were collected along the Citarum River around the three hydroelectric dams and up into the Jakarta Bay. Microplastics within the samples are fibres, fibre clumps, foam, fragments and microbeads. Fibres have the highest count overall and are dominant along with fibre clumps around the Cirata Dam, highly likely due to the amount of textile industries here. Second are fragments which are predominantly thin, sub-rounded with a high sphericity, and vastly increase around the Jatiluthur Dam where the industries here are predominantly chemical factories.