Supplementary Materials

Quantification and identification of microplastic in sediment and surface water from selected areas in the Brunei ecosystem

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Section S1: Figures

Figure S1. Baby leg, Microplastic sampling tool for water.

"BabyLegs" is a novel sample tool made to effectively gather microplastics from aquatic ecosystems. This ingenious invention is a pair of leggings with a thin mesh construction that can collect microplastic particles floating in water. The BabyLegs device is a relatively small, compact device intended to collect microplastics from aquatic settings, specifically from soil and river water samples. It is composed of a collection chamber at one end and a mesh filter (< 500 μm) at the other in a cylindrical container. To retain microplastic particles, water must pass through the mesh filter while the device is submerged in the water sample. After being captured, the microplastics are gathered in the chamber for further examination and measurement. considering its compact form and ease of use, the BabyLegs device is ideal for field sampling applications(Marine Debris Program, 2015), allowing researchers to quickly gather samples of microplastic from a variety of aquatic settings. Its design makes it simple to use and guarantees that microplastic particles will be reliably captured for additional research and analysis.

Figure S2. Sampling site D (Kampong Saba, 4.525546°N, 114.564849°E).

Sampling D (Kampong Saba) is one of the interesting locations for MP sampling for various reasons. It is Asia's largest water village where people rely on fishing and tourist attractions. Here in this research, we could collect only water samples but we refused to do the sediment sampling for safety purposes. Kampong saba is known for crocodile inhibition and thus we could do only for water sampling (Shams *et al.*, 2021). However, from the water sampling data collection, we could roughly expect for similar kind of MP available in Sampling D sediments.

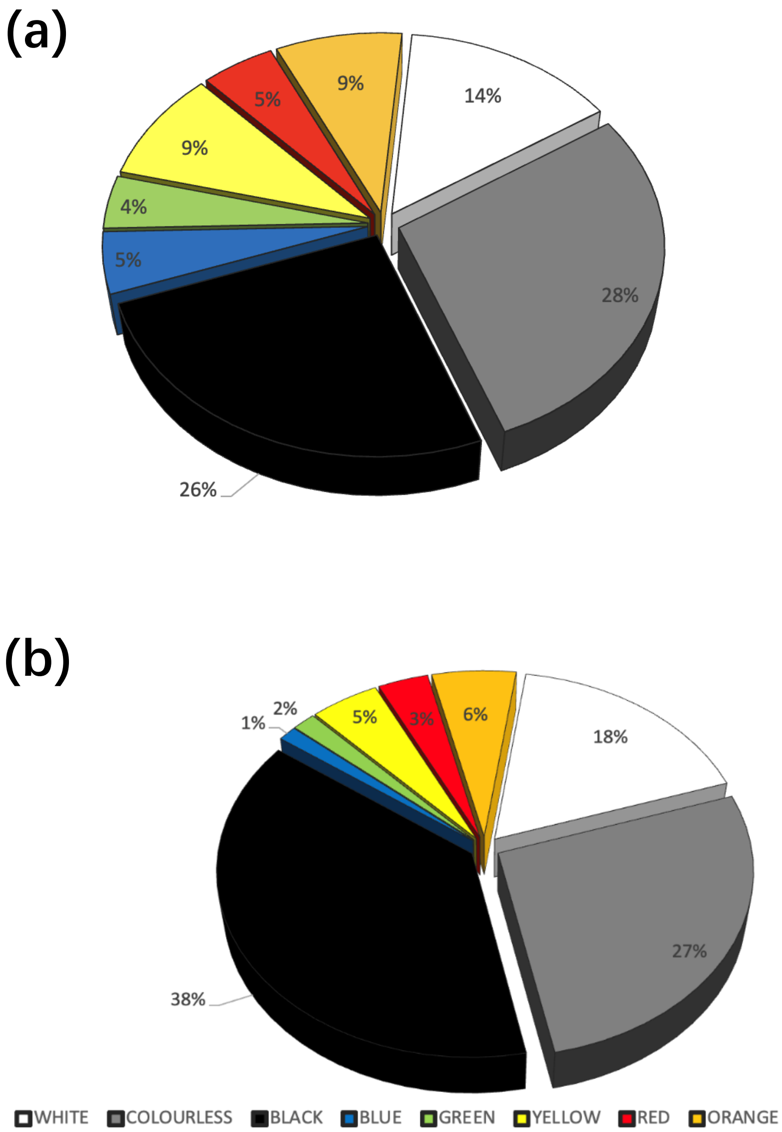

Figure S3. Overall identification and percent abundance of microplastic colors in the sediment (a), and water (b), across all sites.

With transparent-coloured microplastics emerging as the most abundant, constituting 28% of the findings, while green-coloured microplastics were the least prevalent at 4%. Conversely, in water samples, black-colored microplastics dominated, comprising a substantial 38%, with blue-colored microplastics being the scarcest at a mere 1%. Notably, across both sediment and water samples, black and transparent microplastics collectively commanded half of the pie chart, indicating their significant presence in the environment. Upon closer examination, when comparing sampling stations as depicted in Figure 2, sediment analysis revealed distinct nuances. White-coloured microplastics exhibited the highest prevalence in station F, comprising a notable 19% of the total findings. Furthermore, colourless microplastics exhibited remarkable prevalence in station A, capturing a staggering 49% of the bar chart. Stations B and C shared the highest concentration of black-coloured microplastics. Interestingly, blue-coloured microplastics were predominantly found in station F, whereas green-coloured microplastics were most abundant in station E. Intriguingly, station A exhibited an absence of both blue and green-coloured microplastics. Station C stood out with the highest concentration of yellow-coloured microplastics, comprising 11% of the total findings. Additionally, station F showcased a notable presence of red-coloured microplastics, constituting 9% of the findings, while station B revealed a substantial prevalence of orange-coloured microplastics at 15%. It's worth noting that the coloured microplastics exhibited various shades, likely attributable to degradation and deterioration processes occurring over time.

In our comprehensive analysis of water samples collected from various stations, a fascinating array of microplastic diversity emerged, painting a vivid picture of our environmental challenges. At station F, a striking prevalence of white-coloured microplastics stood out, constituting a significant 24% of the total. Meanwhile, station B boasted the highest concentration of black microplastics, suggesting potential localized sources or accumulation patterns. The panorama of microplastic hues continued to unfold with intriguing findings at stations A and C. At station A, transparent microplastics reigned supreme, comprising a substantial 34% of the sampled particles. Station C, on the other hand, presented a veritable kaleidoscope of colours, with blue, green, yellow, and red microplastics each vying for dominance. This vibrant spectrum hints at a complex interplay of environmental factors influencing microplastic distribution and composition. Delving deeper into our analysis, station F emerged once again as a hotspot, this time for orange microplastics, which commanded a notable 20% of the total abundance. Such localized concentrations underscore the spatial variability inherent in microplastic pollution and underscore the importance of targeted mitigation efforts tailored to specific geographical contexts.

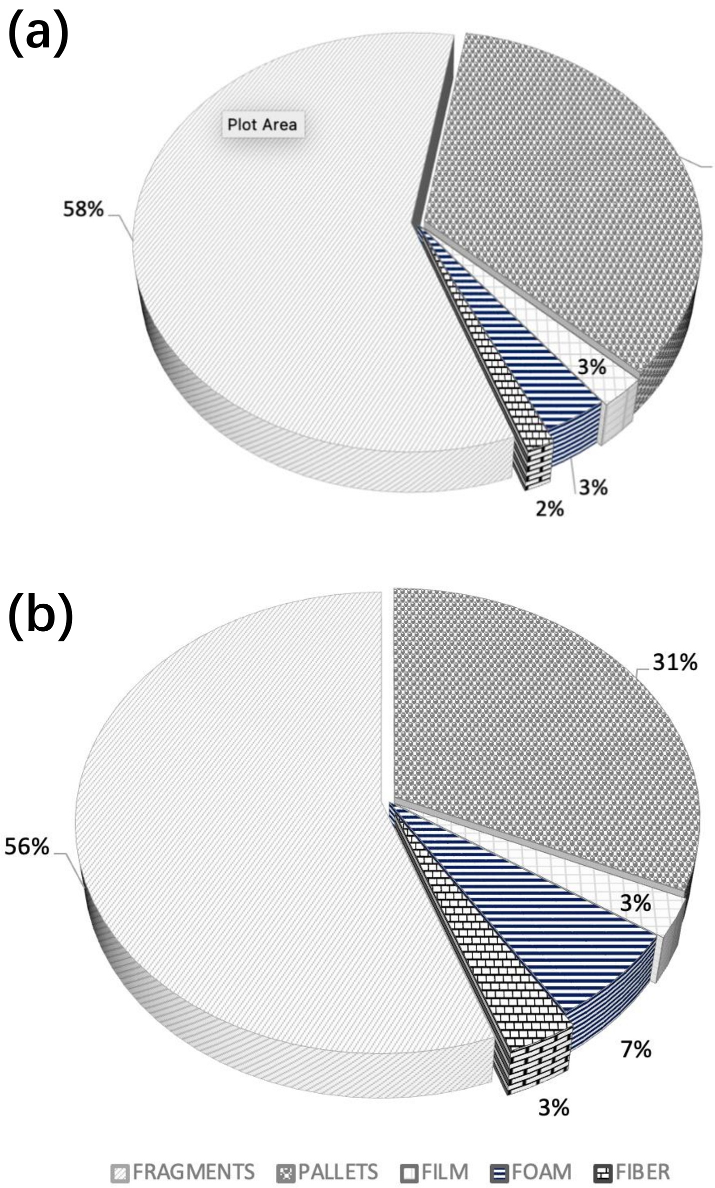

Figure S4. Overall identification and percent abundance of microplastic shape in the sediment (a), and water (b), across all sites.

An abundance of different microplastic shapes are found in the sediment and the water. Microplastics found in sediment were dominated by fragment shapes by 56% in sediment and 58% in water. The least microplastic found in sediment is fiber type which only has 2% and in water are fiber and film which both share the same percentage abundance of 3%. When compared across each sampling site, for sediment, station B shows the highest abundance of fragment-type microplastic by 65% and the least 50% in station F which still shows how dominant fragment-type microplastics are. Station F, exhibits the highest abundance of foam-type microplastics when compared to the other sites. For water samples, fragments in station A show the highest abundance amongst the other sampling sites, by 63%. As for pallets of microplastics, station D shows the highest abundance. In station C, foam-type microplastic was found to be in the highest abundance by 20%. Film microplastics were found the highest in station B and fiber type was most abundant in station E. Figure S4 shows the FTIR overlay of the extracted MP samples

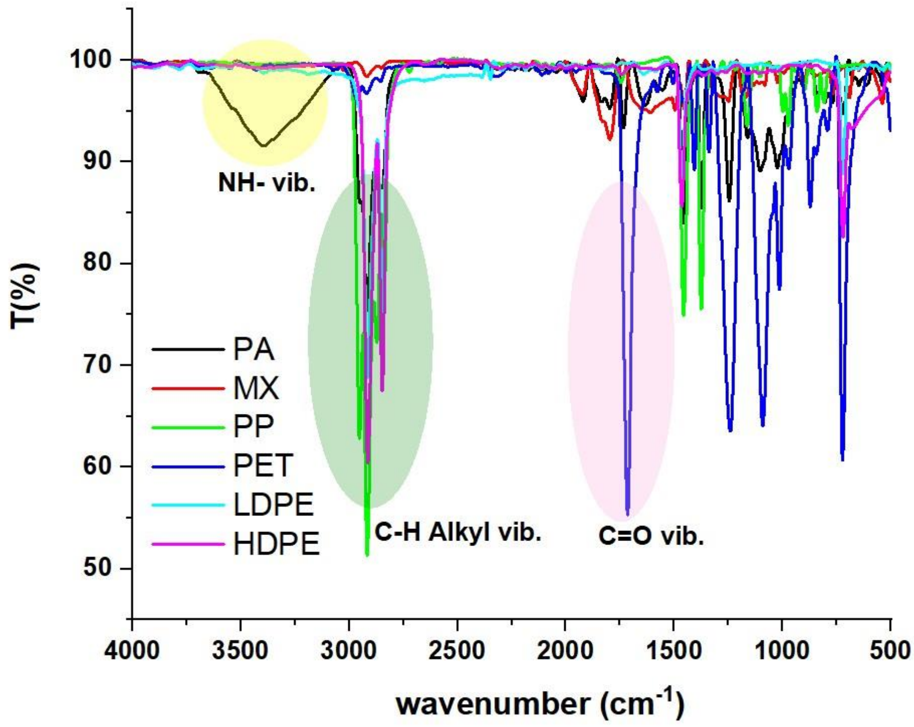

Figure S5. Overlay FTIR of all the extracted MP samples.

Section S2: Tables

Table S1.Total of microplastics captured for both sediment and water from each station

STATION	SEDIMENT (pieces/ g)	WATER (pieces /mL)
A	295	135
B	284	137
C	216	168
D	**N/A**	179
E	207	111
F	210	120
TOTAL	**1212**	**850**

REFERENCES

Marine Debris Program, N., 2015. Laboratory Methods for the Analysis of Microplastics in

the Marine Environment: Recommendations for quantifying synthetic particles in waters and sediments.
Shams, S., Reza, M.S., Azad, A.K., Juani, R.B.H.M., Fazal, M.A., 2021. Environmental Flow Estimation of Brunei River Based on Climate Change. Environ. Urban. ASIA 12, 257–268. https://doi.org/10.1177/09754253211047201