Island of garbage in Puerto Colombia in June 2019.

ECO-HYDRAULIC IMPACT OF PLASTIC FLOW OVER THE MOUTH OF THE MAGDALENA RIVER AND ADJACENT BEACHES

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Abstract: Plastic debris are an important issue due to the environmental impact it induces at the aquatic ecosystems. Since most of plastics come from land-based sources, rivers play an important role in transporting plastic patches. The Magdalena river, the most important river in Colombia ranks among the most contaminated rivers by plastic in the world. This contribution analyzes in situ data recorded during beach and river cleaning events, among of them stands out the data obtained from a coastal garbage island. The latter allowed estimating the plastic mass input of the Magdalena. This analysis could be used to raise societal attention on this eco-hydraulic problem and to highlight the need of an engineered plastic patches management plan and field measurements.

Keywords: plastic, Magdalena river, Garbage Island, eco-hydraulics.

Methods

1. The analysis was focused on a garbage island (Fig. 2) .
2. The Island contained more than 1050 tons of garbage, of which approximately 20% was plastic.
3. This Island was formed in a period of two – four days, initiating the accumulation of garbage on May 27th and being fully formed on May 31th (Fig. 3).
4. By analyzing data from satellite images and videos and assuming a LDPE density of 940 kg/m3, the approximate daily mass of plastics that entered the island in this time interval (3 days midpoint) could be estimated.
5. This estimation demanded delimiting the surface of the garbage island, by rebuilding in Qgis the affected area captured in drone videos. A subsequent correction, comparing several newspaper images, was carried out to find the real dimensions of the debris island.

Figure 1: Geographic location of the cleaning events

Figure 2: Island of garbage in Puerto Colombia in June 2019. Retrieved from Vanguardia (2019).

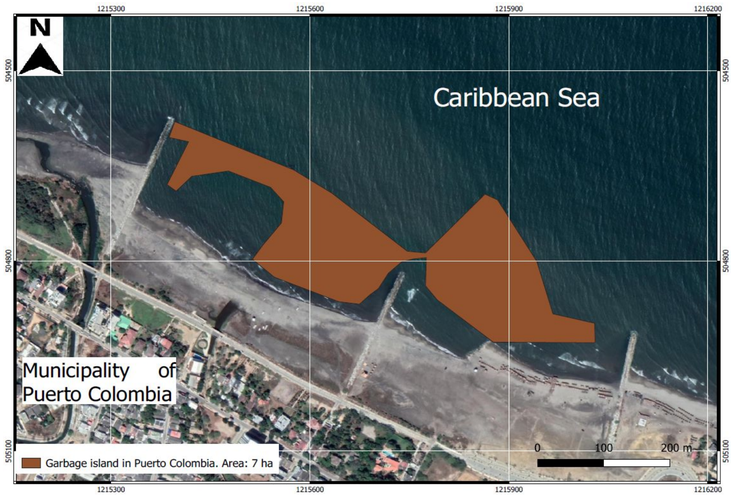

Figure 3: Island of garbage in Puerto Colombia in June 2019.

Results

It was determined that the approximate daily mass of plastics that entered the island in this time interval (3 days midpoint) was 65 tons. Finally, an annual projection of this rate results in 2.37 x 10 4 ton/year, which approaches both the midpoint (1.67 x 10 4 ton/year) and upper mass inputs (2.95 x 10 4 ton/year) estimated by Lebreton et al., (2017) for the lower Magdalena.

Conclusions

- The data reviewed confirm the incidence of plastic flow in the lower Magdalena river that significantly affects both the biota and the community welfare.
- Our results suggest that garbage patches volumes may be used as proxy information to estimate the plastic mass inputs.

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