

Plastic: an insidious new threat to Amazon's conservation

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Introduction

Microplastic (MP) pollution has been recognized as one of the major threats to aquatic biota, becoming a dominant issue in the recent literature on environmental impacts. The number of publications on MPs has increased exponentially worldwide since the 1990's. For the Amazonian ecosystem, the study of MPs is even more recent, and all the scientific production is concentrated in the last 10 years. This review aims to describe the current state of scientific knowledge about plastic pollution in the Amazon environment and related biota.

Materials and methods

An extensive literature review were conducted using databases such as Google Scholar, Web of Knowledge and ResearchGate. The set of keywords used in the review were searched in English, Spanish and Portuguese. A meta-analysis was carry on by filling out an *Excel* spreadsheet with several variables extracted from the studies.

Results

Up to June 2020, only 34 publications were available on MPs at the Amazon or related biota, 10 (29.4%) peer-reviewed articles and 24 (70.6%) grey literature documents (figure 1A). Most studies were conducted in Brazilian Amazon (32) and were published between 2010 and 2020, but 83.3% were from the last two and a half years (2018 to 2020) (figure 1B). The main subjects investigated were environmental screening and monitoring of microplastics (38%), ingestion and uptake of MPs by biota (35%), physiological effects of MPs (15%) and potential biomonitor species (12%) (figure 1C). Considering the different environments, most studies were conducted on rivers and beaches (38% each), followed by estuaries (15%) and the Amazon shelf (6%) (figure 1D). A single study considered the whole environment, since it is a review under publication for the whole Peru. MP ingestion was reported for freshwater, marine and estuarine fishes from the amazon coast. A plastic fragment was found in the amazon manatee (*Trichechus inunguis*). The sea

anemone *Bunodosoma cangicum* and the freshwater crab *Dilocarcinus pagei* were also found to accidentally consume MPs. Plastic fibers was the dominant type of MPs in 50% of the publications and the size analyzed varied from 1 μm to 5 cm. Nearly half of the publications (16) used analytical tools for identifying the plastic polymers. The most common identified polymers were Polyamide, PE, PP, Rayon, PET, PS, ABS, PU, PMMA and PVC.

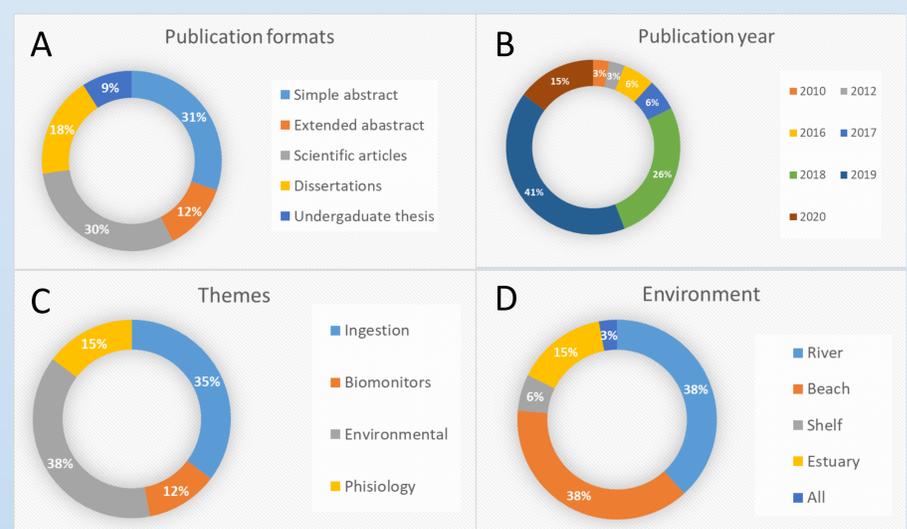


Figure 1: the distribution of the 34 publications units on microplastics at the Amazon (both grey and white literature), according to A: publication format; B: publication year; C: research theme and D: target environment.

Conclusion

This review shows that MPs contamination is already a reality for the Amazon environment and related biota. Negative effects at different ecological levels are probably taking place in the ecosystem. However, limited studies, lack of standardized methodologies and methodological flaws make it difficult to establish the fundamental knowledge necessary to evaluate the environmental levels and impacts of MP in the region, becoming urgent the need to improve scientific knowledge and laboratory infrastructure to study MPs in Amazon.

Acknowledgments