



Composites from Recycled Plastic Bottle Caps with Banana Rachis Fiber for Waste Valorization in Marine applications

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The European Union's commitment to reducing waste generation has prompted significant transformations, particularly focusing on enhancing recycling rates and minimizing landfilling [1, 2]. However, regions with constrained waste treatment infrastructure, such as the Outermost Regions (ORs) and islands, face unique challenges in meeting these directives [3]. This work explores the specific case of the Canary Islands, which currently struggles with low recycling rates and high landfilling percentages.

In light of the EU's waste directives and the pressing need for sustainable waste management solutions, this study investigates the feasibility of implementing Circular Economy principles within the polymer transformation industry of the Canary Islands. The research focuses on utilizing a polymer blend derived from recycled plastic bottle caps, coupled with banana fibers extracted from banana plants' pseudo-stem and rachis.

Results indicate that the polymer blend, reinforced with banana fibers, exhibits promising mechanical properties and cost-effectiveness, positioning it as a viable alternative to traditional plastic materials. Composite materials with higher reinforcement percentages demonstrate superior mechanical performance, suggesting their potential for various applications. The study also includes tests related to climatic aging and marine working conditions, confirming the durability and resilience of the composite materials under harsh environmental factors typical of island regions.

Furthermore, this study emphasizes the importance of extracting value from urban and agroforestry waste streams, thereby reducing environmental impacts associated with waste disposal. By adopting Circular Economy strategies, regions like the Canary Islands can not only address their waste management challenges but also contribute to broader sustainability goals.

This research underscores the significance of innovative approaches to waste management, particularly in regions facing inherent limitations. By leveraging local resources and embracing Circular Economy principles, the Canary Islands and similar regions can pave the way for a more sustainable and resilient future.

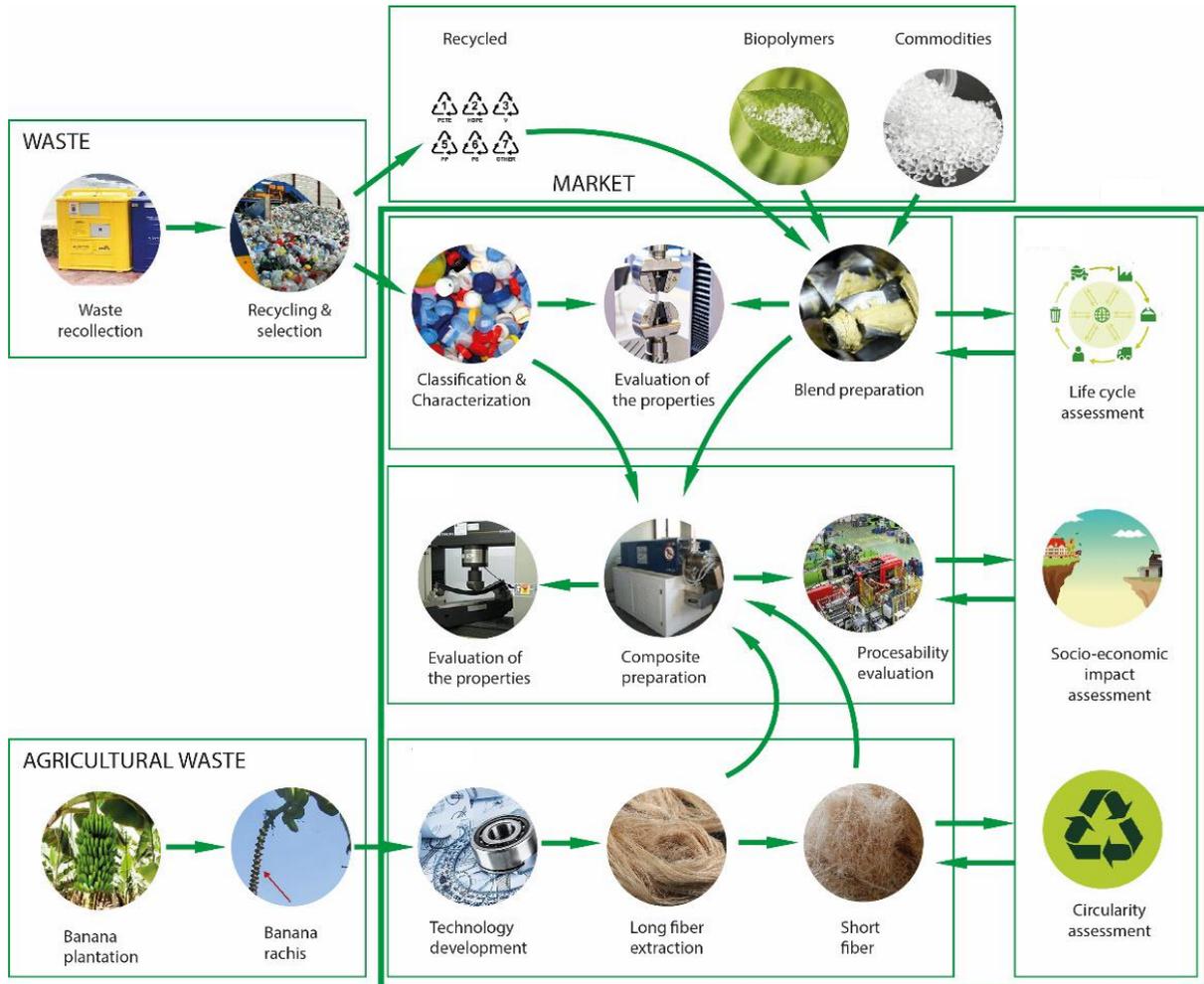


Figure 1. Chart flow

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