

Footprint For The Future, Exploring Bio-Based Biodegradable Plastics in Trail Running Shoes

This research project examines the environmental issue of microplastic pollution, specifically originating from shoe soles in natural ecosystems. Despite increasing awareness of microplastics, the impact of footwear, especially for outdoor activities like trail running, is often overlooked. This study investigates bio-based, biodegradable plastics as sustainable alternatives for the soles of trail running shoes to reduce harmful microplastic pollution.

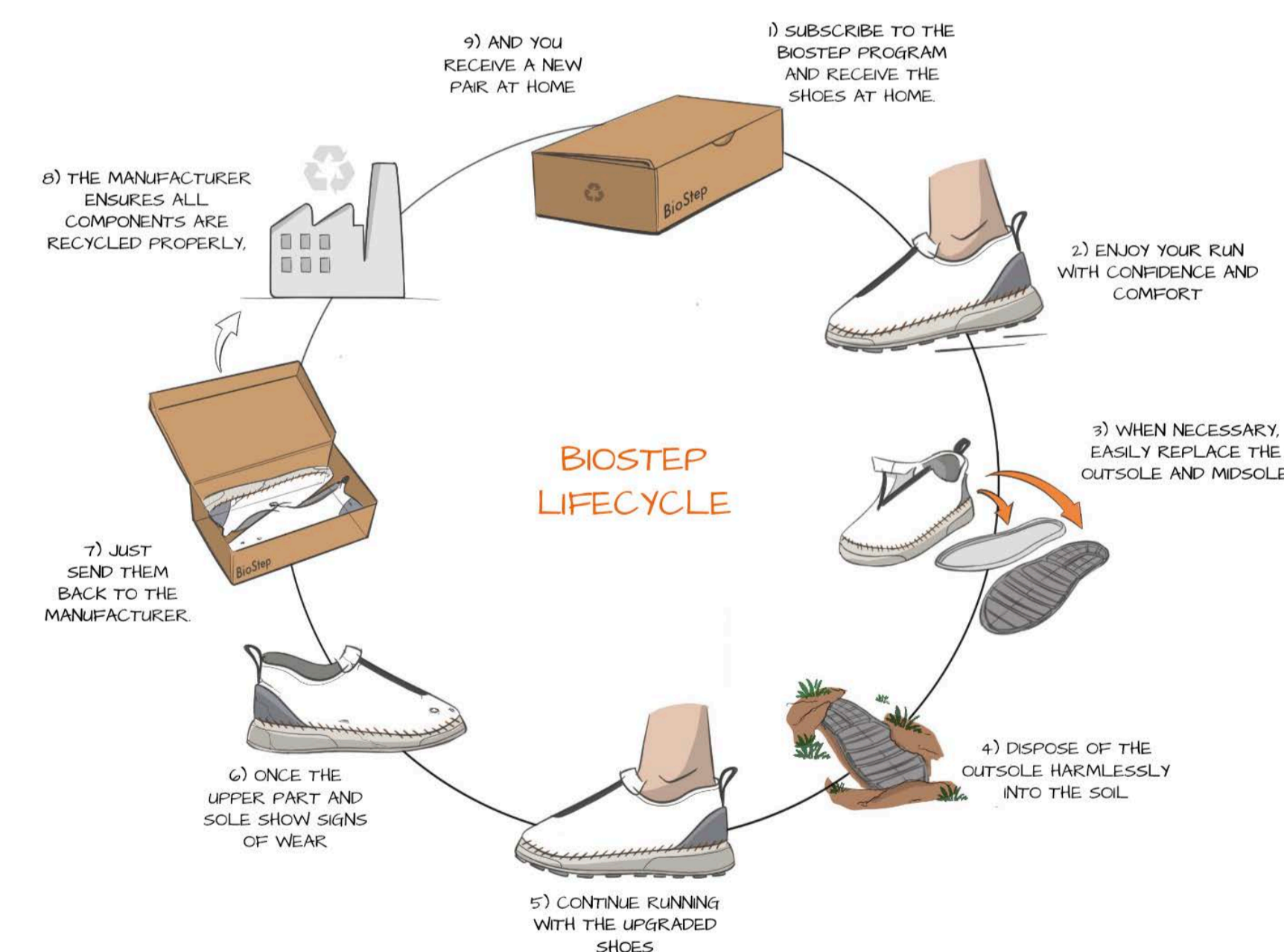
The investigation into bio-based, soil-biodegradable plastics identified PHA as a promising material, although it currently lacks the required flexibility for shoe sole applications. This led to the development of “BioStep,” a trail running shoe with a replaceable biodegradable outsole, designed to prevent microplastic release and decompose harmlessly at the end of its lifecycle.

“BioStep” consists of four main components: a knitted fabric upper, a removable midsole, a replaceable outsole,

and a sole stitched to the upper part. The design prioritizes the product’s architecture, in anticipation of future material improvements, and is intended to be disassembled at the end of its lifecycle to ensure proper recycling of each component.

The product lifecycle aims to minimise the environmental impact during use and at the end of life. As the outsole wears out, it can be easily replaced and disposed of in soil, preserving the rest of the shoe and extending its overall lifespan.

When replacement of both the sole and the upper part is necessary, users can return them to the manufacturer for recycling, receiving a new pair through a subscription program. This strategy seeks to create a sustainable cycle, ensuring that even non-biodegradable components are properly collected and recycled by the manufacturer.



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