

Beach Clean 2.0 Toolkit

Beach Clean 2.0 is a community-designed open-source toolkit that promotes material circularity by enabling communities and environmental groups to systematically collect and recover marine plastics from beaches.



Product Specification

Beach Clean 2.0 is a community co-designed, open-source toolkit, that encourages material circularity through systematic beach cleaning where marine plastics can be harvested by community members and environmental activists, such as beach cleaning groups. It comprises of a graphic instruction leaflet for a colour-coded materials harvesting process, a downloadable 3D print file to enable printing of a bag carrier, and a short usability survey for ongoing validity testing of the product, to inform future improvements. The 3D printable file may be printed by individuals with access to this technology, local schools and universities or industry prototyping facilities. The following products are available for download:

- Beach Clean 2.0 Instructions.
- Flyer Mockup.
- Beach Clean 2.0 3D Printable bag holder options (.stl): We recommend a 100% reworked / recycled rPLA filament.
- Usability survey QR code and link: Please contribute to the ongoing user testing of the system to help preserve positive features and improve the Beach Clean 2.0 Toolkit. If you have used Beach Clean 2.0, please complete this User Experience Survey: [Make User Experience Survey](https://forms.cloud.microsoft/e/0VnVDSn2QL) a live link to: <https://forms.cloud.microsoft/e/0VnVDSn2QL>.

Overview

Marine plastic pollution and beach litter remain a complex obstacle – or ‘wicked problem’ (Rittel & Webber 1973) – to oceanic health and societal wellbeing; thus, requiring a transdisciplinary

Category

Other Educational Tools &
Materials
Miscellaneous

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approach. Beach cleaning is a well-established, positive intervention that reduces litter and encourages ocean stewardship by increasing participants' environmental awareness. Plastics, especially, travel globally and persist in the oceans for prolonged periods. The life span of plastics may be as much as 500 years. Current collection efforts typically focus on removing litter, which often reaches landfill, rather than exploring the journey of the materials found and their potential for circular valorisation. Beach Clean 2.0 combines the social-psychology theory of 'Enviro-Leisure Activism' (Power 2022), 'Positive Design' (Desmet & Pohlmeier 2013) and polymer processing material science developing an ocean stewardship toolkit. This green transition activates environmental, community-oriented and leisure motives of coastal communities, and through design-led approaches equips people with knowledge, opportunity and capability to carry out a circular beach clean. Furthermore, research indicates that beach cleaning improves mental and physical wellbeing (Wyles et al. 2017).

Outcomes

Through iterative design and usability evaluation, the team further developed a citizen marine plastics collection system using colour-coded bags to sort materials by family type. Following an audit of beach clean contents, significant volumes of polypropylene (PP) twine, polyethylene (PE) rope, and mixed rigid plastics were identified informing the design of Beach Clean 2.0, which, has helped convert 36%-75% of marine plastics from site-specific objects of waste to materials of use. Compliance tests discovered that beach cleaner sorting were between 82.7%-100% for three categories of materials, where shortfalls related to integrated organic matter rather than identification issues. Test parts have been compression moulded using blended plastics and experimental 3D printed filament has been developed. Beach Clean 2.0 was user tested at seven locations across 1000km of Ireland's northern coastline – from the most southeastern part of Northern Ireland (Kilkeel) to the most northwestern in the Republic of Ireland (Moville). Here, the Usability Metric for User Experience (UMUX) survey (Finstad, 2010), was adapted for product and service design measuring effectiveness, efficiency, satisfaction and overall experience. The latest iteration of the design (V3: Sept.2025) had UMUX scores that averaged 71.8 (n=17) which is a good score but falls short of the ideal target of 80, indicating an excellent user experience. Across all of the studies to date (n=84) Beach Clean 2.0 has scored 79 for Trust and 71 for social value, demonstrating its potential.

UN Sustainable Development Goals Alignment

- SDG14 Life Below Water, specifically Target 14.1: Significantly reduce marine pollution, in particular from land-based activities.
- SDG3 Good Health and Well Being

References:

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