Adaptive capacity of the community for plastic waste management

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"Upon conducting field research, which includes climbing onto the robots to check, we reach the following conclusion:

1. The robots have state-of-the-art technology capable of chasing birds away.
2. All of the information you seek verification is wrong. Your scouts are likely too scared to come closer and, thus, make poor speculations from their 200-meter distance on what the robots can do."

—In "Bogeyman" (*The Kingfisher Story Collection*)

[SCIENCE COMMUNICATION]

Plastic waste pollution is a major global environmental issue. In the 1950s, the world generated only two million tonnes of plastic, but by 2023, this number had soared to over 450 million tonnes [1]. This represents a more than 200-fold increase in plastic production and consumption. Plastics are popular due to their durability, flexibility, cost-effectiveness, and lightweight nature [2].

However, the benefits of plastics come with significant environmental costs. Plastic debris can harm both terrestrial and aquatic animals; for instance, thousands of turtles and marine creatures fall victim to plastic fishing nets. Additionally, plastics break down into microplastics, which can enter the food web and disrupt the balance of ecological systems.

Subsequently, they can be consumed by humans, potentially leading to health issues such as cancer, cardiovascular diseases, and digestive problems [2].

In response, efforts are being made to reduce plastic waste through restrictions and bans on certain items, such as single-use plastic bags. Policies promoting initiatives like the 3R (Reuse, Reduce, Recycle), zero-waste lifestyles, and eco-friendly practices are recommended to address plastic pollution [3, 4].

Besides that, the adaptive capacity of local communities is also crucial for long-term success in combating plastic waste [4]. Adaptive capacity refers to the ability of systems, institutions, humans, and other organisms to adjust to potential damage, seize opportunities, or respond to consequences [5]. In the context of plastic pollution, local communities need to adapt their lifestyles to manage plastic waste effectively.

Illustration. Community-based plastic collection on the coastal ocean. Generated by Microsoft Designer.

For example, Phan et al. proposed strategies for plastic management in local and regional areas of Vietnam. These strategies include maintaining 3R practices, using eco-friendly materials, and improving waste collection systems. Collaboration among residents, authorities, and stakeholders, along with the adoption of a zero-waste lifestyle, is also essential [4].

To implement these strategies effectively, enhancing public awareness and perceptions of environmental protection is key. The Bayesian Mindsponge Framework (BMF) analytics, a novel method in socio-psychological research, is a potential approach to explore and explain psychological motivations toward waste management [6,7]. By combining the granular interactions thinking of Mindsponge theory and Bayesian analysis aided by Markov Chain Monte Carlo simulation, BMF can elucidate how personal norms and values influence the behavioral intention to use reusable shopping bags [8].

In summary, employing BMF analytics to predict behaviors and intentions related to 3R initiatives, eco-friendly practices, and zero-waste lifestyles offers insights into adapting to environmental changes, an area that remains underexplored in the literature.

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