Public Awareness and Behavioural Barriers to Reducing Plastic Pollution in Aquatic Environments

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Abstract:

The increasing prevalence of plastic pollution in water is now an ecological, public health and social issue. Despite growing public concern with plastic waste, awareness does not always lead to pro-environmental behavior. The public knowledge, attitude and behavior barriers that hinder individual and community action against plastic pollution in rivers, lakes, seas and coastal system are reviewed. The article outlines important psychological and social determinants of behavior knowledge, attitude, perceived risk, social norms, perceived behavioral control, convenience, habitual consumption, monetary cost, information gap and cognitive overload. The analysis also covers measurement techniques for awareness and behavior, like surveys, interviews, focus groups, observational studies, experiment designs and long-term tracking. The review discusses the need for use of education, community engagement, policy intervention, labeling, institutional accountability and culturally desirable communication to achieve sustainable behavioral change. To reduce plastic pollution, we need a concerted effort that combines public awareness campaigns with practical alternatives, supporting infrastructures, behaviour modifications and environmental governance. By understanding the disconnect between what people are aware of and what they actually do, it will be easier to design interventions that protect aquatic ecosystems. Further, it will enhance their environmental behaviour over the long term.

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Keywords: Plastic pollution; aquatic environments; public awareness; behavioral barriers; pro-environmental behavior

Introduction

Plastic pollution in aquatic environments poses critical threats to marine ecosystems and human health. By 2016, over 830 million tons of plastic waste had accumulated globally in rivers and oceans, with public awareness of the issue still limited (1). Microplastics have been detected in ocean sediments and the blood of both vertebrates and invertebrates (2). Scientific studies link plastics to toxicological effects, reproductive issues, and immuno-disruption in various species, signaling imminent risks to ecosystems and human health (3). Research gaps still hinder efforts to develop effective messaging for behavior change (4). The present work investigates public awareness and behavioral barriers related to plastic pollution in aquatic environments, with a focus on the implications for policy, practice, and survey research (5). The first section examines public awareness prior to specific actions, identifying knowledge, attitudes, beliefs, values, and social norms that hinder behavioral change (6). The second section reviews barriers that prevent selected actions from being adopted (7). The third section outlines methodologies for assessing awareness and behavior before, during, and after campaign interventions (8). The fourth section proposes strategies to enhance awareness and overcome behavioral barriers (9). The fifth section evaluates the roles of policy, community, and institutions in promoting awareness and adoption of behavior change (10). The sixth section presents case studies of interventions that have successfully increased awareness and shifted behavior (9). The seventh section considers ethical and cultural dimensions of messaging, including respect for values, avoidance of stigma, and equity (10). The eighth section identifies priorities for future research that address existing gaps (11).

Foundations of public awareness in environmental protection

Awareness of the multiple facets of public awareness is critical for any campaign to improve environmental behaviors (13). Awareness can be understood as a hierarchy that encompasses four elements, namely awareness of an issue, knowledge about it, pro-environmental attitudes, and pro-environmental behavior (13). According to the knowledge-attitude-behavior (KAB) model, improving awareness and knowledge of plastic pollution can encourage a public shift towards pro-environmental attitudes and behavior (14). However, campaigns centred on awareness often overlook other facets of awareness, such as the perceived effectiveness of different pro-environmental actions (15). Risk perception studies emphasize that effective risk communication considers both the knowledge of the hazard and changes in attitudes and pro-environmental behaviors required to alleviate the risk before it can occur (16-19).

Several additional frameworks illustrate the diverse influences on attitudes and behaviors (20). The risk-perception model relates attitudes toward hazards to perceived risk and the socio-psychological concept of subjective capability—the perceived ability to influence or control a situation (21). The theory of planned behavior posits that behavior is dependent on intentions, and that attitudes, social norms, and perceived behavioral control subsequently influence those intentions (22). Attitude-behavior models, such as the norm-activation model and the value-belief-norm model, maintain that knowledge about a threat leads to personal and collective outcome evaluations, which in turn shape awareness of responsibility and subsequently motivation to act (23). The self-determination theory adds further complexity, asserting that awareness of constraints on the freedom to act can weaken intrinsic motivation (24). Each of these frameworks indicates additional drivers of awareness and behavior that shape the influence of education campaigns (25, 26) (table 1, figure 1).

Table 1. Public-awareness constructs relevant to reducing plastic pollution in aquatic environments

Construct	Definition in this manuscript	Behavioral relevance	Suggested indicators
Issue awareness	Recognition that plastic pollution affects rivers, lakes, seas, sediments, organisms, and human well-being.	Creates the first condition for public concern and willingness to listen to mitigation messages.	Awareness of plastic leakage, microplastics, ecosystem harm, and human exposure.
Knowledge	Understanding of sources, pathways, consequences, and feasible reduction actions.	Improves the ability to choose effective behaviors rather than symbolic actions only.	Knowledge score; awareness of single-use plastics, recycling limitations, and reusable alternatives.

Risk perception	Perceived seriousness, personal relevance, and urgency of aquatic plastic pollution.	Shapes concern, attention, support for policy, and readiness to change habits.	Perceived risk to aquatic life, food chains, community health, tourism, and fisheries.
Attitudes and values	Positive or negative evaluation of plastic reduction and environmental responsibility.	Influences intention, but may not be sufficient when barriers remain high.	Agreement with statements about responsibility, stewardship, and ecological protection.
Social norms	Perceptions of what peers, family, institutions, and communities consider acceptable behavior.	Can normalize reusable options and discourage littering or unnecessary single-use consumption.	Perceived peer approval; visibility of reusable behavior; community expectations.
Perceived behavioral control	The belief that one can realistically reduce plastic use or dispose of plastics properly.	Predicts whether intention can become actual behavior.	Confidence in avoiding single-use plastics; access to alternatives; perceived convenience.

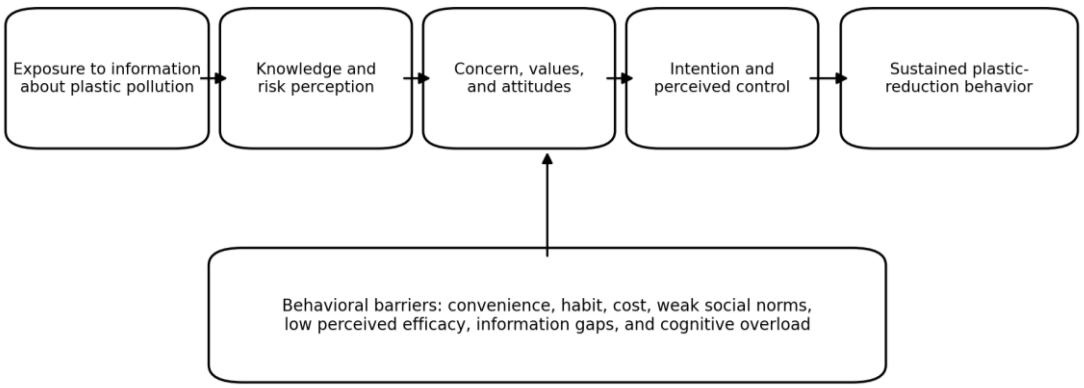

Figure 1: Awareness-to-action pathway for reducing plastic pollution

Behavioral barriers to reducing plastic pollution

In addition to public awareness of the plastic pollution problem, a better understanding of how to overcome individuals' motivational barriers to pro-environmental behavior is also needed (27). Unsurprisingly, the behaviours individuals can adopt to reduce plastic pollution are sometimes at odds with convenience, existing habits, and even social norms (1). Motivational barriers preventing meaningful increases in pro-plastic-reduction behaviours can be grouped into eight categories: convenience, existing habit, perceived efficacy, financial cost, social norm, information gap, cognitive overload, and lack of awareness of the issue (28).

The first three barriers—convenience, existing habit, and perceived efficacy—are upstream determinants; the other five are downstream (2). Convenience, existing habit, and perceived efficacy are collective upstream barriers common to all stakeholders (29). The concept of convenience refers to the ease of performing a (non-)behaviour relative to on-going alternatives (30). Financial cost is often a strong barrier that would prevent the adoption of pro-environmental behaviors (2). Examples of downstream barriers that hinder individuals from adopting pro-environmental behaviours into their routines include social norm and lack of awareness about the specific actions that one can undertake to improve the problem (27) (table 2).

Table 2. Behavioral barriers and targeted responses for reducing aquatic plastic pollution

Barrier	How it limits action	Targeted response	Example application
Convenience	Single-use plastics are often easier, faster, and more available than alternatives.	Make the sustainable choice the easiest choice.	Provide refill stations, reusable containers, clearly placed bins, and default reusable options.
Habit	Repeated purchasing, disposal, and consumption routines continue without active reflection.	Use prompts, reminders, and habit-disruption cues.	Place signs near purchase points, cafeterias, beaches, and waste-disposal areas.
Low perceived efficacy	Individuals may believe their actions are too small to matter.	Show collective impact and visible local outcomes.	Report kilograms of plastic removed, reduced bottle use, or cleaner shoreline indicators.
Financial cost	Reusable or plastic-free alternatives may appear more expensive.	Subsidize alternatives and remove cost barriers.	Distribute reusable bags or bottles and support low-cost refill systems.
Weak social norms	People may not see plastic reduction as expected or socially valued.	Use peer modeling and community norm messaging.	Highlight schools, businesses, or neighborhoods adopting plastic-reduction practices.
Information gaps	The public may know pollution exists but not know which actions are most effective.	Provide clear, specific, action-oriented messages.	Use simple guidance: refuse, reduce, reuse, sort correctly, and participate in cleanups.
Cognitive overload	Complex labels, conflicting instructions, and excessive information reduce action.	Simplify choices and reduce decision burden.	Use standardized labels, color-coded bins, and short visual instructions.

Methods for measuring awareness and behavior

Reducing plastic pollution in lakes and oceans is a global priority (31). Measuring the general public's awareness of the associated issues and potential solutions is essential for guiding appropriate messages (32). Furthermore, understanding barriers to adopting effective behaviors is equally important (33). Broadly speaking, people are aware of plastic pollution, its adverse effects, recommended solutions, and the need for sustainability (34). General plastics awareness is high among university students, yet awareness of microplastics is markedly lower (27).

Public awareness of plastic pollution is not uniform across demographic and other groups; significant divergence exists, for example, across disciplines within a student population (12). People tend to be more aware of water pollution than plastic pollution, which is perceived as a soil and river issue (34). Awareness is also influenced by the medium through which information is obtained —media sources, such as Instagram, newspapers, and television, and human sources, such as friends, teachers, and social motivation (35). Information is more readily received through the former than the latter (36). For lakes, specialized sources, such as academic articles and the Ontario Ministry of the Environment, Conservation, and Parks website, obtain higher accorded many feedback (27) (table 3).

Table 3. Methods for measuring public awareness and plastic-reduction behavior

Method	Best used for	Strengths	Limitations
Questionnaire survey	Knowledge, attitudes, risk perception, norms, intentions, self-reported behavior.	Efficient for large samples and demographic comparisons.	May be affected by recall error and social-desirability bias.
Semi-structured interview	Understanding motivations, barriers, cultural meanings, and perceived responsibility.	Provides rich explanations behind behavior.	Smaller samples; requires careful coding and interpretation.
Focus group	Exploring group norms, shared perceptions, and community-level barriers.	Useful for message testing and intervention design.	Dominant voices may influence discussion.
Observation or waste audit	Actual disposal practices, littering behavior, and plastic leakage points.	Measures behavior more directly than self-report.	Requires time, field access, and standardized protocols.
Experimental or quasi-experimental design	Testing effects of labels, prompts, nudges, incentives, or campaign messages.	Can estimate intervention effects more clearly.	Needs baseline data and suitable comparison groups.
Longitudinal tracking	Sustained behavior change after campaigns or policies.	Distinguishes short-term awareness from durable change.	More costly and vulnerable to participant attrition.

Strategies to enhance awareness and overcome barriers

National and local campaigns and initiatives across the world have proposed many strategies to enhance public awareness of and participation in reducing plastic pollution and other socio-environmental issues (37). Common such strategies include: Encourage communities or schools to conduct regular zero-waste such as “beach clean-up events, “proudly eco-friendly” and “transat-hats” campaigns aim to of people’s attitudes toward transatlantic prevent pollution of the environment and aquatic ecosystem; Adopt steps that set principles to display vital contents of plastic by taping materials used, keeping evenly-balanced containers, regularly-share information and public exhibit premises at steps such workshops dealing with repeat knowledge sharing (27).

Communities can organize public sign-up initiative, such as ACAP and national day events self-folded and share (38). Local demand influences potential engagement of multi-sectoral decision makers (39). Leverage channels, systems, and functionalities that can enhance public involvements and then engage interdisciplinary stakeholders to strengthen awareness of microplastics regardless of company’s concern of academia serving within channels (40). Inter-systems-enable dissemination of knowledge that go beyond effort of outreach (41). Double check whether the target community or sea system has already in place the same effort; consider emphasize-on-learn approach to nationwide general public besides participant sea system of outreach (27).

Public awareness and knowledge is positively associated with people’s attitude toward plastic pollution, and the degree of awareness and knowledge is relatively low among those citizens who raise awareness and don’t contribute to plastic reduction beaches (28). Attitude toward plastic pollution is not a key persuasive factor for those tourist- involved educational workshops (27). Public awareness and publicly-exposed data positively and significantly drive citizens’ awareness of joining the educational workshop. Provide participants with choices for other participation activity and establish a transparent regime for people to express their preferred channel (28) (figure 2).

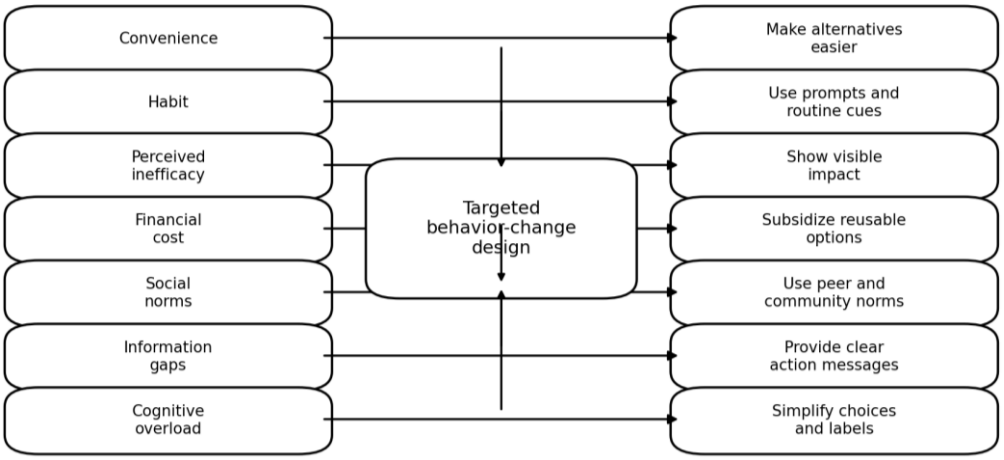

Figure 2: Matching behavioral barriers with intervention strategies

Role of policy, institutions, and communities

Policy interventions address plastics pollution at multiple scales, bringing different stakeholders and instruments into play (42). Local governments have an important mandate to educate citizens about proper disposal practices, institute mandatory labeling requirements, and improve the accessibility of disposal infrastructure (43). Non-governmental organizations can address policy issues by generating public support for new regulations and providing incentives for responsible behavior by businesses (12). High-level policies on plastics pollution as well as on the broader topics of soil erosion, deforestation, carbon footprint reduction, and water consumption remain largely absent from school curricula, creating significant challenges for the underlying knowledge-attitude-behavior framework (27). Within countries, voluntary or mandatory labeling can provide information about both the environmental and the social importance of reducing plastics usage (29). Well-disseminated regulations for single-use plastics limit their production, and organized behavior-change initiatives collectively reinforce compliance with the relevant regulations (28) (table 4, figure 3).

Table 4. Stakeholder roles in awareness-building and plastic-pollution reduction

Stakeholder	Primary role	Potential contribution	Accountability indicator
Local government	Regulation, waste infrastructure, enforcement, and public education.	Improve collection systems, ban or restrict selected single-use items, and support clean-up logistics.	Availability of disposal points, enforcement records, and reduction in aquatic litter hotspots.
Schools and universities	Education, youth engagement, and behavior modeling.	Integrate plastic-pollution topics into curricula and organize student-led audits and campaigns.	Student knowledge scores, participation rates, and campus plastic-use reduction.
Non-governmental organizations	Advocacy, outreach, and community mobilization.	Coordinate cleanups, public campaigns, citizen science, and policy advocacy.	Number of campaigns, volunteers, collected waste, and policy outputs.
Businesses and retailers	Product choice, packaging decisions, labeling, and consumer nudges.	Reduce unnecessary packaging and provide reusable or returnable options.	Share of plastic-free options, refill availability, and compliance with labeling rules.
Media and social platforms	Risk communication and norm formation.	Disseminate clear messages and highlight local success stories.	Audience reach, engagement, and accuracy of

			environmental messages.
Community members	Daily plastic-use choices, disposal behavior, and social influence.	Adopt reusable practices, sort waste, avoid littering, and participate in local actions.	Self-reported behavior, observed disposal practices, and participation in community initiatives.

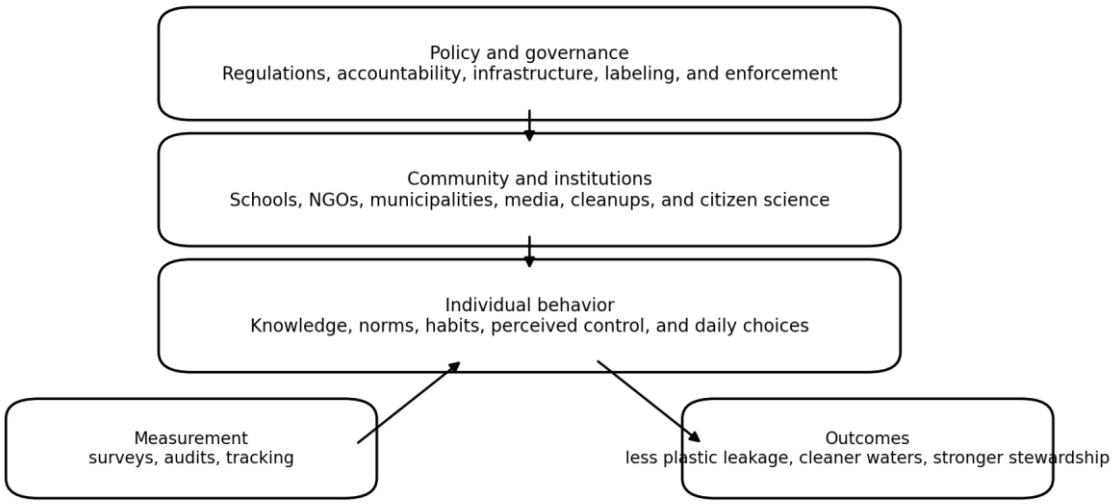

Figure 3: Multilevel framework for reducing plastic pollution in aquatic environments

Case studies of effective interventions

In 2010, an extensive plastic pollution campaign was launched on Aquidneck Island with multiple media events, radio broadcasts, social media postings, public discussions, and educational outreach to schools—strategies that can successfully be replicated elsewhere (27). The program emphasized the positive dimensions of the challenge and featured an on-air discussion with a respected community leader who called on citizens to take action (43). Weekly radio spots and Internet postings described small, feasible lifestyle changes anyone could adopt to diminish plastic pollution; free reusable bottles, bags, and takeout containers were distributed to help those unable to afford replacements; and community-wide follow-up sessions tracked progress and sustained interest (44). As these interventions developed, the Island's public agencies initiated encouraging complimentary actions including policies to ban certain single-use items (28).

During a Dutch project in 2017 and 2018, an initiative aimed to reduce plastic waste attracted significant media interest and engaged hundreds of citizens (30). Organizers targeted multipliers—individuals or organizations that influence large numbers of others—because of their power to amplify outreach and inspire collective action and also involved other stakeholders such as artists, companies, politicians, research institutes, educational establishments, and survey bureaus to broaden communication channels (31). Young people were specifically chosen as a target group given their drive to shape the future; clean-up initiatives in schools were combined with choices for alternatives to single-use plastic to increase relevance to a pivotal environmental issue; site decorations underscored the importance of citizen effort; and the objective was framed as making plastic hard to avoid instead of stigmatizing its usage (2).

Ethical and cultural considerations in messaging

Environmental education initiatives in Europe emphasize respect for local cultures and traditions while encouraging the community to develop and implement viable ideas for reducing marine litter (37). Mass media campaigns to combat marine litter should carefully consider culture-specific factors (38). A large share of the general public accepts that the world is facing an environmental crisis, but awareness of the extent of marine litter, its causes and effects, and potential solutions remains limited (39). The gaining of a more comprehensive understanding of marine litter does not necessarily result in a higher uptake of responsible behavior (40). Environmental education campaigns can consequently increase public awareness and inform citizens about ways in which they can care for the environment (44).

Future directions and research needs

Plastics are everywhere (45). A saturated consumerism and a weak governance system have led to abundance of plastics in the daily life of humans (46). As a consequence, the aquatic ecosystem is heavily impacted by the accumulated plastic debris (47). Various efforts and actions have been raised to face the generation and pollution of plastic debris in the aquatic ecosystem (48). The public awareness on plastic debris pollution in aquatic environments is acknowledged as an important issue for aquatic and human health (38). Public awareness among private citizens, businesses, and institutions on the topic of plastics pollution in terrestrial and aquatic ecosystems was investigated at the baseline stage in the context of both marine and non-marine environments in regular and pandemic settings in East Asia (2).

To address the public awareness toward plastic pollution in aquatic environments, the socio-economic, governance, and aquatic pollution status and issues in East Asia have been reviewed to understand the important context and framework for the situation (49, 50). Patterns of behavior obstacles for reducing plastic pollution are crucial in enhancing the awareness and motivating the action for mitigation in aquatic environments (51, 52). The comprehensive survey also provided an important baseline assessment on knowledge, attitudes, social norms, perceived behavioral control, and pro-environmental behavior for the topic of plastics pollution across East Asia (53, 54).

Surveys, interviews, focus groups, observational studies, experimental designs, and longitudinal tracking are widely used and repeated approaches to measure awareness and behavior on various settings (55, 56). These approaches can consider the validity and reliability in diverse settings through careful design and arrangement of question, purpose, and materials (57, 58). Specific metrics on knowledge, awareness, attitude, intention, reported behavior are universally employed to denote the analytical dimension with simple constructs (59, 60). The normal semi-structured manner of group discussion and arrangement also enables a targeted interaction and conversation to investigate the topic of interest on environmental issues in East Asia (61).

Conclusion

Plastic pollution in aquatic environments is a significant global challenge. Increasing public awareness of the problem and facilitating pro-environmental behavior are fundamental strategies to reduce plastic pollution. Awareness includes public knowledge about the threat posed by plastic and society's willingness to act against it. Since the different constructs of awareness and their interrelations have seldom been thoroughly examined, these aspects of awareness are described in the first two sections of this work. Behavioral barriers to reducing plastic pollution include convenience, habitual behavior, perceived efficacy, financial costs, social norms, gaps in information, and cognitive overload. Similar to awareness, the barriers to pro-environmental action have still not been systematically investigated in this way, and the third section maps these barriers onto relevant behavioral theories.

Measuring both awareness and behavioral barriers is essential to understanding the current situation and the impact of future interventions. Various instruments for collecting relevant and comparable data have been widely used but often without careful consideration of the specific validity and reliability of each. The fourth part of this paper reviews the most common measurement methods, including surveys, interviews, focus groups, observational techniques, experimental designs, and longitudinal tracking, and discusses the most appropriate sampling frames and other operational details. When awareness is the focal point, the five dimensions of knowledge, perceived importance, concern, attitudes, and pro-environmental intentions are especially recommended. When behavioral barriers are of primary interest, convenience, habits, perceived efficacy, financial costs, social norms, available information, and cognitive capacity represent the most relevant constructs.

The fifth section introduces specific strategies to enhance awareness and overcome these barriers, concentrating on the barriers perceived as most prominent. These strategies draw on insights from the theoretical literature, case studies of successful initiatives, and expert consultations. They encompass the content, structure, and tracing of awareness-motivating messages; framing techniques for information about the impacts of annual consumption; interventions to stimulate dispositional concern for the global problem; nudges, risk communication techniques, and gamified approaches to make lowering one's own contribution easier; incentives to switch to higher-cost alternatives with lower environmental impact; and education programs to extend community distribution of information, foster consensus on perceived importance and social norms, and address convenience, habitual behavior, and other barriers perceived as additional constraints. Each strategy can be further tailored according to audience, context, and specific barriers addressed.

Lastly, movement towards effective and broad-scale initiatives will remain necessary for a considerable time still. Among the remaining actions needed to accelerate this progress, the sixth section explains policy measures such as institutional responsibilities, community-led initiatives, governance, and accountability mechanisms. Each of these actions can facilitate the adoption and extent of awareness-enhancement strategies, supporting initiatives widely examined in the literature and leading to higher societal engagement.

The remainder of the concluding section highlights a set of principal, unanswered research questions for the field.

Funding statement: This work was supported and funded by the Deanship of Scientific Research at Imam Mohammad Ibn Saud Islamic University (IMSIU) (grant number IMSIU-DDRSP2601).

References:

1. Auld S. Living in the plastic crisis: a study of student awareness & behaviour regarding single-Use plastics on Lakehead University Campus. 2020. [PDF]

2. Marie Heidbreder L, Babloka I, Drews S, Menzel C. Tackling the plastic problem : a review on perceptions, behaviors, and interventions. 2019. [PDF]

3. Martins I, Almeida CMR, Ramos S. Plastic pollution in aquatic ecosystems: From research to public awareness. Life Below Water. 2022. archive.org

4. Baechler BR, De Frond H, Dropkin L, Leonard GH, Proano L, Mallos NJ. Public awareness and perceptions of ocean plastic pollution and support for solutions in the United States. Frontiers in Marine Science. 2024 Jan 19;10:1323477. frontiersin.org

5. Miguel I, Santos A, Venâncio C, Oliveira M. Knowledge, concerns and attitudes towards plastic pollution: An empirical study of public perceptions in Portugal. Science of The Total Environment. 2024 Jan 1;906:167784. sciencedirect.com

6. Praveena SM. Exploring public awareness, influencing factors and policy implications towards microplastic pollution: perspectives from Malaysia. Marine Policy. 2024. [HTML]

7. Bertolazzi S, Cuttitta A, Pipitone V. Addressing marine plastic pollution: a systematic literature review. Current Opinion in Environmental Sustainability. 2024 Jun 1;68:101428. sciencedirect.com

8. Horton AA. Plastic pollution: When do we know enough?. Journal of Hazardous Materials. 2022. sciencedirect.com

9. Ibrahim MA, Saba AO, Mohammed M, Ojewole AE. Public awareness and perception of the ecological impacts and responsibility for plastic pollution in Nigeria. Environmental & Socio-economic Studies. 2025 Mar 26;13(1):15-27. sciendo.com

10. de Sousa FDB. Consumer awareness of plastic: An overview of different research areas. Circular Economy and Sustainability. 2023. nih.gov

11. Wootton N, Nursey-Bray M, Reis-Santos P, Gillanders BM. Perceptions of plastic pollution in a prominent fishery: Building strategies to inform management. Marine Policy. 2022 Jan 1;135:104846. [HTML]

12. L. Hartley B, Pahl S, Veiga J, Vlachogianni T et al. Exploring public views on marine litter in Europe: Perceived causes, consequences and pathways to change. 2017. [PDF]

13. Caminiti C, Diodati F, Puntoni M, Balan D, Maglietta G. Surveys of knowledge and awareness of Plastic Pollution and Risk Reduction Behavior in the General Population: a systematic review. International Journal of Environmental Research and Public Health. 2025 Jan 27;22(2):177. mdpi.com

14. Ravi RK, Edwin V, Rasheed FA, Jaison AM. Awareness, pro-environmental behaviours, and strategies for mitigation of plastic pollution among nursing students in the United Arab Emirates. New Emirates Medical Journal. 2024 Jan;5(1):E02506882346080. benthamdirect.com

15. Rapada MZ, Yu DE, Janairo JI, Yu KD. Impact of online-based information and interaction to proenvironmental behavior on plastic pollution. Cleaner and Responsible Consumption. 2023 Jun 1;9:100126. sciencedirect.com

16. Mashamba R, Dalu MT, Cuthbert RN, Dondofema F, Dalu T. Human perceptions and reports of pro-environmental behaviours in the context of plastic pollution in rural communities within a UNESCO subtropical biosphere reserve. Journal of Environmental Studies and Sciences. 2025 Sep;15(3):503-15. ump.ac.za

17. Saavedra F, Mego M, Ticona S, Thiel M, Baeza J, Espinosa A. Sea of plastic: representations of the sea and pro-environmental attitudes and behaviors regarding marine plastic pollution in Peru and Chile. Frontiers in Psychology. 2024 Jan 18;14:1308796. frontiersin.org

18. Mujtaba BG. Shaping Pro-Environmental Intentions: A Theory of Planned Behavior-Guided Study on Plastic Pollution Reduction Behavior in Texan High Schools. Organization Development Journal. 2025. odjournal.org

19. Prihandono[1] D, Abiprayu[1] KB, Wijaya[1] AP, Airyq[1] IM, Maruto[1] SN. Analyzing Behavioral Patterns in Plastic Waste Management: Towards Sustainable Environmental. InProceedings of the International conference of Economics Business and Economics Education Science (ICE-BEES-24) 2024 Oct 2 (Vol. 298, p. 221). Springer Nature. atlantis-press.com

20. Liu GL, Wang Y. Modeling EFL teachers' intention to integrate informal digital learning of English (IDLE) into the classroom using the theory of planned behavior. System. 2024. [HTML]

21. Wang C, Wang H, Li Y, Dai J, Gu X, Yu T. Factors influencing university students' behavioral intention to use generative artificial intelligence: Integrating the theory of planned behavior and AI literacy. International Journal of Human–Computer Interaction. 2025 Jun 3;41(11):6649-71. openreview.net

22. Ababneh KI, Ahmed K, Dedousis E. Predictors of cheating in online exams among business students during the Covid pandemic: Testing the theory of planned behavior. The International Journal of Management Education. 2022 Nov 1;20(3):100713. nih.gov

23. Wu SW, Chiang PY. … of planned behavior on the relationships between environmental awareness, green advocacy, and green self-efficacy on the green word-of-mouth intention. Sustainability. 2023. mdpi.com

24. Li L, Wang Q, Li J. Examining continuance intention of online learning during COVID-19 pandemic: Incorporating the theory of planned behavior into the expectation–confirmation model. Frontiers in psychology. 2022. frontiersin.org

25. Zadeh AH, Farhang M, Zolfagharian M, Hofacker CF. Predicting value cocreation behavior in social media via integrating uses and gratifications paradigm and theory of planned behavior. Journal of Research in Interactive Marketing. 2023 Mar 21;17(2):195-214. [HTML]

26. Brehmer M. Perceived moral norms in an extended theory of planned behavior in predicting university students' bystander intentions toward relational bullying. European journal of investigation in health, psychology and education. 2023 Jul 2;13(7):1202-18. mdpi.com

27. Hamphoff CM. Introducing a Modern Milk Man in Germany?: Drivers and Barriers for the Adoption of Reusable Packaging Systems in Germany: The Case of the Reusable Packaging …. 2023. [HTML]

28. Myatt P. Coastal Plastics Abatement on Aquidneck Island, Rhode Island: Stakeholder Perspectives and Lessons Learned. 2019. [PDF]

29. Saavedra F, Mego M, Ticona S, Thiel M et al. Sea of plastic: representations of the sea and pro-environmental attitudes and behaviors regarding marine plastic pollution in Peru and Chile. 2024. ncbi.nlm.nih.gov

30. Panchal TK, Patel P, Gupta A, Saikia MV. YOUTH ENGAGEMENT AND TECHNOLOGICAL INNOVATIONS TOWARDS SDGS: INSIGHTS FROM OCEANCLEANERZ TECHNOLOGIES. researchgate.net. . researchgate.net

31. Purba NP, Pasaribu B, Faizal I, Martasuganda MK, Ilmi MH, Febriani C, Alfarez RR. Coastal clean-up in Southeast Asia: lessons learned, challenges, and future strategies. Frontiers in Marine Science. 2023 Dec 15;10:1250736. frontiersin.org

32. Migliorini L, Olcese M, Cardinali P, Madera F. Exploring outdoor initiatives as tools for youth engagement, inclusion, and environmental awareness: a multi-case study from Italy and France. Children and Youth Services Review. 2025 Nov 7:108659. [HTML]

33. Samsudin NA, Othman H, Siau CS, Zaini ZII. Exploring community needs in combating aedes mosquitoes and dengue fever: a study with urban community in the recurrent hotspot area. BMC Public Health. 2024. springer.com

34. Wootton N, Nursey-Bray M, Holland S, Gillanders BM. Better understanding ocean awareness: Insights from young people. Marine Policy. 2024. sciencedirect.com

35. Tabanao EG, Barnido DD, Pableo JC. Youth engagement in environmental sustainability: Bridging action and awareness for SDG 11. Ignatian International Journal for Multidisciplinary Research. 2025;3(2):335-45. icceph.com

36. Buijs AE, de Koning S, Mattijssen TJ, Smeding IW, Smits MJ, Steins NA. Civil society for sustainable change: strategies of NGOs and active citizens to contribute to sustainability transitions. Journal of Environmental Planning and Management. 2024 Oct 14;67(12):2863-84. tandfonline.com

37. Bettencourt S, Freitas DN, Lucas C, Costa S, Caeiro S. Marine litter education: From awareness to action. Marine Pollution Bulletin. 2023 Jul 1;192:114963. sciencedirect.com

38. Liu TK, Chang H, Chen YS. Public awareness of marine environmental quality and its relationship for policy support on marine waste management. Marine Pollution Bulletin. 2023. [HTML]

39. Van Oosterhout L, Dijkstra H, Van Beukering P, Rehdanz K, Khedr S, Brouwer R, Duijndam S. Public perceptions of marine plastic litter: A comparative study across European countries and seas. Frontiers in Marine Science. 2022 Jan 28;8:784829. frontiersin.org

40. Bettencourt S, Freitas DN, Costa S, Caeiro S. Public perceptions, knowledge, responsibilities, and behavior intentions on marine litter: Identifying profiles of small oceanic islands inhabitants. Ocean & Coastal Management. 2023 Jan 1;231:106406. sciencedirect.com

41. Râpă M, Cârstea EM, Șăulean AA, Popa CL, Matei E, Predescu AM, Predescu C, Donțu SI, Dincă AG. An overview of the current trends in marine plastic litter management for a sustainable development. Recycling. 2024 Apr 9;9(2):30. mdpi.com

42. Catarino AI, Mahu E, Severin MI, Akpetou LK, Annasawmy P, Asuquo FE, Beckman F, Benomar M, Jaya-Ram A, Malouli M, Mees J. Addressing data gaps in marine litter distribution: citizen science observation of plastics in coastal ecosystems by high-school students. Frontiers in Marine Science. 2023 Feb 6;10:1126895. frontiersin.org

43. Lucrezi S. Public perceptions of marine environmental issues: A case study of coastal recreational users in Italy. Journal of Coastal Conservation. 2022. nih.gov

44. Çevik C, Kıdeyş AE, Tavşanoğlu ÜN, Kankılıç GB, Gündoğdu S. A review of plastic pollution in aquatic ecosystems of Turkey. Environmental Science and Pollution Research. 2022 Apr;29(18):26230-49. google.com

45. Yu RS, Yang YF, Singh S. Global analysis of marine plastics and implications of control measure strategies. Frontiers in Marine Science. 2023. frontiersin.org

46. King CD, Stephens CG, Lynch JP, Jordan SN. Farmers' attitudes towards agricultural plastics–Management and disposal, awareness and perceptions of the environmental impacts. Science of the Total Environment. 2023 Mar 15;864:160955. [HTML]

47. Thiagarajan C, Devarajan Y. The urgent challenge of ocean pollution: Impacts on marine biodiversity and human health. Regional Studies in Marine Science. 2025. [HTML]

48. Apete L, Martin OV, Iacovidou E. Fishing plastic waste: Knowns and known unknowns. Marine Pollution Bulletin. 2024. sciencedirect.com

49. Akande M. Sustainable solution for plastic waste management and education campaigns to mitigate plastic consumption and foster behavior change. 2023. liberty.edu

50. MacDonald A, Allen D, Williams L, Flowers P, Walker TR. People, plastic, and behaviour change–a comment on drivers of plastic pollution, barriers to change and targeted behaviour change interventions. Environmental Science: Advances. 2023;2(4):551-7. rsc.org

51. Tang KHD. Attitudes towards plastic pollution: A review and mitigations beyond circular economy. Waste. 2023. mdpi.com

52. Aithal PS. Strategic and sustainable plastic management: promoting awareness over bans for responsible usage. Poornaprajna International Journal of Philosophy & Languages (PIJPL). 2024 Dec 31;1(1):136-70. researchgate.net

53. Rahman MM, Jahan I, U-Shah F, Shahide AM, Alam Shobuj I, Hossain MT, Alam E, Islam MK. Public perception on plastic pollution: a web-based study in Dhaka City, Bangladesh. BMC Public Health. 2025 Feb 20;25(1):710. springer.com

54. Bujold PM, Williamson K. Solutions to plastic pollution with community-based behavior change. 2025. sgp.org.np

55. Fink A. How to conduct surveys: A step-by-step guide. 2024. [HTML]

56. Olawale SR, Chinagozi OG, Joe ON. Exploratory research design in management science: A review of literature on conduct and application. International Journal of Research and Innovation in Social Science. 2023;7(4):1384-95. researchgate.net

57. Alsharida RA, Al-rimy BAS, Al-Emran M, Zainal A. A systematic review of multi perspectives on human cybersecurity behavior. Technology in society. 2023. [HTML]

58. Chaudhary S, Gkioulos V, Katsikas S. Developing metrics to assess the effectiveness of cybersecurity awareness program. Journal of Cybersecurity. 2022. oup.com

59. Tang Y, Hew KF. Effects of using mobile instant messaging on student behavioral, emotional, and cognitive engagement: a quasi-experimental study. International Journal of Educational Technology in …. 2022. springer.com

60. Ussher JM, Perz J, Allison K, Power… R. Attitudes, knowledge and practice behaviours of oncology health care professionals towards lesbian, gay, bisexual, transgender, queer and intersex (LGBTQI) …. Patient Education and …. 2022. sciencedirect.com

61. Wu H, Wang Y, Wang Y. "To use or not to use?" A mixed-methods study on the determinants of EFL college learners' behavioral intention to use AI in the distributed learning context. International Review of Research in Open and Distributed Learning. 2024 Aug;25(3):158-78. erudit.org