



Editorial: Waste Challenges in the Context of Broad Sustainability Challenges

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Editorial on the Research Topic

Waste Challenges in the Context of Broad Sustainability Challenges

It is now undeniable that humanity's relationship with the planet is sick. The most effective approach to restrict the degradation of ecosystems is to significantly change human consumption patterns toward more sustainable ones. The amount of waste generated is the result of the consumer society that emerged in the second half of the 20th century (Bauman, 2007). Waste can lead to both resource and environmental problems; sustainable waste management is therefore an important tool to achieve a sustainable consumption cycle in society (Awasthi et al., 2019). When improperly managed, the greenhouse gases (GHG) carbon dioxide and methane gas are produced, contributing to global warming and climate change (Lee et al., 2016).

Waste management has strong impacts on different sectors of society, specifically in terms of environment and health, but also related to different aspects of global sustainability. Future ecological challenges will have to consider the strong connections between waste and climate policy (Udomsri et al., 2011), addressing aspects that necessarily reflect the demanding issues of the current environmental situation. This will imply a transition in consumption patterns, more efficient production methods, and waste management with a greater focus on lifecycle, circular economy, and social-environmental impacts (Debrah et al., 2021a; Debrah et al., 20212021b). Within the UN 2030 Agenda, wider sustainability challenges must be considered highly relevant and waste is, per se, considered essential to pursue global sustainability, addressed in different Sustainable Development Goals (SDGs) (Leal Filho et al., 2022). Sustainable cycles can be achieved with increased recycling and reduced landfilling, a major issue in developing countries, thus contributing to climate change impacts' mitigation, efficiency in the use of natural resources, and, consequently, protecting human and environmental health. Worldwide studies have also emphasized that disadvantaged communities are more likely to be exposed to inappropriate waste management (Martuzzi et al., 2010), which can undermine sustainability efforts.

Due to its nature, it is implied that the application of combined methodologies and approaches, i.e., innovative solutions, can contribute to properly addressing this global issue. However, these solutions must consider wider sustainability challenges that go beyond the classic ones as well as ones that have recently emerged: climate change impacts and unpredictability, pandemics, socioeconomic inequalities and exposure to waste, manual scavenging, and many others. A global commitment is

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needed by policymakers, stakeholders, and civil society, working together to strengthen social cohesion through the adoption of common purposes.

Considering what is at stake, research needs to move on towards combined efforts to further advance waste management challenges, translated by the articles integrating this Research Topic, presented below.

Encouraging the use of greener solutions without compromising their competitive advantage to replace the use of plastics in the food industry was the subject of analysis in a commentary produced by Charlebois et al. The authors argue that current bioplastics research needs to be further reinvented to assess its scale. Accordingly, the challenge will rely on persuading the whole food industry to make significant changes in the packaging in a timely way, guided by strategic policy execution at the governmental level.

Based on 761 samples collected from Shandong, Jilin, and Gansu provinces located in China, Jiao et al. have used econometric models to estimate farmers' willingness to participate and pay for centralized mode provision of rural domestic sewage treatment, and found that about 82% of the farmers would be willing to contribute to it. Following these results, the authors highlight that the enhancement of environmental awareness of farmers about the necessity of waste treatment should be the next priority of the Chinese government, thus contributing to creating a positive environment in developing countries and advancing sustainable development goals through better wastewater management.

The "White Coffin" initiative, a flagship of environmental activism on various Malaysian campuses to get rid of polystyrene containers, was a flagship of environmental activism on campuses around 2008. The study by Chan et al. reports on the advocacy of a public Malaysian university for environmental protection through sustainable waste practices since the "White Coffin" ban. The authors found that the first perception of the public is always linked to the dirty recycle bins and foul odors, restricting effective recycling practices. With time, the studied University was able to develop sustainable practices through the programs described in the article, thus showing that sustainability strategies in higher education are in line with the recommendations of the United Nations aiming to limit methane emissions by 2030.

Food waste is becoming increasingly important in terms of volume and value, posing a danger to sustainable development, food market stability, human population increase, and people's well-being. As a result, especially because customers are to blame for a substantial portion of food waste, the study from Szymkowiak et al. examines the problem of home food waste from the standpoint of both food product features and consumer lifestyles. The findings show that consumers who have similar product attribute preferences also have similar food-related lifestyles. The key contribution of this study is the identification of consumer groups and the characteristics that distinguish them in terms of behavioral variables related to the relevance of food product factors influencing the trend to waste them.

Considering the volume of municipal solid waste in Hong Kong, the city has planned to implement a charging scheme in 2023. The study of Cheng et al. has focused on analyzing the urgency of municipal solid waste concern, taking into account the public attitudes toward waste management, supported by strong enforcement, through intensive environmental education programs and resources at the government level. Under this, for a successful implementation of the waste charge scheme in a city with such a high population density as Hong Kong, the authors end up proposing a phase-wise implementation strategy involving a policy mix.

According to Cook et al., construction and demolition waste mismanagement can cause significant harm to the health of 200 million workers and people who live and work near construction and demolition sites. The authors used a systematic PRISMA scoping review comprising more than 3,000 publications to assess hazards and risks associated with these wastes in low- and middle-income countries. Among other findings, the authors found evidence of construction and demolition waste being disposed of by open burning in many low- and middle-income countries, risking exposure to dioxins and related compounds due to high chloride-content PVC, being crucial to assess the magnitude of the emissions involved and its potential to affect human health.

The above-mentioned six articles rely upon different methodologies to assess various aspects involved in waste management challenges at the global level, advancing the knowledge towards the proposed initial call involving Broad Sustainability Challenges. All contributions are clear in highlighting the role played by adequate waste management strategies in every scope assessed, demonstrating how urgent it is to advance sustainable development in this context to strengthen cohesion at a worldwide level.

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MAPD and DGV wrote the first draft of the manuscript. BN and HB have contributed to the manuscript's final version and checked the final manuscript. All authors contributed to the article and approved the submitted version.

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REFERENCES

- Awasthi, M. K., Kumar, A., Sankar Cheela, V. R., D'Adamo, I., Iacovidou, E., Islam, M. R., et al. (2019). Zero waste approach towards a sustainable waste management. *Resources, Environment and Sustainability* 3. doi:10.1016/j.resenv.2021.100014
- Bauman, Z. (2007). *Consuming life*. Oxford: Polity Press.
- Debrah, J. K., Carlotto, I. N., Vidal, D. G., and Dinis, M. A. P. (2021a). Managing Medical Waste in Ghana—the Reality. *Int. J. Environ. Stud.*, 1–17. doi:10.1080/00207233.2021.1994752
- Debrah, J. K., Vidal, D. G., and Dinis, M. A. P. (2021b). Raising Awareness on Solid Waste Management Through Formal Education for Sustainability: A Developing Countries Evidence Review. *Recycling* 6, 6–21. doi:10.3390/recycling6010006
- Leal Filho, W., Vidal, D. G., Chen, C., Petrova, M., Dinis, M. A. P., Yang, P., et al. (2022). An Assessment of Requirements In Investments, New Technologies and Infrastructures to Achieve The SDGs. *Environ. Sci. Eur.* 34, 58. doi:10.1186/s12302-022-00629-9
- Lee, S., Kim, J., and Chong, W. K. O. (2016). The Causes of the Municipal Solid Waste and the Greenhouse Gas Emissions From The Waste Sector In The United States. *Waste Manag.* 56, 593–599. doi:10.1016/j.wasman.2016.07.022
- Martuzzi, M., Mitis, F., and Forastiere, F. (2010). Inequalities, Inequities, Environmental Justice In Waste Management And Health. *Eur. J. Public Health* 20, 21–26. doi:10.1093/eurpub/ckp216
- Udomsri, S., Petrov, M. P., Martin, A. R., and Fransson, T. H. (2011). Clean Energy Conversion From Municipal Solid Waste And Climate Change Mitigation In Thailand: Waste Management And Thermodynamic Evaluation. *Energy sustain. Dev.* 15, 355–364. doi:10.1016/j.esd.2011.07.007

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