



TACKLING PLASTIC WASTE AND POLLUTION FOR HUMAN HEALTH AND MARINE BIODIVERSITY – A CALL FOR GLOBAL ACTION

SUMMARY

This joint position paper sets out:

- Why plastic waste and pollution pose particular problems for low- and middle-income countries, affecting both human health and biodiversity;
- The drivers (proximate and ultimate) for the plastic waste and pollution crisis facing low- and middle-income countries;
- The need for high-income countries and multinational companies headquartered in those countries to take responsibility for their role in creating this crisis;
- Recommendations that:
 1. Multinational companies take immediate action to ensure sustainable use of plastics in their products, and take financial responsibility for management of post-consumer plastic waste from their products in low- and middle-income countries;
 2. International development actors substantially increase aid aimed at preventing plastic waste generation and pollution;
 3. High-income country governments ensure that export of domestic waste from their nations is minimised.

WHY PLASTIC WASTE AND POLLUTION POSE PARTICULAR PROBLEMS FOR LOW- AND MIDDLE-INCOME COUNTRIES, AFFECTING BOTH HUMAN HEALTH AND BIODIVERSITY

It is estimated that globally some 8-13 million metric tonnes of mismanaged post-consumer plastic waste ends up in our oceans every year¹. Much of the plastic pollution in the oceans comes from land-based sources², and evidence suggests that 50-70% of this comes from rapidly growing low- and middle-income countries³, where solid waste management systems are limited or non-existent⁴. In such countries, plastic waste can build up in streets and waterways, overspill from makeshift dumpsites, and be regularly blown into rivers, making its way to the oceans. In coastal areas, plastic waste is blown directly into the sea from coastal dumpsites⁵.

Credit: Michael Coghlan/Flickr



Impromptu dumpsite in Pagan, Mandalay, Myanmar.

Overall, the impacts of mismanaged plastic waste are likely to be felt most by people in poverty. Three billion people currently have no access to proper waste management, of which two billion have no access to waste collection⁶. The resulting waste is openly dumped, and sometimes burnt, releasing chemicals posing a direct risk to human health. Once this plastic waste reaches the marine environment and becomes ocean plastic pollution, it can also have negative impacts on fisheries and tourism that increase the vulnerability of communities whose livelihoods are dependent on a healthy marine environment. While direct human health impacts of ocean plastic pollution are still poorly understood, scientists are currently investigating potential impacts of eating seafood contaminated with ocean plastics which could have further consequences for coastal communities in low- and middle-income countries.

Traditionally, plastic has made up a relatively small portion of the waste generated in low- and middle-income countries⁷. But this is changing, and plastic use in low- and middle-income countries is set to increase as their economies develop and access to global (plastic-based) supply chains and exports increases. The world produces more than 400 million tonnes of plastic a year, and this is set to double by 2035⁸. In 2015, plastic packaging (nearly all single-use) was responsible for almost half of all plastic waste produced worldwide⁹. The generation of solid waste is growing fastest in Sub-Saharan Africa, South Asia, and the Middle East and North Africa where, by 2050, total waste generation is expected to nearly triple, double, and double, respectively. In these regions, more than half of waste is currently openly dumped¹⁰. This poses a huge threat to the health of both people and the marine environment.

1.1 Impacts of plastic waste on human health

Plastics blocking waterways and drains can prevent water flows that help flush through human waste, and can cause flooding, which can lead to increased incidence of water-borne diseases. The 2011 floods in Accra, Ghana were caused by blocked waterways, and resulted in damage to infrastructure and 17,000 homes, which led to 100 cholera deaths¹¹. A solid waste collection programme in Kinshasa, Democratic Republic of the Congo, between 2007 and 2015 was associated with a 40% drop in waterborne disease¹².

Plastic waste can provide a breeding ground for disease vectors. Non-organic household waste (including plastic) provides a variety of habitats for insects (such as flies and mosquitoes) and rodents. Standing water from blocked drains also provides a breeding ground for disease vectors. Disease vectors and diseases they carry include:

- Rats¹³ and other rodents can spread rabies, leptospirosis, hanta virus, typhus and plague;
- Flies can transmit typhoid fever, dysentery, cholera, leprosy and tuberculosis, and rubbish is the major breeding ground for flies¹⁴;
- Mosquitoes can spread diseases such as yellow fever, malaria and dengue; (rainwater collecting in waste plastic items is a significant breeding habitat for dengue-carrying mosquitoes, and it has been estimated that improved water and/or waste management could reduce the impacts of dengue by 95%¹⁵).

Many people affected by a build-up of uncollected plastic waste use burning as the only feasible means of disposal. Uncontrolled burning of household waste causes 270,000 premature deaths every year globally¹⁶ as it releases dioxins, mercury and polychlorinated biphenyls into the atmosphere, all of which pose a direct threat to human health. They increase the risk of diseases such as heart disease, cancer and respiratory ailments such as asthma and emphysema¹⁷. In Ethiopia, a study showed that children from slums where they burn uncollected waste were six times more likely to suffer from acute respiratory infections than those living where there were regular waste collections¹⁸. A 2016 World Health Organisation (WHO) report concluded that a major source of air pollution in African cities was the uncontrolled burning of waste¹⁹. In addition, large, informal dumpsites may pose direct risks to life – for example, 113 people were killed in a landslide at a dumpsite in Ethiopia²⁰.

1.2 Impacts of plastic pollution on biodiversity

Once in the environment, plastic has a direct impact on biodiversity. Whilst plastic is known to have impacts on terrestrial wildlife, soils and freshwater systems, the largest body of research has demonstrated the impact of plastic pollution in ocean systems. The impact of plastic on marine food chains also has potential impacts on human health.

Direct effects of plastic pollution on biodiversity include:

- Entanglement in larger plastics (such as discarded nets), known to affect a range of marine species (including whales, dolphins and turtles);
- Impacts caused by ingestion, such as choking, gut perforations, and “pseudo-satiation” (a false feeling of fullness) can lead to reduced feeding, growth and reproduction, and ultimately starvation²¹. Species including fish, seabirds and cetaceans, as well as commercially important seafood (such as mackerel and Pacific oyster²²), and those vital to ecosystem function (such as corals²³ and marine worms²⁴) may be affected;
- Increased susceptibility of corals to disease, particularly species favoured by reef fish and other organisms²⁵. This poses concerns for the long-term viability of reef ecosystems, including reef-based fisheries, which are important for coastal communities;
- Introduction of hazardous substances into marine food chains, as plastics can transfer toxins to the animals that eat them²⁶, potentially concentrating and passing these toxins up the food chain from prey to predator (biomagnification)²⁷. Toxins associated with microplastics may come from inherent additives²⁸ or concentrated common environmental pollutants already in the water^{29, 30}, such as pesticides (for example DDT).

The potential build-up of toxins in marine life also raises potential concerns about human health impacts, particularly for the one billion people in coastal zones who rely on fish as their main source of protein³¹. This is a current priority area for research by the WHO and national governments.



Credit: Richard Carey/Adobe Stock

Turtles and other marine life are at risk of ingesting or becoming entangled in plastic waste.

2. CAUSES OF THE PLASTIC WASTE AND POLLUTION CRISIS FACING LOW- AND MIDDLE-INCOME COUNTRIES

The extent of plastic pollution from mismanaged waste in low- and middle-income countries can be largely attributed to three key factors:

1. The sheer amount of plastic products and packaging being sold within a country (as a result of domestic plastic production or import);
2. The low level of access to waste collection and effective management, including that of plastics;
3. The import of post-consumer plastic waste from other, usually higher income, countries.

2.1 Increasing plastic use in low- and middle-income countries

In general, the plastic-dominated global economy and packaging model now adopted as the norm in high- and middle-income countries is shifting to low- and middle-income countries as a result of globalisation and economic development. Plastics may be introduced to low- and middle-income countries for a number of reasons by international companies, or national industries that are working to the same model of, or are owned by, international companies. These include centralised distribution of goods, increasing international export and import markets, and plastics being adopted within traditional industries such as fishing. Whilst increasing the use of plastic is beneficial in some cases, such as for medical supplies, much of the increasing use could be considered unnecessary, and the plastic is often replaceable, such as with light-weight plastic bags and (particularly where there is a rising middle class) takeaway food packaging. The widespread transition to plastics for consumer convenience generally outweighs any recognition of the end of life challenges of such plastic. One example of this is the introduction of the "sachet economy" in many parts of Asia and Africa. ▶

2.2 Limited waste management in low- and middle-income countries

Even high-income countries have not yet developed effective and holistic circular economies for plastics, and the challenges facing low- and middle-income countries are considerably greater. Few low- and middle-income countries have effective waste management collection systems, and if they do, they rarely reach into rural areas. The development of effective waste management in low-income countries is undermined by lack of political will or prioritisation (despite demonstrable impacts to human health and economic costs), and may be affected by political corruption (at national or local

levels). There may be additional challenges for Small Island Developing States, where plastic pollution on the coast may be ocean-borne, and where opportunities for on-land disposal are limited.

2.3 Export of post-consumer plastic waste to low- and middle-income countries

For many years, a range of high-income countries have relied on exportation as a key strategy to deal with domestic post-consumer waste, including plastics. For example, in the UK, around 650,000 tonnes of waste plastic are exported each year, and historically, more than half of these have been sent to China, which is also the world's largest producer of plastic products³². In January 2018, China closed its borders to other countries' plastic waste. Since then the UK has exported substantially more plastic waste to other countries as compared to 2017, such as Malaysia (+230%), Indonesia (+19%), Vietnam (+51%), Pakistan (+78%) and Turkey (+166%)³³. Some of these countries are now so overwhelmed with imported plastic waste that they are also putting import restrictions in place³⁴. Major concerns have been raised as a result of inspections to ensure correct treatment of this waste in some of those countries, and most recently investigations into fraud and corruption have been initiated³⁵. At present, there is no mechanism for source countries to be held accountable for the impacts of plastic waste exported for recycling to other countries, particularly to countries less able to manage waste.

THE "SACHET ECONOMY"

Sachets are a common form of packaging for consumer goods such as toiletries, cooking sauces etc. in many low- and middle-income countries, and are made of a composite material which is currently non-recyclable³⁶. They can be a major source of visible community and beach pollution³⁷. In some countries, such as India, sachets offer savings (relative to full-size purchase), but as well as increasing product access for the poor, this has driven perverse behaviour such as bulk buying by richer families. In other countries, such as Indonesia, the long-term cost of multiple sachets is considerably more than buying the full sized item³⁸. Companies argue that the alternative of refillable smaller size receptacles is open to abuse and mislabelling at point of sale, and at least one company is investigating the potential for recycling of sachets³⁹. However, in reality, most sachets are not collected by anyone because of their low value and non-recyclability.

3. RESPONSIBILITIES OF MULTINATIONALS AND HIGH-INCOME COUNTRIES

Plastic pollution is one particularly environmentally pernicious and destructive consequence of the take-make-dispose model of economic development birthed and exported by high-income countries, often driven by the desire for short-term profit. Whilst communities and governments in some of the world's poorest countries are rightly making admirable efforts to limit and clean up plastic pollution, overseas aid budgets spend miniscule amounts on the issue of mismanaged plastic waste despite its health impact on people in poverty and its contribution to ocean plastic pollution that threatens biodiversity. The costs of waste disposal are generally predominantly borne by national or local governments, while the profits from plastic use are reaped by the companies involved. Despite recent announcements, such as the New Plastics Economy Global Commitment launched in 2018, the business models of multinational corporations look fundamentally unchanged⁴⁰.

Solutions to the current plastic waste crisis cannot be confined solely to clean-ups, or even waste management and recycling improvements alone, but instead need to address flows of plastic into countries considering the overall level of plastic production and use at source. If plastic production is allowed to continue to increase in line with predicted growth, it will soon overwhelm even improved waste management systems. According to the waste hierarchy⁴¹, we need to put the brakes on virgin plastic production especially for unnecessary items such as single-use products, as well as establish appropriate and effectively managed systems to deal with current, historical and residual waste, and move towards a closed-loop circular plastics economy. In doing so, we must nevertheless be mindful of potential unintended negative human health impacts in low- and middle-income countries from initiatives aimed at reducing plastic pollution (e.g. access to water if plastic bottles are restricted) and take measures to mitigate these.

High-income countries and the companies headquartered there must take responsibility for the global prevalence of today's plastics-dominated consumption model and the consequent extent of plastic waste and pollution suffered by low- and middle-income countries.



Credit: JB Strain

We need to put the brakes on virgin plastic production.

3.1 The role of the corporate sector

Change will need strong leadership from multinational companies that operate across high-income and low- and middle-income countries. In low- and middle-income countries, where waste management systems are particularly poor, multinationals must take more responsibility for the plastic waste they produce, especially where this is hard to recycle (for example sachets⁴²), or requires shipping to other countries in order to be recycled, and/or commonly builds up as communal waste (for example plastic bottles and bags). Indeed, even where global corporations have made commitments to increase recyclability/recycled content of products, it is not clear what, if any, impact this will have on plastic waste in countries with inadequate waste management or recycling facilities.

In many high-income countries (including all EU nations⁴³), companies are held accountable for the different waste streams that they produce through Extended Producer Responsibility (EPR) schemes, based on the 'polluter pays' principle⁴⁴. At present these schemes are rarely applied across a company's international operations, including in low- and middle-income countries, yet they could contribute significantly to addressing the problem of plastic pollution globally. EPR schemes provide mechanisms to ensure that corporate actors take financial responsibility for the post-consumer stage of a products' lifecycle. In the case of plastics, EPR schemes often focus on packaging⁴⁵. These schemes often require producers to contribute to the recovery of waste packaging, and pay a fee for covering recycling costs. This can incentivise better design so that products last longer or are more easily recycled, leading to more sustainable use of plastics.

Currently there are few mechanisms ensuring corporate responsibility for the end life of plastic packaging or products exported to low- and middle-income countries. Furthermore, adoption of national EPR schemes in these countries may be limited by government structures, limited infrastructure, and risks that any tax on plastic is used for broader revenue raising without being used to address the waste problem, thus undermining trust in the system. That said, such schemes are not exclusively government-led, and there are examples of companies showing leadership, proactively taking responsibility and developing voluntary EPR commitments themselves. We encourage corporations to adopt proactive EPR schemes, across all aspects of their supply chains, and not just in high-income countries, but specifically in low- and middle-income countries where the impact of plastic waste may be felt much more acutely.

As discussed below, incentives for design that considers the end of a product's life (so called cradle to cradle design) and fiscal policies promoting recycled plastic use, would also strengthen any EPR schemes developed.

3.2 Increasing official development aid to prevent plastic waste generation and pollution

Increased official development aid can enable governments to develop and adopt a range of regulatory and fiscal interventions to reduce overall production and use of plastic materials. For example:

- Bans, levies and taxes targeting most-commonly polluting plastics (including single-use items) as has been done in Costa Rica⁴⁶ and Kenya⁴⁷;
- Incentivising innovative product design that aims to reduce plastic content of products or improve recyclability, along with shifts to viable alternative, non-plastic materials (whilst being aware of the negative impacts that some proposed alternatives may have⁴⁸);
- Incentivising the use of reusable and refillable items (such as food containers and drinking bottles), through raising awareness, subsidisation of refills, and levies for non-reusable items through the supply chain.

As well as reducing overall plastic use, there is an urgent need to build resilient local waste management systems and work towards more circular material flows where possible. At present, solid waste management is seriously underfunded, both by low- and middle-income country governments and by donors. The OECD's Development Assistance Committee figures show only 0.3 percent of Overseas Development Assistance (ODA) is currently spent on solid waste

management⁴⁹, yet mismanaged solid waste in low- and middle-income countries likely accounts for 50-70% of plastics entering the oceans⁵⁰. Three quarters of this comes from uncollected waste and litter; and a quarter from leakages post-collection and mismanaged disposal sites⁵¹. Therefore extending waste collection services to all, and eliminating open dumping could more than halve the amount of plastic waste entering the oceans, from both coastal communities and via rivers⁵². By increasing global ODA spent on the sector to three percent, donors could reach all two billion people currently without waste collection, and thus directly improve public health in low- and middle-income countries⁵³.

Tackling plastic and other solid waste, and moving to more circular based systems, offers multiple benefits: reducing pollution, improving health outcomes, and providing income generating opportunities for people living in poverty. If local people can make a safe livelihood from recycling plastic, or use it to create other products to sell in local markets, then there is incentive to prevent plastic reaching the oceans. However, new systems should not be based on current waste production patterns – with a danger of over-reliance on specific waste resources within plastic recycling economies – but should be future-proofed to respond to future waste management scenarios, which may see less overall plastic in the system.



A waste collection truck in Pakistan.

Credit: Hazel Thompson/TeaFund

4. RECOMMENDATIONS FOR ACTION

WHETHER OR NOT THERE IS A GOVERNMENT REQUIREMENT, WE EXPECT MULTINATIONAL COMPANIES TO:

- Report on the overall number of single-use plastic items sold, and commit to reducing this using alternative delivery systems that are environmentally sustainable, such as refillable, reusable models.
- Adopt a proactive approach to EPR schemes, and ensure adequate systems are in place in communities without waste management to collect and reuse or recycle plastic packaging, so that one item is collected for every one sold in low- and middle-income countries.
- Ensure that they are fully aware of, and take responsibility for, the plastic pollution created throughout the entire lifecycle of their products across their full supply chains, and are transparent about the steps they are taking to minimise this.
- Work in partnership with governments and the informal recycling sector including waste pickers to create safe, dignified jobs.
- Invest in innovations that lead to a whole-scale shift towards simplification of recycling systems, focusing on fewer, recyclable polymers, and reduced use of additives and multilayer laminates, enabling cost-effective and scalable recycling systems to be developed across the globe.

WE EXPECT DONOR GOVERNMENTS AND INSTITUTIONS TO:

- Commit to increasing the proportion of aid spent on solid waste management to three percent, addressing waste in low- and middle-income countries through reducing the amount of plastic produced and supporting integrated sustainable waste management.
- Avoid investment in large-scale, high-cost projects, such as incineration, that threaten waste-picker livelihoods, are not suited to waste streams with high organic content, and require high levels of institutional capacity to manage effectively.
- Prioritise technical assistance to low and middle-income governments to a) develop and implement legal and fiscal measures to ban or reduce unnecessary, problematic, and non-recyclable plastic; b) implement EPR schemes; c) improve waste management governance and the enabling environment for effective waste management; and d) scale up contextually relevant community-based recycling approaches.
- Support low- and middle-income countries to produce and implement Integrated Waste Management and Marine Litter Action Plans, including a dedicated plastics action plan to prevent pollution and help reduce production of problematic, non-essential, and non-recyclable plastics, such as through investment into necessary capacity within national and local governments.

WE EXPECT HIGH-INCOME COUNTRY GOVERNMENTS TO:

- Ensure that export of domestic waste from their nations is minimised, and where any plastic waste is exported, to ensure that appropriate recycling facilities are in place in the receiving countries.

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REFERENCES

1. Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R. & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768-771.
2. Gihir, K. & Baurer, F. (2017). Marine protection starts on land. Technical solutions to rid the oceans of plastic offer limited help. *Perspectives on Development Financing*, 4, 1-3.
3. KfW Development Bank (2017, November 17). Development Finance Forum 2017. Retrieved from <https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Veranstaltungen/Development-Finance-Forum-2017/>
4. Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R. & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768-771
5. Kosuth, M., Mason, S.A. & Wattenberg, E.V. (2018). Anthropogenic contamination of tap water, beer, and sea salt. *PLoS ONE* 13(4): e0194970. <https://doi.org/10.1371/journal.pone.0194970>
6. Wilson, D. C, Rodic, L., Modak, P., Soos, R., Carpintero, A., Velis, C., Iyer, M. & Simonett, O. (2015). Global Waste Management Outlook Summary for Decision-Makers. International Solid Waste Association (ISWA) and United Nations Environment Programme.
7. KfW Development Bank (2017, November 17). Development Finance Forum 2017. Retrieved from <https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Veranstaltungen/Development-Finance-Forum-2017/>
8. UN Environment (2018) Single Use Plastics: A roadmap for sustainability. Available at <https://www.euractiv.com/wp-content/uploads/sites/2/2018/06/WED-REPORT-SINGLE-USE-PLASTICS.pdf>
9. Ibid
10. World Bank (2028). What a Waste 2.0. Available at: <https://openknowledge.worldbank.org/bitstream/handle/10986/30317/9781464813290.pdf?sequence=10&isAllowed=y>
11. Amoako, C., & Frimpong Boamah, E. (2015). The three-dimensional causes of flooding in Accra, Ghana. *International Journal of Urban Sustainable Development*, 7(1), 109-129.
12. Radio Okapi (2015, August 20). Kinshasa: fin du programme d'assainissement Parau. Retrieved from : <https://www.radiookapi.net/2015/08/20/actualite/societe/kinshasa-fin-du-programme-dassainissement-parau>
13. Cointreau, S. (2006). Occupational and Environmental Health Issues of Solid Waste Management – Special Emphasis on Middle- and Lower-Income Countries. Washington DC: The World Bank.
14. Keiding, J. (1986). Chapter 6 in: The housefly—biology and control. Training and information guide (advanced level). Switzerland, Geneva: Division of Control of Tropical Diseases, World Health Organization.
15. Ibid
16. Kodros, J. K., Wiedinmyer, C., Ford, B., Cucinotta, R., Gan, R., Magzamen, S., & Pierce, J. R. (2016). Global burden of mortalities due to chronic exposure to ambient PM_{2.5} from open combustion of domestic waste. *Environmental Research Letters*, 11(12), 124022.
17. Verma, R., Vinoda, K. S., Papireddy, M., & Gowda, A. N. S. (2016). Toxic Pollutants from Plastic Waste-A Review. *Procedia Environmental Sciences*, 35, 701-708.
18. United Nations Human Settlements Programme (UN-HABITAT) (2008). State of the World's Cities 2008/2009 HARMONIOUS CITIES. London: Earthscan.
19. World Health Organisation (2016, May 12). Air pollution levels rising in many of the world's poorest cities. Retrieved from: <http://www.who.int/en/news-room/detail/12-05-2016-air-pollution-levels-rising-in-many-of-the-world-s-poorest-cities>
20. Boyd, S. & Schroeder, P. (2017). Smoke Screen: why the UK must turn its back on incineration and embrace the circular economy as a solution to the world's waste crisis. London: Tearfund.
21. Thiel, M., Luna-Jorquera, G., Álvarez-Varas, R., Gallardo, C., Hinojosa, I. A., Luna, N., Miranda-Urbina, D., Morales, N., Ory, N., Pacheco, A. S., Portflitt-Toro, M. & Zavalaga, C. (2018) Impacts of Marine Plastic Pollution From Continental Coasts to Subtropical Gyres—Fish, Seabirds, and Other Vertebrates in the SE Pacific Frontiers in *Marine Science*, 5 (238). DOI 10.3389/fmars.2018.00238.
22. Rochman, C. M., Tahir, A., Williams, S. L., Baxa, D.V., Lam, R., Miller, J. T., Teh, F. C., Werorilangi, S. & Teh, S. J. (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. *Scientific reports*, 5, 14340.
23. Hall, N. M., Berry, K. L. E., Rintoul, L., & Hoogenboom, M. O. (2015). Microplastic ingestion by scleractinian corals. *Marine Biology*, 162(3), 725-732.
24. Wright, S. L., Rowe, D., Thompson, R. C. & Galloway, T. S. (2013). Microplastic ingestion decreases energy reserves in marine worms. *Current Biology*. 23(23), 1031- 1033.
25. Lamb, J. B., Willis, B. L., Fiorenza, E. A., Couch, C. S., Howard, R., Rader, D. N., True, J.D., Kelly, L.A., Ahmad, A., Jompa, J. & Harvell, C. D. (2018). Plastic waste associated with disease on coral reefs. *Science*, 359(6374), 460-462.
26. Tanaka, K., Takada, H., Yamashita, R., Mizukawa, K., Fukuwaka, M. A., & Watanuki, Y. (2013). Accumulation of plastic-derived chemicals in tissues of seabirds ingesting marine plastics. *Marine pollution bulletin*, 69(1-2), 219-222.
27. Farrell, P., & Nelson, K. (2013). Trophic level transfer of microplastic: *Mytilus edulis* (L.) to *Carcinus maenas* (L.). *Environmental Pollution*, 177, 1-3.
28. Nobre, C. R., Santana, M. F. M., Maluf, A., Cortez, F. S., Cesar, A., Pereira, C. D. S., & Turra, A. (2015). Assessment of microplastic toxicity to embryonic development of the sea urchin *Lytechinus variegatus* (Echinodermata: Echinoidea). *Marine pollution bulletin*, 92(1-2), 99-104.

29. Rochman, C. M., Kurobe, T., Flores, I., & Teh, S. J. (2014). Early warning signs of endocrine disruption in adult fish from the ingestion of polyethylene with and without sorbed chemical pollutants from the marine environment. *Science of the Total Environment*, 493, 656-661.
30. Mato, Y., Isobe, T., Takada, H., Kanehiro, H., Ohtake, C., & Kaminuma, T. (2001). Plastic resin pellets as a transport medium for toxic chemicals in the marine environment. *Environmental science & technology*, 35(2), 318-324.
31. World Health Organisation (2008, August 6). Global and regional food consumption patterns and trend. 3.5 Availability and consumption of fish. Retrieved from: http://www.who.int/nutrition/topics/3_foodconsumption/en/index5.html
32. National Audit Office. (2018, July 19). The packaging recycling obligations. Retrieved from: <https://www.nao.org.uk/wp-content/uploads/2018/07/The-packaging-recycling-obligations.pdf>; Minter, Adam (2013, November 8). How Beijing - and the rest of China recycles plastic [exerpt]. <https://www.scientificamerican.com/article/china-recycles-plastic/>.
33. Unearthed. (2018, June 14). Plastic Crisis set to intensify as more countries look to restrict foreign waste. <https://unearthed.greenpeace.org/2018/06/14/china-plastics-ban-malaysia-vietnam-poland/>
34. Ibid
35. Laville, S. (2018, October 19). UK plastics recycling industry under investigation for fraud and corruption. Retrieved from: <https://www.theguardian.com/environment/2018/oct/18/uk-recycling-industry-under-investigation-for-and-corruption>
36. <http://www.independent.co.uk/news/business/news/unilever-plastic-sachets-recycle-stop-enter-ocean-creasolv-process-billions-cosmetics-food-products-a7728396.html>
37. Rodionova, Z. (2017, May 17). Unilever develops technology to prevent billions of plastic sachets from entering into oceans. Retrieved from: <https://www.independent.co.uk/news/business/news/unilever-plastic-sachets-recycle-stop-enter-ocean-creasolv-process-billions-cosmetics-food-products-a7728396.html>
38. Singh, R., Ang, R. P., & Sy-Changco, J. A. (2009). Buying less, more often: an evaluation of sachet marketing strategy in an emerging market. *The Marketing Review*, 9(1), 3-17.
39. Unilever (2017, May 26). CreaSolv®: a breakthrough recycling technology we want to share. Retrieved from: <https://www.unilever.com/news/news-and-features/Feature-article/2017/CreaSolv-a-breakthrough-waste-recycling-technology-that-we-want-to-share.html>
40. A Crisis of Convenience, the corporations behind the plastic pollution pandemic <https://greenpeace.org/international/publication/19007/a-crisis-of-convenience-the-corporations-behind-the-plastics-pollution-pandemic>
41. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69403/pb13530-waste-hierarchy-guidance.pdf
42. Lévi, D. (2017, July 29). The Curse of Sachets in Asia: why western companies should be held accountable. Retrieved from: <https://zerowasteurope.eu/2016/07/the-curse-of-sachets-in-asia-why-western-companies-should-be-held-accountable/>
43. <https://www.oecd.org/environment/waste/Global%20Forum%20Tokyo%20Issues%20Paper%2030-5-2014.pdf>
44. OECD (2014). Issues Paper, The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges Global Forum on Environment: Promoting Sustainable Materials Management through Extended Producer Responsibility (EPR). Tokyo.
45. Watkins, E., Gionfra, S., Schweitzer, J.P., Pantzar, M., Janssens, C. & Brink, P.T. (2017). EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging. Institute for European Environmental Policy: Brussels, Belgium.
46. Boyd, S. & Schroeder, P. (2017). Smoke Screen: why the UK must turn its back on incineration and embrace the circular economy as a solution to the world's waste crisis. London: Tearfund.
47. Otieno, B. (2017, August 26). State plans incentives for non-plastic bag makers. Retrieved from: <https://www.businessdailyafrica.com/news/State-plans-incentives-nonplastic-bag-makers/539546-4072016-15p3i66z/index.html>
48. Rakowski, S. (2017, November 15). Fauna & Flora International backs call to ban 'oxo-degradable' plastic packaging. Retrieved from: <https://www.fauna-flora.org/news/ffi-backs-call-to-ban-oxo-degradable-plastic-packaging>
49. Lerpiniere, D., Wilson, D. C., Velis, C., Evans, B., Voss, H. & Moodley, K. (2014) Review of International Development Co-operation in Solid Waste Management. Report prepared by University of Leeds and formatted by D-Waste on behalf of ISWA Globalisation and Waste Management Task Force. Vienna: International Solid Waste Association.
50. KfW Development Finance Forum 2017: Oceans 21. <https://www.kfw-entwicklungsbank.de/Internationalfinancing/KfW-Development-Bank/Veranstaltungen/Development-Finance-Forum-2017>
51. Mckinsey and Ocean Conservancy (2015) Stemming the Tide: land based strategies for a plastic free ocean. Available at <https://www.mckinsey.com/~media/mckinsey/business%20functions/sustainability%20and%20resource%20productivity/our%20insights/saving%20the%20ocean%20from%20plastic%20waste/stemming%20the%20tide%20full%20report.aspx>
52. Based on the estimation that 50 to 70% of plastic waste entering the oceans is from developing countries and most of that is due to a lack of collection and open dumping.
53. Based on Tearfund calculations.