From pollution to solution – Are we there yet?

The history of plastic is full of important inventions that have changed many parts of our lives. From everyday convenience to a danger to the planet, it is a material that continues to shape our world. As plastic use has grown, so have the environmental concerns. The United Nations Environment Programme (UNEP) argues succinctly that plastic pollution "can alter habitats and natural processes, reducing ecosystems' ability to adapt to climate change, directly affecting millions of people's livelihoods, food production capabilities and social well-being."[1]

Globally, about one million plastic bottles are bought every minute and up to five trillion plastic bags are used every year. Half of the plastic that is produced is designed for single-use purposes. Plastic can be seen easily everywhere in our natural environment. It is becoming part of the Earth's fossil and a marker of the Anthropocene, our current geological era[2].

A threat multiplier

The scale of global plastic pollution is significant and growing, that has gone from a de minimis quantity prior to 1950 to a staggering 60m tons in 2020. Regrettably, less than 10% of plastic waste is ever recycled, with most plastic waste discarded or incinerated.[3] The challenge of discarded plastic waste has proven to be pervasive, with plastic debris found in the deepest part of the world's ocean including the Marina Trench[4] and embedded in snow and water in the world's highest peaks including on Mt. Everest[5].

Tongai Kunorubwe
Head of ESG, Fixed Income at T. Rowe Price

A further challenge with discarded plastic is that it takes between 20-500 (not a typo) years for plastic to decompose[6], regrettably even then it does not vanish but simply gets broken down into smaller and smaller particles. Current scientific research shows that concerningly these smaller particles are increasingly ending up in human blood, where a recent peer reviewed study showed these to be present in ~80% of people assessed[7]; in the placentas of human babies[8]; and embedded in human lung tissue[9]. Thus, the adverse impact of plastic on human health is likely to be material.

In parallel, plastic is a material contributor to greenhouse gases (GHG) emission and climate change. The production, conversion and waste management of plastic generates about 4% of GHG emissions. Of these, 90% can be qualified to the production and conversion stage of the plastics lifecycle.

In 2019, total GHG emissions related to fossil-based plastics throughout their lifecycle were 1.8 gigatonnes of carbon dioxide equivalent ($GtCO_2e$), or 3.4% of global emissions. With increasing plastics use and waste, these emissions are projected to more than double by 2060, reaching 4.3 $GtCO_2e$.[10]

[1] https://www.unep.org/plastic-pollution#:~:text=Plastic%20pollution%20can%20alter%20habitats,capabilities%20and%20social%20well%2Dbeing

[2] Chen, H., Zou, X., Ding, Y. et al. Are microplastics the 'technofossils' of the Anthropocene?. Anthropocene Coasts 5, 8 (2022). https://doi.org/10.1007/s44218-022-00007-1.

[3] Geyer, R. (2020). Production, use and fate of synthetic polymers in plastic waste and recycling. In Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions. Letcher, T.M. (ed.). Cambridge, MA: Academic Press.13-32.

[4] Peng, X., Chen, M., Chen, S., Dasgupta, S., Xu, H., Ta, K., Du, M., Li, J., Guo, Z. and Bai, S., 2018. Microplastics contaminate the deepest part of the world's ocean. Geochemical Perspectives Letters, 9(1), pp.1-5.

[5] Napper, I.E., Davies, B.F., Clifford, H., Elvin, S., Koldewey, H.J., Mayewski, P.A., Miner, K.R., Potocki, M., Elmore, A.C., Gajurel, A.P. and Thompson, R.C., 2020. Reaching new heights in plastic pollution—preliminary findings of microplastics on Mount Everest. One Earth, 3(5), pp.621-630.

[6] United Nations Environmental Program, June 2021.

[7] Leslie, H.A., Van Velzen, M.J., Brandsma, S.H., Vethaak, A.D., Garcia-Vallejo, J.J. and Lamoree, M.H., 2022. Discovery and quantification of plastic particle pollution in human blood. Environment international, 163, p.107199.

[8] Ragusa, A., Svelato, A., Santacroce, C., Catalano, P., Notarstefano, V., Carnevali, O., Papa, F., Rongioletti, M.C.A., Baiocco, F., Draghi, S. and D'Amore, E., 2021. Plasticenta: First evidence of microplastics in human placenta. Environment international, 146, p.106274.

[9] Amato-Lourenço, L.F., Carvalho-Oliveira, R., Júnior, G.R., dos Santos Galvão, L., Ando, R.A. and Mauad, T., 2021. Presence of airborne microplastics in human lung tissue. Journal of Hazardous Materials, 416, p.126124.

[10] Global Plastics Outlook: Policy Scenarios to 2060 (OECD, 2022).

To be clear, reducing plastic-related emissions alone will be far from sufficient, to achieve ambitious climate mitigation goals such as net-zero emissions, but nevertheless represents a key component on the road map to achieving these goals.

Put simply, plastic pollution is a "threat multiplier". This is a term borrowed from the US military, because not only does plastic have standalone adverse consequences, but also has the potential to exacerbate many existing challenges such as those focused on human health, the biodiversity crisis, and GHG emissions.

Impact on Marine Life

Marine plastic pollution is increasingly recognised as a significant threat to marine ecosystems, including phytoplankton, which are the foundation of the marine food web. If phytoplankton are affected by plastic pollution, it can have cascading effects through the food web, impacting the species that feed on them and the overall health of marine ecosystems.

Marine animals often ingest plastic debris, mistaking it for food. This can increase physical harm, and lead to blockages in the digestive system, malnutrition, and even death. Additionally, animals can become entangled in larger plastic items like nets and six-pack rings, leading to injury, impaired movement, and drowning.

Plastic in the ocean breaks down into microplastics, which are small plastic pieces less than 5mm long, which are swallowed by a wide range of marine organisms. They made up 88% of global plastic leakage to the environment in 2019, around 20 million metric tons, polluting all ecosystems[11]. When phytoplankton encounter these contaminated microplastics, they can absorb these toxic substances, which can affect their growth and reproduction.

An estimated 300,000 whales, dolphins, and porpoises a year die from ghost nets.[12] A recent study done by University of Exeter found that all seven species of sea turtle from the Atlantic and Pacific Oceans and the Mediterranean Sea had traces of microplastics in their gut.[13] Plastic debris is said to cause the deaths of more than a million seabirds each year.[14] In a meta study conducted across over 100 scientifically robust studies on fish and plastic ingestion among 508 fish species, over two-thirds of these had records of plastic ingestion.[15] Explicitly, fish often mistake small plastic pieces, such as pellets, for food with often catastrophic consequences.

Plan of action

The increasing impact from marine litter has created international concern over the effect on marine ecosystems. Whilst quite clearly much more needs to be done, as the scale of the plastic pollution challenge is increasingly understood, we have started to see some signs of global co-operation aimed to tackle plastic pollution. As illustrative, in March 2022, the United Nations Environment Assembly adopted a historic resolution to develop an international legally binding instrument with the ambition to complete negotiations by the end of 2024[16].

Similarly, also in March 2022, the Declaration of The Organisation for Economic Cooperation and Development (OECD) Environment Ministerial Meeting committed to develop comprehensive and coherent lifecycle approaches to tackle plastic pollution and promote co-operation internationally. Importantly, the same OECD meeting took a system thinking approach, emphasizing the interconnectedness of the climate and the plastic waste pollution challenges, featuring them in this instance as dual central focus areas.

Ultimately, cleaning up plastic pollution from marine environments is a costly and ongoing process. This includes the removal of large debris, restoration of habitats, and mitigation of long-term environmental damage. The degradation of marine ecosystems results in the loss of valuable services such as carbon sequestration, water purification, and coastal protection, which have significant economic implications. Despite the scale of the challenge, we can not be discouraged and in fact we need to be intentional in helping crowd in capital into this mission critical area.

Latterly, we have started to see unique capital market backed solutions, where the bond market for example brings its heft towards funding resilient plastic waste collection and recycling projects, in this instance through contingent payout instruments. A recent exciting example is the World Bank, plastic waste collection and reduction bond, which select fixed income portfolios at T. Rowe Price purchased at new issue.

[11] https://iucn.org/resources/issues-brief/plastic-pollution, May 2024.

[12] Ramp, C., Gaspard, D., Gavrilchuk, K., Unger, M., Schleimer, A., Delarue, J., Landry, S. and Sears, R., 2021. Up in the air: drone images reveal underestimation of entanglement rates in large rorqual whales. Endangered Species Research, 44, pp.33-44.

[13] Duncan, E.M., Broderick, A.C., Fuller, W.J., Galloway, T.S., Godfrey, M.H., Hamann, M., Limpus, C.J., Lindeque, P.K., Mayes, A.G., Omeyer, L.C. and Santillo, D., 2019. Microplastic ingestion ubiquitous in marine turtles. Global change biology, 25(2), pp.744-752.

[14] https://www.unesco.org/en/ocean

[15] Savoca, M.S., McInturf, A.G. and Hazen, E.L., 2021. Plastic ingestion by marine fish is widespread and increasing. Global Change Biology, 27(10), pp.2188-2199.

[16] https://www.unep.org/news-and-stories/press-release/historic-day-campaign-beat-plastic-pollution-nations-commit-develop

Final thought

Climate change, the biodiversity challenge, and plastic pollution are among the most pressing environmental challenges of the 21st century. Addressing these issues requires systematic thinking and comprehensive joined-up strategies. Collective efforts from governments, businesses, and individuals are essential to mitigate these environmental threats.

T. Rowe Price and International Finance Corporation (part of the World Bank Group) are partnering to grow the blue bond market to address the planetary and societal risks posed by the current underfunding of the blue economy.

T. Rowe Price and International Finance Corporation are not affiliated companies.

Risks

Blue bonds carry investment risks, which include credit risk and interest rate risk. Investment in blue bonds involves additional risks compared to other bonds: (1) the market for blue bonds is likely to be smaller and less liquid than markets for other types of bonds; (2) projects for which the proceeds of blue bonds are used are not always precisely defined; (3) blue bonds may produce a lower yield than other types of bonds; and (4) prices of blue bonds may be less transparent and/or more difficult to assess.

Important information

This material is being furnished for general informational and/or marketing purposes only. The material does not constitute or undertake to give advice of any nature, including fiduciary investment advice, nor is it intended to serve as the primary basis for an investment decision. Prospective investors are recommended to seek independent legal, financial and tax advice before making any investment decision. T. Rowe Price group of companies including T. Rowe Price Associates, Inc. and/or its affiliates receive revenue from T. Rowe Price investment products and services. **Past performance is no guarantee or a reliable indicator of future results.** The value of an investment and any income from it can go down as well as up. Investors may get back less than the amount invested.

The material does not constitute a distribution, an offer, an invitation, a personal or general recommendation or solicitation to sell or buy any securities in any jurisdiction or to conduct any particular investment activity. The material has not been reviewed by any regulatory authority in any jurisdiction.

Information and opinions presented have been obtained or derived from sources believed to be reliable and current; however, we cannot guarantee the sources' accuracy or completeness. There is no guarantee that any forecasts made will come to pass. The views contained herein are as of the date noted on the material and are subject to change without notice; these views may differ from those of other T. Rowe Price group companies and/or associates. Under no circumstances should the material, in whole or in part, be copied or redistributed without consent from T. Rowe Price.

The material is not intended for use by persons in jurisdictions which prohibit or restrict the distribution of the material and in certain countries the material is provided upon specific request. It is not intended for distribution to retail investors in any jurisdiction.

Australia—Issued by T. Rowe Price Australia Limited (ABN: 13 620 668 895 and AFSL: 503741), Level 28, Governor Phillip Tower, 1 Farrer Place, Sydney NSW 2000, Australia. For Wholesale Clients only.

Canada—Issued in Canada by T. Rowe Price (Canada), Inc. T. Rowe Price (Canada), Inc.'s investment management services are only available to non-individual Accredited Investors and non-individual Permitted Clients as defined under National Instrument 45-106 and National Instrument 31-103, respectively. T. Rowe Price (Canada), Inc. enters into written delegation agreements with affiliates to provide investment management services.

DIFC—Issued in the Dubai International Financial Centre by T. Rowe Price International Ltd which is regulated by the Dubai Financial Services Authority as a Representative Office. For Professional Clients only.

EEA—Unless indicated otherwise this material is issued and approved by T. Rowe Price (Luxembourg) Management S.à r.l. 35 Boulevard du Prince Henri L-1724 Luxembourg which is authorised and regulated by the Luxembourg Commission de Surveillance du Secteur Financier. For Professional Clients only.

Hong Kong—Issued by T. Rowe Price Hong Kong Limited, 6/F, Chater House, 8 Connaught Road Central, Hong Kong. T. Rowe Price Hong Kong Limited is licensed and regulated by the Securities & Futures Commission. For Professional Investors only.

New Zealand—Issued by T. Rowe Price Australia Limited (ABN: 13 620 668 895 and AFSL: 503741), Level 28, Governor Phillip Tower, 1 Farrer Place, Sydney NSW 2000, Australia. No Interests are offered to the public. Accordingly, the Interests may not, directly or indirectly, be offered, sold or delivered in New Zealand, nor may any offering document or advertisement in relation to any offer of the Interests be distributed in New Zealand, other than in circumstances where there is no contravention of the Financial Markets Conduct Act 2013.

Singapore—Issued by T. Rowe Price Singapore Private Ltd. (UEN: 201021137E), 501 Orchard Rd, #10-02 Wheelock Place, Singapore 238880. T. Rowe Price Singapore Private Ltd. is licensed and regulated by the Monetary Authority of Singapore. For Institutional and Accredited Investors only.

Switzerland—Issued in Switzerland by T. Rowe Price (Switzerland) GmbH, Talstrasse 65, 6th Floor, 8001 Zurich, Switzerland. For Qualified Investors only.

UK—This material is issued and approved by T. Rowe Price International Ltd, Warwick Court, 5 Paternoster Square, London, EC4M 7DX which is authorised and regulated by the UK Financial Conduct Authority. For Professional Clients only.

USA—Issued in the USA by T. Rowe Price Associates, Inc., 1307 Point Street, Baltimore, MD, 21231, which is regulated by the U.S. Securities and Exchange Commission. For Institutional Investors only.

00000 | 202504-4424660
LE73687