Plastics: Can UNEA4 find the right balance?

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Outline - Plastics are everywhere and make up a large proportion of the waste stream. While plastic litter is a visual and physical environmental contaminant, especially in rivers and the marine environment, less visible microplastics are of increasing concern. Current control measures are often limited to banning single-use plastics, like plastic bags and straws. UNEA4 considered resolutions on phasing out single-use plastics and strengthening global governance on marine plastic litter and microplastics. The final resolutions were watered down from their initial submissions, proposed action is delayed, and policy approaches are still quite inadequate. This brief suggests that a more comprehensive, scientific, evidence-based, life cycle approach is needed rather than simple bans or taxes.

1. Plastics are Everywhere

At the beginning of the "plastic age" 70 years ago, the benefits of plastic were widely lauded as bringing about a brighter and cleaner world (Thompson et al. 2009). There is no question that plastics have become so indispensable for modern society due to the diversity of polymers and their versatile properties, which have led them to become dominant materials in all aspects of life. Think of any sector, and you will find plastics as essential components. Of course, plastics don't become so versatile without additions of inorganic fillers, plasticizers, thermal and ultraviolet stabilizers, flame retardants, colouring, among others some of which are potentially toxic (Thompson et al. 2009).

Geyer et al. (2017) estimated that 8,300 million tonnes of virgin plastics have been produced to date, with only 9% recycled. They projected that with current trends 12,000 million tonnes of plastic waste will be either in landfills or the environment by 2050. According to the World Economic Forum (2016) plastic packaging is 26% of the total volume of plastic used and "after a short first-use cycle, 95% of plastic packaging material value, or $80–120 billion annually, is lost to the economy".

To illustrate the impossibility of avoiding plastics in the modern world, consider drinking water. One study found that 83% of 159 tap water samples from five continents (including the US, Uganda, Ecuador and Indonesia) were contaminated with microfibres, indicating that microplastics have penetrated tap water around world (Tyree and Morrison 2017). Bottled water (93%) is similarly contaminated with microplastics (Mason et al. 2018).

This briefing note is intended to examine the adequacy of the resolutions on plastic emanating from UNEA4, as well as to highlight actions being proposed elsewhere, and some alternative approaches that could be considered by the region's decision makers.

2. Plastics and Environmental Damage

Because plastics are so ubiquitous and recycling is often poorly managed, plastics end up forming a large proportion of the waste stream. Discarded plastic can be found almost everywhere on Earth—in the depths of the oceans, on top of mountains, and in the polar ice (Browne et al. 2011; Besseling *et al.* 2017; Bergmann *et al.* 2016). The global alert of the potential environmental damage caused by plastic waste stems from the discovery of hundreds of plastic parts in the bodies of dead seabirds, turtles, and whales (Campani et al. 2013). Gruesome images of marine animals entangled in discarded fishing nets or the plastic rings of a six-pack of beer soon followed. Huge garbage patches were found floating in the open ocean gyres and oceanic convergences (Cozar *et al.* 2014; Desforges *et al*. 2014). The very properties of plastic that makes it so valuable also means that plastic will remain in the environment for a very long time, before it eventually breaks down.

In much of the world, rivers and beaches are covered with plastic debris, as unthinking consumers

deliberately throw away used bottles, containers, plastic bags, straws, and cigarette butts. Unfortunately, many animals view this waste as potential food. More than 260 species have been recorded as ingesting or becoming entangled in plastic waste, causing "impaired movement and feeding, reduced reproductive output, lacerations, ulcers and death" (Thompson *et al*. 2009).

While there has been a lot of media attention on single use plastics and banning of plastic bags, microplastics may be an even bigger and more ubiquitous problem. Microscopic plastic particles may contain low concentrations of organic contaminants (e.g. polychlorinated biphenyls (PCB), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides, polybrominated diphenylesters, alkylphenols, and bisphenol A (BpA), either added during manufacture to soften the plastic or as a flame retardant or adsorbed from seawater. Some of these chemicals can penetrate cells and may be endocrine disruptors, whereas the larger microplastic particles are excluded. Adsorption of chemicals onto microplastics may also retard their biodegradation. Multiple persistent organic pollutants (POP), PCBs, PAHs, and dioxins have been found also in plastic pellets on beaches. And microplastics are now being found in human faeces (MacMillan 2018). Safe exposure levels may not take adequate account of interactions between multiple contaminants, and especially the effects on vulnerable children or pregnant women.

The cost of after-use externalities, such as clogging urban drainage systems, and greenhouse gas emissions from production of plastics, is estimated at $40 billion per year, exceeding the profits of the plastic packaging industry (World Economic Forum 2016).

Plastics are notoriously difficult to recycle compared to aluminium and can only be recycled for a limited number of times. The plastics used in most consumer products are marked with a number inside the triangle logo for recycling. However, even for the same plastic number, inconsistent composition, colour, melt properties, and food contamination can make recycling problematic and highly labour intensive (Parker 2018).

3. Current Approaches to Controlling Plastics

There are some approaches underway to address the problem of plastics in the environment such as the European Commission Marine Strategy Framework Directive's Technical Subgroup on Marine Litter. In February 2019, the European Parliament approved new rules on single-use plastics, as part of the European Union Plastics Strategy, which requires all plastic packaging in Europe to be "reusable or recyclable by 2030"[1].

In Asia-Pacific, bans seem to be the preferred policy approach. The Republic of Korea has revised regulations on non-medicinal products to ban the importation and production of toothpaste and tooth whiteners containing plastic microbeads from July 2017 and to ban their sale from July 2018. Plastic bag, straw, styrofoam container bans are being implemented in many countries, including Korea, Vanuatu, and India (about 30 countries worldwide)[2]. Vanuatu has issued a regulation banning plastic bags and straws under the Waste Management Act 2014 (Figure 1). Research in California shows that banning shopping bags may simply be offset by purchasing trash bags (Taylor 2018).

A recent review of national legislation covering plastic waste found that microbeads are largely omitted from existing legislation (UNEP/WRI u.d.). Only 4% of 192 countries had enacted bans on plastic microbeads as of mid-2018.

[1] Details are available at: http://europa.eu/rapid/press-release_STATEMENT-19-1873_en.htm

[2] Available from Reusethisbag.com: https://www.reusethisbag.com/articles/where-are-plastic-bags-banned-around-the-world/

In other countries, incineration and waste-to-energy plants are being hastily constructed, as the option of exporting the waste has dried up. In 2017, the People's Republic of China banned the import of 24 types of solid waste, including paper and plastic. Illegal exports of waste to other countries, such as the Philippines and Malaysia, has boomed as a result. Some countries without adequate recycling facilities have simply abandoned collection of recyclables, allowing waste plastic to be dumped in landfills.

Regional awareness of the need for urgent action is reflected in the 2019 Bangkok 3R Declaration: Towards Prevention of Plastic Waste Pollution through 3R and Circular Economy[3]. Although voluntary and legally non-binding, the Declaration commits countries to (i) identify legislative gaps; (ii) develop effective policies and programmes; (iii) support innovative solutions and research on bio-based alternatives; (iv) strengthen international cooperation; (v) promote public awareness; (vi) support establishment of a regional knowledge hub on marine litter; (vii) consider mobilizing dedicated funding; (viii) promote multi-layer partnerships and strengthen regional cooperation; and (ix) harmonize monitoring approaches. The Declaration concludes with "resolve to implement necessary 3R and circular economy policy and measures in Asia and the Pacific to prevent plastic waste pollution, including marine littering".

4. Discussion of Plastics at UN Environment Assembly (UNEA4)

UNEA4 discussed the progress made by the ad hoc open-ended expert group on marine litter and microplastics, established as a result of UNEA3 in 2017. The expert group was tasked to "further examine the barriers to and options for combating marine plastic litter and microplastics from all sources…and to provide options for continued work". The options include: (i) establishing a global knowledge hub; (ii) establishing a scientific and technical advisory group; (iii) exploring interagency examination of health and environmental aspects; (iv) preparing a compendium of industry initiatives; and (v) a range of options for enhanced coordination and governance. The expected outcome of UNEA4 was guidance on "the future direction, timing and expected outcomes of the work of the expert group". However, the final resolutions were watered down from their initial submissions, proposed action is delayed, and policy approaches are still quite inadequate.

UNEP was also tasked with compiling voluntary commitments targeting marine litter and microplastics, to support the implementation of SDG14 – life below water, specifically target SDG14.1 on preventing and significantly reducing marine pollution (UNEP 2019). This analysis concludes, rather optimistically, that "there will be a positive trend towards reduction in marine litter by 2025 in some areas". Additional research is recommended on technological solutions and the impact on marine ecosystems. Greater emphasis on centralized reporting of progress is also recommended (UNEP 2019).

One UNEA4 resolution (from Japan, Norway and Sri Lanka) focused on strengthening global governance of marine litter and microplastics. This resolution requested UNEP to establish (i) a scientific advisory body; (ii) a dedicated unit within UNEP; and (iii) an expert group for taking stock of progress. It also recommended a scientific and technological programme on monitoring and assessment and "developing guidance on technological solutions, options, policies and measures…taking into account the whole life-cycle of plastics". By pushing the matter to UNEA5, the final resolution stated that UNEP should "prepare for consideration by the United Nations Environment Assembly at its Fifth Session, recommendations for the design and elements of a new

[3] The Bangkok 3R Declaration was issued at the Ninth Regional 3R Forum in Asia and the Pacific, 4-6 March 2019, Bangkok, Thailand, and can be accessed at: https://www.env.go.jp/press/7743Final-Bangkok%203R%20Declaration-adopted-6%20March%202019-Issued-without-formal-editing.pdf

and comprehensive global governance and coordination agreement (including the consideration of a legally binding agreement), for enhanced international cooperation towards the long-term elimination of discharges into the oceans of plastic litter and microplastics".

A second resolution, proposed by India, recommended a phase out of single-use plastics by 2025. It requested UNEP to support national or regional action plans, establish a technical facility, leverage the private sector work towards "affordable and eco-friendly alternatives". India has been very keen on these issues and tried to include "phase-out all single-use plastics products by 2025" in various resolutions. Japan noted this is not compatible with its national strategy on plastics which aims to cumulatively reduce 25% of single use plastics by 2030. Some other countries also thought this was too ambitious and not realistic. In the pre-UNEA4 negotiations the term "phase out" was deleted and countries argued over whether the verb should be "reduce" or "address" and resulted in pushing the target year out to 2030 instead of 2025.

Some other resolutions such as "environmentally sound management of waste" and "innovative pathways to sustainable consumption and production" also indirectly address the issue of plastic waste.

The draft final ministerial statement included the following: "we will address the damage to our ecosystems caused by the unsustainable use and disposal of plastic products, including by significantly reducing single-use plastic products by 2030, and we will work with the private sector to find affordable and environmentally friendly alternatives"". Given the concerns expressed above during negotiations, some countries have reserved their opinion on this commitment. Other related statements address the circular economy, less toxic material flows, and sound waste management.

5. Alternative Ways to Find a Better Balance

While the open-ended nature of UNEP's approach to the end result of poor management of plastics, viz. its ultimate fate as marine litter and microplastics, will continue to gather information and encourage more research, some more immediate alternatives are available and should be pursued. Phasing out single-use plastic products should not be the only action undertaken and may not even be the best available alternative, as illustrated in Vanuatu.

Product alternatives – Microplastics in cosmetics can be replaced with more natural products, such as cellulose, crushed walnut shells, coffee grounds, apricot kernels, beeswax, or other similar material (Bhattacharya 2016). Hence, industry should be encouraged to find replacements or face eventual bans on the use of microplastics (Wang *et al.* 2018). Other plastic products that claim to be biodegradable may only be biodegradable under certain industrial conditions, can release other additives, or make recycling more difficult. Labelling products as biodegradable may simply encourage people to litter more frequently. One surprising fact that smokers may not be aware of is that the cigarette filter they so easily discard is made of plastic, is the most common item in plastic litter, and may take hundreds of years to break down.

Technologies are being developed to recycle plastics by breaking down the polymers to a carbon-rich fuel (Capocelli u/d). The environmental fate of the plastic additives and the greenhouse gas reduction potential of this approach needs further research. According to the World Economic Forum (2016) plastics should never become wastes and wherever possible should be decoupled from fossil fuel feedstocks. A range of biopolymers is being examined as an alternative approach to using fossil fuels as the primary source material, with the prospect of quickly breaking down into organic forms if discarded (Lipscombe-Southwell 2019).

Waste management alternatives – Plastic waste/scrap has its own international trade code - HS3915,

but it is easy for mixed plastic waste or contaminated waste to be exported as clean plastic scrap. This suggests a need for more systematic standardisation of waste categories and more effective inspection of waste shipments before they leave the port. Morita and Hayashi (2018) suggest that Japan will only be able to export high quality plastic scrap, while lower grades will be processed as waste domestically (including incineration).

Policy alternatives – Banning single use plastics might appear to be an easy policy approach (127 countries have banned single use plastic bags, while about 30 have taxed them), but it has some downside implications, as well as only scratching the surface of the problem. For example, the life cycle environmental costs of cotton re-usable bags or paper straws may be as large as the life cycle environmental costs of well-managed plastic products (Environment Agency 2011). Some research suggests that re-usable recycled plastic bags might be the best alternative based on a life-cycle analysis (Adler 2019). Reliance on voluntary behaviour by consumers to choose the more environmentally sound product also has had limited success in relation to other environmentally damaging products.

The most important policy approach is to require that all plastic products are recyclable and recycled (UNEP 2014; World Economic Forum 2016). Policies to achieve this outcome must be coherent and synergistic. This may involve embedded labelling of the plastic type, ensuring eco-design so that the different types of plastic can be easily separated, providing a monetary incentive to submit plastics for recycling, increasing fines for littering, levies or restrictions on packaging, requiring retail outlets to accept back packaging and used plastic items for recycling, providing subsidies for recycling companies (if necessary), and increasing penalties for illegal disposal of plastic waste.

International cooperation and harmonisation of approaches may be necessary to ensure that countries don't free-ride on the efforts of others. Morita and Hayashi (2018) recommended that policy makers in Asia should develop "uniform, standardized, and transparent trade standards for plastic scrap". These standards would underpin an internationally harmonized approach to preventing environmental damage from internationally traded plastic scrap.

6. Conclusions

Plastics have made modern life not only more convenient but safer. Nevertheless, due to its dominance in our throw-away societies, plastic waste has also become the bête noire of modern concern regarding environmental pollution. It is debatable whether "plastics" really deserve this primary position in the backlash against wasteful consumption, compared to other issues (such as chemical pollution or food waste). Simple slogans like "more plastic in the sea than fish" may be useful in raising awareness but a more scientific, evidence-based approach is needed to find the right balance (Environment Agency 2011).

To find an appropriate balance between the undoubted value of plastic in improving human wellbeing and its damaging impacts on the environment once it becomes waste, requires more than a knee jerk reaction such as calling for bans on single use plastic bags and straws (Adler 2019). A much more coherent and synergistic policy response touching on all stages of plastic products from eco-design to ultimate disposal is needed. At the same time continued research and development of plastic products to make them more environmentally friendly should be encouraged. Consumers should also be encouraged to accept recycled, repaired or re-purposed products (Hogg *et al.* 2018).

UNEA4 has helped to raise the global attention on plastic wastes and the urgent need to find affordable and practical solutions. While the proposed actions will make marginal improvements to this global agenda, the watered-down resolutions mean that some countries will make greater progress than others. Nevertheless, caution may be warranted if it becomes clearer that simple

solutions like bans actually increase the environmental burden on the planet rather than reducing it. More nuanced and science-based policies may help to find a better balance.

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