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Is the Montreal Protocol a model that can help solve the global marine plastic debris problem?

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ABSTRACT

The impacts of plastic debris on the marine environment have gained the attention of the global community. Although the plastic debris problem presents in the oceans, the failure to control land-based plastic waste is the primary cause of these marine environmental impacts. Plastics in the ocean are mainly a land policy issue, yet the regulation of marine plastic debris from land-based sources is a substantial gap within the international policy framework. Regulating different plastics at the final product level is difficult to implement. Instead, the Montreal Protocol may serve as a model to protect the global ocean common, by reducing the production of virgin material within the plastics industry and by regulating both the polymers and chemical additives as controlled substances at a global level. Similar to the Montreal Protocol, national production and consumption of this virgin content can be calculated, providing an opportunity for the introduction of phased targets to reduce and eliminate the agreed substances to be controlled. The international trade of feedstock materials that do not meet the agreed minimum standards can be restricted. The aim of such an agreement would be to encourage private investment in the collection, sorting and recycling of post-consumer material for reuse as feedstock, thereby contributing to the circular economy. The proposed model is not without its challenges, particularly when calculating costs and benefits, but is worthy of further consideration by the international community in the face of the global threats posed to the ocean by plastics.

1. Introduction

Plastic waste pollutes every ocean and can enter the marine environment from land and from ocean sources. Marine plastic debris ranges from industrial plastic waste to litter and derelict synthetic fishing gear [1,2]. In the oceans, plastic can float, sink or remain in suspension and can be transported long distances from the point of entry into the marine environment. The impacts of this pollutant on marine species are well documented and include ingestion, entanglement and habitat degradation. Research has recently begun focussing on the leaching of additives from plastics, as well as the uptake of chemicals by plastics from the surrounding seawater [3]. These sorbed chemicals and those added during the manufacture of plastic products can transfer to those organisms that ingest plastic waste. Ingestion has been documented from whales to microscopic organisms. The effects of plastics and the chemicals they transport on the marine food web and human health are still unclear [4].

The costs of removal by coastal communities, repairs to equipment and infrastructure and reduced harvests when target organisms are caught by derelict fishing gear, are some of the contributors to the socio-economic impacts of marine plastic debris. Tourism can also suffer when amenities are affected by plastic waste [5,6].

Analysis has shown the international and regional policy response is inadequate in protecting the oceans from land-based sources of pollution [7], particularly plastic waste [8]. Policy intervention has largely treated the issues of marine plastic debris as a failure of solid waste management practices [9]. (paragraph 218). Calls have been made to improve waste management infrastructure, particularly in developing countries, and to reduce per capita waste generation in order to reduce the volume of plastic leaked into the ocean from mismanaged waste streams [10]. Policy measures by government that would assist in achieving this have been suggested [11]. Delineation has begun to emerge between policy measures that provide a linear solution to the waste issue, such as waste-to-fuel and waste-to-energy [12], and those that incentivise a circular materials flow throughout the lifecycle of plastic products. The business case for progressing from a linear waste approach to a circular economy for plastics has been outlined in a report by the World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company [13]. The report highlighted the need to explore the overall enabling role that policy can play in incentivising such a

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circular economy, increasing the involvement of industry in controlling plastic production that may eventually enter the sea.

The model proposed here refers to four types of recycling based on the linear or circular lifecycle they deliver [24]. The objective of the model is to incentivise primary and tertiary recycling because of their contribution to a circular materials flow, thereby reducing the need for virgin feedstocks. Secondary and quaternary recycling are regarded as interim mitigation measures that reduce the contribution of marine plastic debris to the current stock, but do not reduce the long-term need for virgin feedstocks.

This paper is a first attempt at modelling a new international legally binding instrument that consults with industry to work towards a circular materials flow within the broader goal of a circular economy. The global nature of the issue lends itself to an international approach to ensure the efforts in one region are not negated by continued pollution in another region. Industry is increasingly voicing support for improved recycling of all types of plastics, supported by stable regulatory frameworks [14–16].

The international community has several options to remedy this lack of an international instrument. The first option provides for the amendment of existing international instruments to ensure all the sources and impacts of the many plastic products on the market today and in the future are included in their scope.

The second option is to negotiate a new international legally binding instrument to regulate the plastics industry at a global level. The Law of the Sea Convention provides enabling Articles to support the establishment of such an agreement. Similar to the 1995 Fish Stocks Agreement, a new international instrument could be established as a third implementing agreement of the provisions in the Law of the Sea Convention, relating to the prevention of pollution of the marine environment from land-based sources.

The third option is to negotiate a new 'stand-alone' agreement independent of the Law of the Sea Convention. In this paper, the potential for the use of the Montreal Protocol is investigated [17] to address plastic production on land (see Fig. 1). This would allow for greater control of the lifecycle of plastic, from production through to treatment, and reducing their impacts on the oceans.

2. Amend existing frameworks or develop a new international legally binding instrument?

A number of existing multilateral environmental agreements provide a broad mandate for States to regulate marine plastic debris. Those with direct application include the UN Law of the Sea Convention, as well as the range of UN Regional Seas Conventions and their respective Protocols to prevent land-based sources of marine pollution. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the Stockholm Convention on Persistent Organic Pollutants could also be considered, as well as the Convention on Biological Diversity.

The Law of the Sea Convention promotes a cooperative approach, mandating that States "endeavour" to establish global and regional rules and standards to combat land-based pollution (Article 207(4)). However, implementation has been fragmented with fourteen of the eighteen Regional Seas Programmes adopting a binding framework in the form of an overarching Convention to protect the shared marine environment. Of these, six have adopted Protocols for land-based sources of pollution that are in force and four are still pending. Eight regions therefore have no binding agreement specifically applicable to land-based sources of marine plastic debris. The length of time to amend these frameworks and the varying regional approaches are unlikely to yield the global standards in the timeframes required.

The mandate of the UN Regional Seas Programmes does not extend to the regulation of the global lifecycle of the plastics industry from design to final treatment. Similarly, the Basel Convention, Stockholm Convention and the Convention on Biological Diversity do not provide the mandate or scope to regulate all sources, trade and impacts of plastic products.

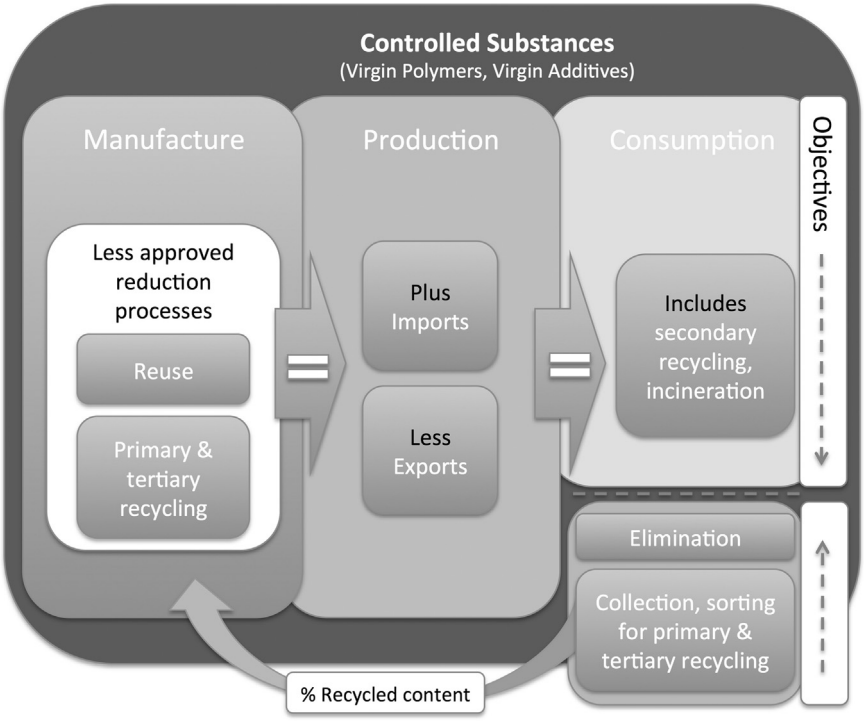

Fig. 1. Applying Elements of the Montreal Protocol to Plastic Consumption. The diagram illustrates the calculations of national manufacture, production and consumption of the controlled substances (virgin plastic polymers and virgin chemical additives) and links them to the objectives of reducing the calculated national consumption, while increasing the elimination of harmful chemicals and products. A third objective can be achieved by mandating minimum recycled content in the manufacture of products, which in turn incentivises the collection of plastic waste and sorting as feedstock for primary and tertiary recycling processes. Secondary recycling and incineration are regarded as interim measures and do not reduce consumption levels long-term due to their linear lifecycle.