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Economic and Social Commission – Sustainable Development

Research Report

Topic 1: The prevention of micro plastics entering the ocean



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The prevention of micro-plastic entering the oceans

Introduction of the issue

From the latest global events, it has become clear that a major problem of pollution has been inaugurated. Many waste products have been produced with non-biodegradable materials, such as plastics, and are one of the main causes of marine pollution (Council, 2008)¹. It is now commonly known that plastic bags and six pack rings are harming marine life, but micro plastics are significantly damaging the ocean too. (Rochman, 2016)² Micro plastics are small pellets of plastics smaller than 5mm (Coomer, 2017)³, and are commonly used in cosmetics such as toothpaste and facial scrubs. They are also formed by abrasion and fragmentation. The problem with micro plastics is that they are designed to be washed down the drain. This then leads to waste treatments, sewage and eventually into the ocean. (Overny, 2013)⁴ This significant increase in harm to marine life simultaneously means that humans are also at risk. The micro plastics are so small that it is near to impossible to filter them out, therefore it is highly necessary to find solutions in preventing micro plastics from entering the oceans.

Definition of Key Terms

Micro-plastic – Microplastics are small plastic pieces less than five millimetres long which can be harmful to our ocean and aquatic life (NOAA, 2017)⁵, generally classified as smaller than 5mm in size. They are insoluble in water, and have a tendency to absorb toxins surrounding them.

Microbeads – The term microbeads indicate the plastics made of polyethylene. It is a specific type of plastic (smaller than 1 mm) which are used cosmetics. It has the same purpose as microplastics; it acts as an exfoliating agent.

¹ California Ocean Protection Council (20/11/08). Visited on the 27/12/17. Available at: http://www.opc.ca.gov/webmaster/ftp/pdf/opc_ocean_litter_final_strategy.pdf

² Rochman, CM (23/03/16). Visited on the 27/12/17. Available at: <http://iopscience.iop.org/article/10.1088/1748-9326/11/4/041001/pdf>

³ Coomer, M (25/04/17). Visited on the 27/12/17. Available at: <https://marinedebrisblog.wordpress.com/category/microplastics/>

⁴ Overny, J (31/05/13). Visited on the 27/12/17. Available at: <https://actu.epfl.ch/news/microplastic-pollution-prevalent-in-lakes-too-2/>

⁵ NOAA (10/10/17). Visited on the 27/12/17. Available at: <https://oceanservice.noaa.gov/facts/microplastics.html>

Marine pollution – The introduction by man, directly, or indirectly, of substances or energy to the marine environment resulting in deleterious effects such as: hazards to human health, hindrance to marine activities, impairment of the quality of seawater for various uses and reduction of amenities. (Sea, 2001)⁶

GESAMP – The term GESAMP (Group of Experts on the Scientific Aspects of Marine Environmental Protection) denote to a group of independent scientific experts that provides advice to the UN system on scientific aspects of marine environmental protection. (GESAMP, nd)⁷

PCCP – The term PCCP stands for personal care and cosmetic products. PCCP microplastics are made from various types of polymers and chemicals, and most importantly are non-degradable. (Leslie, 2015)⁸

Photodegradation – Photodegradation is the process of decomposition by the action of light, especially sunlight. (Dictionary, nd)⁹ This process is present in the formation of secondary microplastics.

The Great Pacific Garbage Patch – Also known as the Pacific trash vortex, the Great Pacific Garbage Patch is a collection of marine debris in the North Pacific Ocean. (Evers, 2014)¹⁰

⁶ UN Convention on the Law of the Sea (25/09/01). Visited on the 27/12/17. Available at: <https://stats.oecd.org/glossary/detail.asp?ID=1596>

⁷ GESAMP (ND). Visited on 27/12/17. Available at: <http://www.gesamp.org>

⁸ Leslie, H.A. UNEP (2015). Visited on (01/01/18). Available at: <http://environmental-governance.org/wp-content/uploads/2015/06/Plastic-in-cosmetics-Are-we-polluting-the-environment-through-our-personal-care-2015Plas.pdf>

⁹ Oxford Dictionary (ND). Visited on 03/01/18. Available at: <https://en.oxforddictionaries.com/definition/photodegrade>

¹⁰ Evers, J. (19/09/14). Visited on 27/12/17. Available at: <https://www.nationalgeographic.org/encyclopedia/great-pacific-garbage-patch/>

Background information

Microplastics are small pieces of plastics that are smaller than 5 mm, produced and used in industrial production and is created from the degradation of excessively used plastics. Currently, there are two types of microplastics that can be classified as either primary or secondary microplastics. Firstly, primary microplastics are ones that are produced as microbeads, capsules, fibres or pellets. They are often used in PCCP, industrial scrubbers and other manufacturing uses as it has an abrasive quality. Secondary microplastics are the plastics that are formed as a result of the breakdown of larger plastic pieces. This occurs due to the fragmentation and weathering of plastic debris, under the exposure of sunlight. (NOAA, Marine Debris Program, nd)¹¹ This process is called photodegradation.



Figure 1: Microplastics from Chesapeake Bay Surface Water Samples (Photo credit: Will Parson Chesapeake Bay Program)

The significant increase in the production of plastics began in the 1950s, and have since become a commonly used material for many products. These include packaging, protection and cosmetics, at a very favourable low cost. In many of the cosmetic cleansing products, such as facial scrubs, lotions, soaps or even toothpaste, it has been discovered that they contain microplastics and microbeads. Plastics have been used for their malleability, durability and low cost for the consumer and industrial products. To be more specific, microplastics have the abrasive quality to act as a scrub, which is why it is commonly used in PCCP. However, plastics are not biodegradable and (Evers, National Geographic, 2014)¹² instead only break down into smaller and smaller pieces.

¹¹ NOAA (ND). Visited on the 27/12/17. Available at:

https://marinedebris.noaa.gov/sites/default/files/MicroplasticsOnePager_0.pdf

¹² Evers, J. (19/09/14). Visited on the 27/12/17. Available at: <https://www.nationalgeographic.org/encyclopedia/great-pacific-garbage-patch/>

Therefore, the primary problem that is caused by microplastics is its threat to marine life. The small pellets of highly-toxin-absorbent plastics are threatening the marine life as they often mistake plastics for food. For instance, sea turtles mistake plastic bags as jellyfish, a food they highly favour. To give another example, Albatrosses feed their chicks with plastic pellets as they mistake them for fish eggs. As a result, the chicks die of starvation or damaged organs (Evers, National Geographic, 2014)¹³.

Furthermore, microplastics can also disturb the marine food web. They can block the sunlight from reaching to the bottom of the ocean, where planktons, algae and other autotrophs lie as the microplastics collect to the surface of the ocean. As an autotroph, they are the producers of the marine food web. Hence, if the number of autotrophs decrease, naturally any and all other marine mammals (such as tunas and sharks) that consume plankton, will decrease in population too. This will also eventually lead to less consumption and an increase in value of fish by humans. However, concerning the risk of harm to the marine life, the problem of consuming microplastics is due to its ability to absorb and leach out pollutants. As mentioned before, they are able to easily absorb toxins and harmful pollutants such as BPA, as a product of photodegradation, which also links to health consequences. PCB (polychlorinated biphenal), a chemical substance that may cause cancer, is also a substance that can be absorbed by microplastics and eventually enter the marine food chain once consumed. (Evers, National Geographic, 2014)¹⁴

¹³ Evers, J. (19/09/14). Visited on the 27/12/17. Available at: <https://www.nationalgeographic.org/encyclopedia/great-pacific-garbage-patch/>

¹⁴ Evers, J. (19/09/14). Visited on the 27/12/17. Available at: <https://www.nationalgeographic.org/encyclopedia/great-pacific-garbage-patch/>

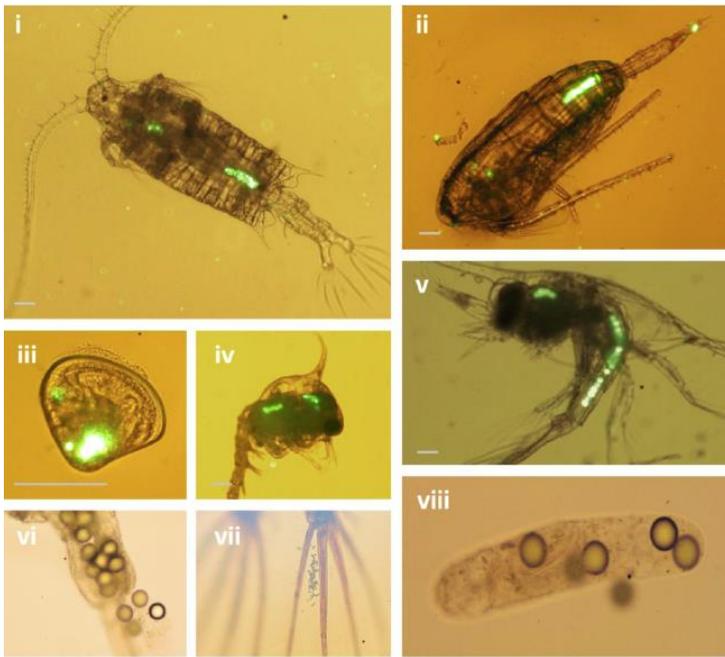


Figure 2: Images of microplastic ingestion by plankton. From Cole, Matthew et al. "Microplastic ingestion by zooplankton." *Environmental science & technology* (2013)

As of now, an approximate 51 trillion microplastics are present in the oceans (Centre, 2017)¹⁵, and continue to pollute the seas. More than 8 million metric tons of plastic is accumulated annually into the oceans, increasing the rate of damage to the marine life. The accumulation of plastic does not only affect the alarming state of marine life health, but also visually pollutes the seas. Countries that are highly dependent on tourism will also be in loss of visitors, as well as fisheries. By 2050, there will be more plastics than fish according to estimates, if no immediate actions are performed to slow the process down. (Centre, 2017)¹⁶

In a study by École Polytechnique Fédérale de Lausanne (EPFL), it has also been revealed that there has been traces of microplastics in Europe's largest river – Lake Geneva. This study, being one of the first of its kind to focus on continental freshwater lakes, also proves that microplastics are present in rivers. This is a strain to lake and river ecosystems, as they also threaten the animals inhabiting the aquatic ecosystems, in both physical and chemical manners. (Overny J. , 2012)¹⁷

¹⁵ UN News Centre (23/02/17). Visited on 01/01/18. Available at: <http://www.un.org/apps/news/story.asp?NewsID=56229#.WlaG-yPMwWo>

¹⁶ UN News Centre (23/02/17). Visited on 01/01/18. Available at: <http://www.un.org/apps/news/story.asp?NewsID=56229#.WlaG-yPMwWo>

¹⁷ Overny, J. (31/05/12). Visited on 28/12/17. Available at: <https://actu.epfl.ch/news/microplastic-pollution-prevalent-in-lakes-too-2/>

Major Countries and Organisations Involved

GESAMP – The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection have been nominated by Sponsoring Agencies IMO, FAO, UNESCO-IOC, UNIDO, WMO, IAEA, UN, UNEP and UNDP. Their principal goal was to provide scientific advice concerning the prevention, reduction and control of the degradation of the marine environment to the Sponsoring Agencies. (Kershaw, 2015)¹⁸

UNEP – The UN Environment Programme launched the Clean Seas Campaign in February 2017 with the attempt to engage governments, public media, civil society and the private sector in the prevention of microplastics entering the ocean. The principal purpose of this 5-year programme was to increase awareness and educate about the production of non-biodegradable plastics and its effects on the environment. (UNEP, 2017)¹⁹

United States of America – Illinois became the first American state to ban the use of microplastics in PCCP. (Office, 2017)²⁰ New York, Ohio and California are also expected to follow this lead. Furthermore, the Microbead-Free Waters Act of 2015 states “to amend the Federal Food, Drug, and Cosmetic Act to prohibit the manufacture and introduction or delivery for introduction into interstate commerce of rinse-off cosmetics containing intentionally-added microbeads” by the beginning of 2018. (Pallone, 2017)²¹

Beat the Microbead – Beat the Microbead is an international campaign against the use of microplastics in cosmetics. It is supported by 92 NGOs and 38 different countries. This campaign has managed to ban 448 brands from 119 different manufacturers in using microplastics in their products. To mention a few countries, the campaign has come to an agreement with Gothenburg (Sweden), California (USA), Canada, the US, the UK and many more countries to announce a ban on the production and sale of PCCPs containing microbeads. (Microbead, nd)²²

¹⁸ Kershaw, P.J. GESAMP (2015). Visited on 01/01/18. Available at: http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/GESAMP_microplastics%20full%20study.pdf

¹⁹ UNEP (2017). Visited on (05/01/18). Available at <http://www.cleanseas.org/about>

²⁰ UN News Office (16/06/17). Visited on 27/12/17. Available at: <http://www.un.org/apps/news/story.asp?NewsID=51169#.WlaoSPMwWo>

²¹ ²¹ Pallone, F (03/04/17). Visited on 27/12/17. Available at: <https://www.congress.gov/bill/114th-congress/house-bill/1321?q=%7B%22search%22%3A%5B%22microbead+free+waters+act%22%5D%7D&r=1>

²² Beat the Microbead (ND). Visited on 27/12/17. Available at: <http://www.beatthemicrobead.org/results-so-far/>

Relevant UN Resolutions

Resolution submitted by United Nations Environment Assembly of the United Nations Environmental Programme (UNEP) on the International environmental policy and governance issues: marine plastic debris and microplastics.

<http://undocs.org/UNEP/EA.2/5>

Previous attempts to solve the issue

Many organisations such as Beat the Microbead and Clean Seas Campaign have been successfully reducing numerous companies from using microbeads in their products. Furthermore, the campaign has launched “Look for the Zero” logo on products which do not contain any sorts of plastic. They have also introduced an app called “Beat the Microbead”, which helps users find whether a specific product contains microbeads and other plastics. In this way, campaigns such as Beat the Microbeads have been able to increase the awareness of this issue. (Microbead, Beat the Microbead Campaign, nd)²³

On the 7th of January, the British Prime Minister Theresa May tweeted that in 2015, 5 pence plastic bags were introduced into Britain and that 9 billion fewer bags are being used. (May, 2018)²⁴ This significant decrease in the use of plastics also shows a successful effect on the reduction of secondary microplastics formed.

On the 11th of March 2013, a public event called The Garbage Patch State was installed by an Italian artist called Maria Cristina Finucci. This was presented in Paris at the Maison de l’UNESCO. This artist installed a performance in order to raise awareness about the Great Pacific Garbage Patch, by the sponsorship of the Italian Ministry of the Environment and the University Ca’ Foscari of Venice. (UNESCO, 2013)²⁵

²³ Beat the Microbead (ND). Visited on 27/12/17. Available at: <http://www.beatthemicrobead.org/look-for-the-zero/>

²⁴ May, T. (07/01/18). Visited on 07/01/18. Available at: https://twitter.com/theresa_may/status/949952384775675904

²⁵ UNESCO Office in Venice (11/04/13). Visited on 27/12/17. Available at: http://www.unesco.org/new/en/venice/about-this-office/single-view/news/the_garbage_patch_territory_turns_into_a_new_state/#.U71u8fl_u9U

Possible Solutions

A possible beginning for a solution can be using natural and biodegradable options in PCCPs, instead of microplastics. For example, like many other cosmetic companies, Burt's Bees and St. Ives use apricot pits and cocoa husks as alternatives. In this way, it can still be used as an exfoliating PCCP, with the same effectiveness. (CBC, 2013)²⁶ Another possible solution could be to implement the topic of microplastics into major education systems, in order to increase the awareness of microplastic pollution. In terms of increasing awareness, public events can also be held with the aim of sharing the issues. More campaigns such as Beat the Microbead can also be introduced, and such NGOs should then attempt at increasing the accessibility to more microplastic free products.

²⁶ CBC News (31/07/13). Visited on 27/12/17. Available at: <http://www.cbc.ca/news/canada/thunder-bay/facial-scrubs-polluting-great-lakes-with-plastic-1.1327850>

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