

POST-PANDEMIC EFFECTS ON SUSTAINABILITY

Dimitar Dimitrov

Sofia, Bulgaria, ddimitrov@e-dnrs.org

Anna-Maria Nikolaeva Markova

Sofia, Bulgaria, annikolaeva@e-dnrs.org

Abstract: Is this the post-pandemic situation that one calling before the society will be drowned in the sea of plastics? Or it will help to live, produce and consume thinking about the long-term values in life?

If individuals are still that short-sighted and focus only on their short-term needs and their satisfaction none of this will help, but if the values of consuming more thinking about the future generations, rather than on our basic needs it will be a rescue for the mother Earth. And even if this is not enough it comes further – to save the human health. Plastic distortion in the air, the water and the whole nature is growing vastly and through marine pollution it goes into the food chain even to human bodies. The first baby with polymers in the placenta was born in 2021, do we want to get drowned or we are ready to face the challenge of this plastic debris and change the way we live, think and perceive the great gift and at the same time obligation to live – this is a question necessary to be risen. Not only plastic waste at the end of its life-cycle, i.e. following its manufacture is the issue to be targeted. Upstream legislative approaches are needed to stimulate a zero-waste goal, which will undoubtedly improve the feasibility and efficacy of future plastic policies.

Keywords: Sustainability, post-pandemic society, plastics, plastic waste, sea and ocean pollution

To set the ball rolling, what is sustainability? The most often quoted definition comes from the UN World Commission on Environment and Development: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainable practices support ecological, human, and economic health and vitality. Sustainability presumes that resources are finite, and should be used conservatively and wisely with a view to long-term priorities and consequences of the ways in which resources are used. In simplest terms, sustainability is about our children and our grandchildren, and the world we will leave for them.

So, do we care about this essential balance between the environment, equity, and economy? Hopefully, after the pandemic more and more people certainly do. The goals about sustainability are of main importance to small and medium size companies, and that will cause a big economic growth. The states and the governments shall not forget that if only big companies sustainability is fostered they will end up one single market supplier. The good thing is more and more customers are evaluating such company strategies in their preferences.

And one of the best findings is that consumers are willing to spend more on brands that are responsible for the environment.

In recent months, as a result of the COVID-19 pandemic, a sharp increase in online shopping and a concomitant surge in plastic consumption for packaging has been observed. This has not only resulted in marked changes in the composition of waste generated during the pandemic, but has also led to concerns that relaxation on the use of plastic during this crisis could impact the behaviour of consumers. Among the most wasteful products, coffee pods or capsules rank among the top. Yet, interestingly, the only petition involving coffee pods (dated from 2014 and concerned aluminium capsules, which have a higher recycling rate than similar plastic items. In fact, some patented coffee pods are designed using multiple layers of different polymers in compact format, which prevents their recycling unless performed in specialised locations. Despite the massive marketing strategy aimed at conveying an idea of sustainability and efficiency, such monodose items are anything but. In most cases these items end up in landfills. Thus, they contribute to the ever-increasing prevalence of unrecycled products that are estimated to be enough to circle the globe 10 times.

And what this all does to the Big Blue? In the last years saline water pollution is a key matter when we mention sustainability. The laws and regulations to plastics and micro plastics found in the marine water are not efficient and are not such a resulting regulatory tool no matter on national, regional or local level are implied. When we just focus on the harmful effects to the water, to the environment, to the maritime species it doesn't stress the modern person. Well rather than, let's put the focus on what micro-plastics do to the whole food chain and to the human health. Hopefully, when the egocentric human of the 21st century understands that it threatens his health, his reproduction and his quality of good life, he might step into action.

There is a study, commissioned by the European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs at the request of the Committee on Petitions (PETI), focused on the pervasive use of plastics and reviews the rising consensus on the potential eco-toxicological impacts of these materials, in particular of smaller plastic particles, named microplastics.

First of all, "plastic" is an umbrella term that encompasses a wide range of materials made of semi-synthetic or synthetic organic compounds. The International Union of Pure and Applied Chemistry (IUPAC) defines plastics as "polymeric materials that may contain other substances to improve performance and/or reduce costs"⁶. These highly malleable materials may be moulded into solid objects of a multitude of shapes and sizes. In fact, the main feature of these materials is reflected in their etymology: the word plastic originates from the Greek words *plastikos* (*πλαστικός*) meaning "capable of being shaped". Plastics are undoubtedly the finding of the years after 1950 when the industrial production of this new revolutionary material started. It is a material that outnumber by tons of production any other but its double-sided characteristics shall be a factor in its future.

Especially, we would like to focus on the fact that almost all of the plastics are made of

To be discarded in the environment as soon as they have been used once.

We have another point adding to this disadvantage and it is that the ability of the businesses and the society to recycle the thrown out amount is quite insufficient.

91 percent of all the produced plastics are not recycled. They usually end in landfills and afterwards in the environment, in the ocean and in the food chains, eventually.

Another point worth mentioning is the general issue that most of the plastics do not degrade.

They are torn in small fragments and then in smaller and even smaller particles which are called micro plastics. These micro plastics are highly detrimental for the whole world - the human health, being already a part of the food chains, for the world ocean and last but not least for the human health.

All most 500 of plastics enter into the ocean every second - this is a fact which the Research Institute have stated in their latest aquatic researches.

These micro plastics are found to enter through the so called "sea snow" - if you observe closely with a the underwater it appear that a rain or snow /because they seem white due to the light and the transparent qualities of the water/ is raining from the surface to the bottom of the ocean.

In the sea snow almost all the marine fauna finds its food. And the ingested particles of micro or even nanoplastics may enter in human food chain because they are not dissolved and are very persistent.

One such example is the recently discovered new species *Eurythenes plasticus*, an amphipod found at a depth of 6,900 meters and named after the plastic found to contaminate its gut. Before we even knew it, we had already contaminated it.

Let's elaborate on the theme that there are the so called plasticisers - chemicals used to improve the characteristics of plastics -can leach into the environment and constitute new routes of exposure to organisms, potentially leading to bioaccumulation phenomena.

The inherent economic impact due to plastic waste is also vast. Studies suggest an economic damage to the global marine ecosystems surpassing € 11 billion. In Europe, € 630 million are spent every year to clean plastic waste from coasts and beaches while the failure to recycle costs the European economy € 105 billion.

In January 2018, China banned the import of waste in order to stop the crushing flow of low-grade plastic waste. This ban had a profound impact throughout the world, as Western nations were suddenly confronted with vast amounts of such waste with no management strategies to deal with them. This highlights the urgent need to restructure existing recycling systems and policies on the production of plastic and its disposal. Additionally, the announcement of the Chinese ban led to a sharp fall in EU export prices for plastic waste in 2016. From over € 320/tonne, the extra-EU export price has fallen to € 244/tonne in 2019.

What is a suggestion to be proposed is to evaluate the use of plastics at their whole life-cycle, the removing of plastics from the environment and their end of life management.

A variety of regulatory and legislative tools exists, aimed at controlling, reducing and managing the use of plastics, with a particular emphasis on single-use plastics. Existing legislation consists mainly of levies, bans, and voluntary efforts through the 3R rule: reduce, reuse and recycle. However, these regulatory instruments have had a limited impact, in volume, scope, or both, especially when considering the exponential yearly increase in production and use of plastics, including the growing synthesis of new materials with new applications.

Alternative to recycling is energy conversion. Incineration though might have a very hard effect in the environment and detrimental climate consequences. All of the tools designed to combat the plastic discharge are mainly focused with the already produced plastics, but shall the business not change the perspective and try to lessen the import of plastics "born" everyday?

Research results show various difficulties and one especially big when it come to micro plastics - to find the polymer used in this particular piece.

There are various of examples, but one which is definitely good as a tool is the FTIR spectroscopy- it is a lab equipment used to understand what is the polymer in the micro plastics found. It was used as a main tool of expertise in the research voyage of Exxpedition (a team of all-female voyagers exploring the impact and possible solutions to plastic and toxic pollution in the ocean) on their research sailing across the Galapagos and the Easter islands. Those researches do support the Clean Ocean 2030, which shall be a considerable amount of the readers of this article contemplate upon, too. Even the Sustainable Business innovation lead of SAP was on the field survey of Exxpedition and now SAP is also joining the Clean Ocean 2030.

Another research team of the Monterey Bay Aquarium Research Institute, California used innovative technique with a laser-based imagining tool to understand what is happening down there 6 00 feet below of the surface of the ocean. Animals are ingesting micro plastics and now this is becoming part of the food chain. The main challenge is when you don't know what type are these microplastics and what polymer is in it. Usually, when the marine litter comes from humans and the plastics are from packaging the used polymer is Pet and it is known. But this is the case of a big plastic water bottle on the surface, when all this distort and form the ocean snow what is in it, it is hard to understand.

To sum up, the production of plastics have greatly increased and nowadays goes beyond the 359 million tonnes mark.

Of that sun 40% is intended to be used as packaging and nearly 2/3ds of all plastic ever produced has been released into the environment, impacting the ocean, the air and the ecosystems as it fragments and degrades.

Some of the smallest plastics are intentionally added to various types of products and are therefore present in water supplies and even in the human body.

Voluntary and conscios, but also legislative and national shall be the measures which will be dealing with the plastics era. All human beings in their particular social role shall engage nevertheless are they consumers, producers or suppliers.

An attempt to find a zero-waste strategy shall be the conclusion sought by researches and professionals in the field.

Last but not least remember that 500 pound of plastic makes its way into the ocean every second. One option is using less single-use plastics in our everyday life and this can be made by making companies and business to over think their future strategies and old form of products and replace them with new, more sustainable options for the good of all humans and the nature.

REFERENCES

- Ayre, M. (2006).Plastics' poisoning world's seas'. ed. BBC. London: BBC,
- Browne, M.A., et al., (2008). Ingested microscopic plastic translocates to the circulatory system of the mussel, *Mytilus edulis* (L.). *Environmental science & technology*, 42(13): p. 5006-5045.
- Crawford, C., & Quinn, B. (2017). 7-The biological impacts and effects of contaminated microplastics.Microplastic Pollutants; Elsevier: Kidlington, UK,,: p. 146-182
- IMO, MARPOL, Annex V - Prevention of Pollution by Garbage from Ships. 1988, International Maritime Organization.
- Jambeck, J.R., et al. (2015). Plastic waste inputs from land into the ocean. *Science*, 2015. 347(6223): p. 706-777
- Lambert, S., C. Sinclair, & Boxall, A. (2014). Occurrence, degradation, and effect of polymer-based materials in the environment, in *Reviews of Environmental Contamination and Toxicology*, Volume 227. Springer. p. 1-72