Circular Economy Lab & Observatory

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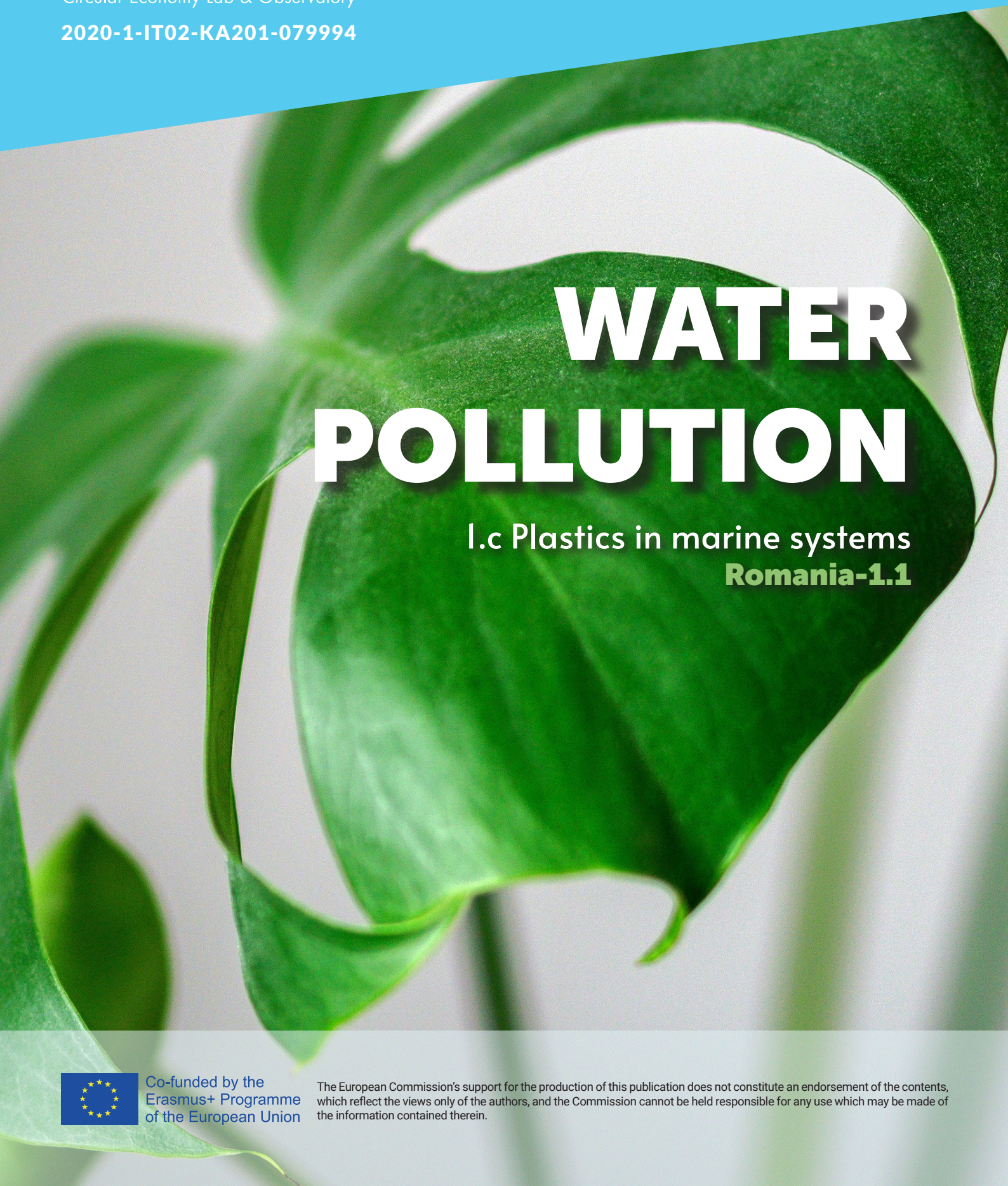

WATER POLLUTION

I.c Plastics in marine systems

Romania-1.1

Co-funded by the Erasmus+ Programme of the European Union

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Introduction

In the coastal and marine ecosystems all around the world, plastic pollution is acknowledged as a serious anthropogenic problem. Any aquatic ecosystem's structure, functioning, and consequently, services and values are directly and/or indirectly disrupted by the unprecedented and ongoing buildup of rising plastic pollution from human sources.

The main sources of these contaminants entering the ocean through diverse ways are land- and sea-based sources. We emphasized many aspects of plastic contamination in coastal and marine habitats in our review research. Different types of plastic pollution, including megaplastic, macroplastic, mesoplastic, and microplastic, are found across ecosystems.

The water, sediment, and biota of the marine and coastal ecosystems show a widespread dispersion of microplastics in their primary and secondary forms. Every year, more than 300 million tons of plastic are produced for use in a wide range of applications. Every year, at least 14 million tons of plastic end up in the ocean, and plastic accounts for 80% of all marine debris found from surface waters to deep-sea sediments.

Plastic debris are ingested or entangled by marine species, causing severe injuries and death. Plastic pollution endangers food safety and quality, human health, coastal tourism, and contributes to climate change. There is an urgent need to investigate new and existing legally binding agreements to address marine plastic pollution. Plastic is a petroleum-based synthetic organic polymer with properties that make it ideal for a wide range of applications such as packaging, building and construction, household and sports equipment, vehicles, electronics, and agriculture.

https://pixabay.com/photos/plastic-in-the-river-sea-flow-4767327/

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Every year, over 300 million tons of plastic are produced, half of which is used to manufacture single-use items such as shopping bags, cups, and straws. Plastic waste, when discarded improperly, can harm the environment and biodiversity.

Plastic can be found on every continent's shoreline, with more plastic waste found near popular tourist destinations and densely populated areas. Land-based sources of plastic debris in the ocean include urban and stormwater runoff, sewer overflows, littering, inadequate waste disposal and management, industrial activities, tire abrasion, construction, and illegal dumping.

Plastic pollution in the ocean is primarily caused by the fishing industry, nautical activities, and aquaculture. Plastic degrades into small particles known as microplastics (particles smaller than 5 mm) or nanoplastics as a result of solar UV radiation, wind, currents, and other natural factors (particles smaller than 100 nm). They are quickly consumed by aquatic creatures due to their small size.

Many countries lack the infrastructure needed to prevent plastic pollution, such as sanitary landfills, incineration facilities, recycling capacity, and circular economy infrastructure, as well as proper waste management and disposal systems. As a result, 'plastic leakage' occurs into rivers and the ocean. Where waste management systems are insufficient to contain plastic waste, the legal and illegal global trade of plastic waste harm ecosystems.

https://pixabay.com/photos/pollution-trash-garbage-ocean-4855507/

Problem's description

Plastics are excellent materials because they are long-lasting, lightweight, and easily molded. This explains their widespread use: annual production has increased by approximately 9% per year over the last five decades, reaching a total of 380 million tons. However, only about 9% of all plastic ever produced has been recycled. Some plastic waste has been safely disposed of in landfills or incinerated.

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Nonetheless, approximately 30% of yearly production currently leaks into the environment, eventually ending up in the ocean, causing a variety of problems for the marine ecosystem.

Plastic in the ocean pollutes beaches and harms wildlife. Fishing lines, ropes, and nets account for more than half of all plastic pollution in the Pacific Ocean. This discarded equipment, known as ghost gear, poses a serious threat to ocean wildlife. Plastic will become more prevalent as global demand for fish rises.

According to one study, at the current rate, there may be more plastic in the sea than fish by 2050. Fish, seabirds, and marine mammals consume these, and they then move up the food chain to humans. Microplastics may have toxic effects on humans and marine life that are not yet fully understood or these toxic effects on humans and marine life are currently unknown.

https://pixabay.com/photos/disaster-pollution-plastic-6249334/

The economic costs of plastic pollution in tourism, shipping, and fishing alone have been estimated to be around $13 billion per year. Overfishing and climate change may pose even greater threats to marine life, biodiversity, and ocean health. Hotter and more acidic oceans will lead to the extinction of coral reefs, which are critical components of many marine ecosystems. The IPCC calculates the total cost of continuing human impacts on ocean quality.

Possible solutions

Unlike greenhouse gases, where the developed world and China continue to be responsible for the majority of emissions, marine plastic originates disproportionately in developing countries due to fewer recycling options and increasingly frequent landfill leaks, in addition to illicit dumping.

Policies should be aimed at assisting these countries in developing the capacity to recycle or store their plastics safely. Economics explains why relying solely on voluntary changes in consumer behavior will not work to stabilize the climate or reduce the plastic problem. Individuals are tempted to “free-ride” on the actions of others and fail to consider the full cost of their decisions.

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Economists refer to this type of quandary as a "collective action problem," which Nobel laureate Elinor Ostrom has studied extensively. In some cases, appealing to social norms or nudging households towards more environmentally friendly behavior can be beneficial. This may be particularly true for certain types of plastics consumption.

Promoting the use of reusable plastic bottles or shopping bags is relatively unobtrusive and plays into consumer psychology: it is a simple way to signal pro-environmental attitudes and adherence to social norms, while also creating the impression of making an immediate impact. When it comes to avoiding plastic pollution, however, switching to such products is just the top of the iceberg.

The fact that the damage caused by our actions is so difficult to see is an even bigger issue in the case of climate change. Our choices affect people living in the future or in distant countries, but reducing our emissions or consumption requires costly lifestyle changes.

Human characteristics that typically support cooperation in small groups—for example, a tendency to reciprocate the good behavior of others or punish free-riders—are far more difficult to sustain when it when it comes to issues with the environment on a worldwide scale, those who inflict harm and those who are damaged never meet.

We, too, lack information. It is difficult to understand the total environmental impact of consumer choices when it comes to emissions or plastic pollution.

https://pixabay.com/photos/pollution-trash-garbage-ocean-4855498/

It is nearly impossible to compare the relative climate costs of two different products without additional information. Carbon pricing is one potential solution: by instituting a global carbon price, carbon-intensive goods would become more expensive relative to other goods. Customers only need to do something they are already familiar with, compare the prices of various products.

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Conclusions

Innovative technologies that aid in breaking the link between pollution and consumption are required if we are to maintain current living standards while saving the planet.

New plastics, such as polylactic acids, use raw materials such as starch, which can be easily derived from renewable sources such as corn or potatoes.

They not only share some of the beneficial properties of existing plastics, but they are also biodegradable, lowering their impact on marine environments.

However, their production is currently more expensive and necessitates the use of energy that should come from renewable sources in order to reduce their carbon footprint. Emissions pricing can help to accelerate the necessary innovations in clean energy.

According to a recent study, the EU's emissions trading system may have increased low-carbon innovation by energy firms by 10%. An even bolder approach would be to increase funding for basic research. Transferring technology can also help developing countries avoid marine plastic pollution.

Plastic pollution is gaining popularity. In a world where images are so important, clips of dolphins playing with plastic bags and turtles trapped in beer holders have become rallying points in anti-pollution campaigns. The solution may rely on a simple piece of economics that the public will have to get used to: a higher price for plastic.

https://pixabay.com/photos/plastic-ocean-pollution-garbage-5275150/

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GROUP

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