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*Global Health Security
COVID-19 & Its Impacts*

Battling Marine Plastic Waste: Nuclear Technology's Role

By Julius Cesar Trajano

SYNOPSIS

Marine plastic pollution has worsened since the COVID-19 pandemic. Nuclear technology provides a sustainable and scientific approach to tackling this environmental problem. Can it help Southeast Asian countries battle plastic pollution?

COMMENTARY

PLASTIC WASTE from mismanaged disposal of single-use face masks, gloves and other personal protective equipment (PPE) used during COVID-19 has ended up choking our oceans. Its complex consequences may last even beyond this pandemic. The worsening plastic pollution in our oceans is a critical area where nuclear technology can play an important role and provide innovative alternative solutions to conventional approaches.

The International Atomic Energy Agency (IAEA) launched in 2020 a new initiative, the [NUclear TEchnology for Controlling Plastic Pollution' \(NUTEC Plastic\)](#), which intends to explore and rapidly expand the use of nuclear technology to fight plastic pollution in the oceans and reduce plastic waste globally.

COVID-19 & Deteriorating Oceans

Even before the pandemic, marine plastic pollution was already posing an existential threat to marine wildlife, ecosystems, food safety and human health globally. Marine

pollution is an issue of global concern, in particular for countries in Southeast Asia that rely on fisheries as a source of food and income.

Every year about 8-12 million metric tonnes of plastic debris find their way into the oceans, including microplastics. With the COVID-19 pandemic, plastic pollution has even been exacerbated. A report by marine conservation organisation OceansAsia estimated that [1.56 billion face masks](#) had entered the oceans in 2020.

This has resulted in an additional 4,680 to 6,240 metric tonnes of marine plastic debris. It will take *450 years* for these face masks to degrade, gradually disintegrating into more hazardous microplastics while endangering marine wildlife.

In the region, five Southeast Asian countries, namely Indonesia, Malaysia, the Philippines, Thailand and Vietnam have been listed as among world's top 10 contributors of mismanaged plastic waste. Collectively, they generate 8.9 million metric tonnes of mismanaged plastic waste annually.

Turning Plastic Waste into Economic Value?

How can nuclear technology help address marine plastic pollution? Many studies have documented the impact of large plastic debris on the marine environment. However, further studies are needed to provide reliable and accurate assessment of the potential damage caused by microplastics which can be ingested by marine animals, including fish.

Together with the toxic chemicals that have accumulated on microplastics, they can be transferred through the food chain and be ingested by humans through the [consumption of seafood](#). This has been identified as a health hazard but has not yet been adequately researched. The major challenge for scientists and policymakers in dealing with ocean plastic pollution is a lack of knowledge on the exact concentration of microplastics in the oceans and the marine food chain.

[Nuclear techniques](#) can play a critical role as they are already successfully deployed to examine marine pollution processes. Specifically, [radioactive tracer techniques](#) can help scientists understand how microplastics get contaminated by toxic pollutants and how they transfer such pollutants to marine organisms and to the food chain.

Such techniques were recently successfully done in Ecuador, revealing that microplastic pollution in the eastern tropical Pacific Ocean will worsen in the coming decades. Precise and timely information on the movement, amount and impact of microplastics can help strengthen marine pollution monitoring programmes, environmental management strategies, and seafood safety regulations.

Another area where nuclear technology can make an impact is in [the recycling and reduction of plastic waste](#). When conventional methods of recycling of plastic waste are no longer possible, radiation technologies can be used to recycle plastic waste into new commercially viable plastic items, thus generating economic benefits while reducing waste volumes.

While this is a promising technique based on recent scientific studies, it has yet to be

seen whether countries can successfully integrate this technique into their sustainable approach to plastic waste.

Southeast Asia: What Can Be Done

Southeast Asian countries should step up to explore the peaceful applications of nuclear technology. These include environmental management. It is thus timely that Indonesia and the Philippines have both expressed their strong commitment to support and participate in the recently launched NUTEC Plastic initiative of the IAEA.

Both have decades of experience in civilian uses of nuclear technology and vowed to address their worsening plastic waste problem. In recent years, Indonesia, Malaysia, the Philippines, Thailand and Vietnam have developed or are developing their national action plans to curb marine plastic pollution.

The integration of the NUTEC Plastic project with their plastic waste control programmes will certainly enhance their respective action plans which all promote the deployment of innovative scientific solutions.

Similarly, utilising nuclear technology can definitely advance the 2019 [ASEAN Framework of Action on Marine Debris](#), which encourages ASEAN member-states to promote and enhance "science-based decisions and policies on marine debris prevention and management".

The region has a growing pool of local nuclear scientists who can collaborate with other relevant environmental scientists and policymakers to develop and apply technologies for plastic waste control.

Plastic pollution is a problem as big as the ocean; hence, support and contribution from different stakeholders are critical in tackling marine plastic pollution. The region's nuclear technology research and training centres should therefore be part of the multi-stakeholder collaboration which is critical in searching for innovative scientific solutions.

Way Forward: A Sustainable Approach

The [ASEAN-IAEA Practical Arrangements](#) on the peaceful uses of nuclear technology, signed in 2019, would be a useful framework for knowledge and technology transfer to Southeast Asian nations. They can equally be the foundation for the two organisations to explore the potential of nuclear technology application in curbing marine litter in the region.

As ASEAN member-states pledge to collectively address marine pollution, they should maximise the growing regional cooperation in nuclear safety, security and technology spearheaded by the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM).

In view of the existential threats posed by marine plastic pollution, it is imperative that countries in the region explore all effective ways to curb and reverse the negative impacts of plastic waste on the marine environment and ecosystem in regional seas.

Building on the success of existing ASEAN cooperation in nuclear technology may have the potential to enhance the region's environmental security with safe, secure and peaceful uses of nuclear technology.

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