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# Marine Plastic Pollution in South Asia

**Marine Plastic Pollution (MPP) is an increasing global concern, and its impact has been gradually documented across the world. Tackling marine pollution is one of the most pressing environmental challenges for Asia and the Pacific. ESCAP member States have recently ratified their commitment to addressing this issue through Resolution 76/1 on "Strengthening cooperation to promote the conservation and sustainable use of the oceans, seas and marine resources for sustainable development in Asia and the Pacific." The South Asian region (SAR) has 2 of the most polluted rivers in the world (the Ganges and the Indus).<sup>1</sup> A large portion of the marine litter found in these polluted rivers contains plastics from land-based sources, mainly from urban areas.<sup>2</sup> The transboundary nature of marine plastic pollution requires early recognition by every country to control the magnitude of marine pollution before it gets out of control. This policy brief provides a background on marine plastic pollution, including issues affecting South Asia and policy recommendations for decision-makers and stakeholders' uptake.**

## South Asia's plastic market and plastic waste handling

South Asia has been one of the most rapidly developing economic regions in the world, with an average annual growth rate of 7.2% over the previous decade.<sup>3</sup> The increasing economic development also comes along with the expansion of manufacturing industries. For example, India has been trying to strengthen and expand its manufacturing industries, including plastic producing industries, to support its national economic growth by putting in substantial investments in this sector.<sup>4</sup> Many industries use plastic at various production stages; consequently, plastic is expected to increase in the coming years.

The increase in economic status in South Asia also allows the population to consume more plastics. A substantial amount of plastic is used in food and drink packaging. The toy industry is the most plastic intensive industry, employing 48 metric tons (MTs) of plastic for every USD 1 million in revenue. Simultaneously, the soft drinks sector leads in plastic's use, particularly in packaging and supply chain, consuming 34.6 MTs per USD 1 million in revenue.<sup>5</sup> As the economic status in the region improves, households afford more luxury goods, leading to an increase in plastic consumption and a growing plastic market. Also, in 2019, virgin plastics were cheaper than recycled material for the first time.<sup>6</sup> This led to more production of single-use plastics and their disposal into water bodies. With the SAR hosting nearly 20% of the world's population, plastic consumption in the region is likely to increase further in the future.

The increase in plastic consumption in the region will inevitably increase waste management pressure, which is relatively ineffective in handling waste and preventing leakages. The SAR's overall waste collection rate ranges from around 40%-50%, where 26%-33% is rural.<sup>7</sup> Such a low waste collection rate implies a lot of the waste is not disposed of properly (i.e., often dumped on the roadsides). A large amount of garbage in South Asia is picked up by the informal sector, where waste pickers pick the trash with a high resale value (PET). Due to their lightweight and buoyancy, the improperly disposed plastics are easily carried away by the wind and rain into nearby rivers to enter the marine environment. Even for the formally collected waste in the region, 75% of it is disposed of in an open dump.<sup>8</sup> This waste disposal approach causes leakage at the dumpsite, making it easy for plastic waste to be carried away into the marine environment.

Generally, the SAR lacks a coordinated recycling system, and that these countries are heavily reliant on the informal sector to carry out the recycling function. Most of the plastic recycling plants in the region are of small to medium scale. Therefore, they cannot afford the investments needed to improve their equipment and further improve secondary plastic products' quality.<sup>9</sup> Likewise, sufficiently trained personnel to sort and clean the plastic feedstock for the recycling plant to further process is lacking, making it harder for the recycling plants to produce secondary plastic products with consistent and high quality. With relatively primitive technology and unskilled labor, these plants can only process some of the most easily recycled plastic waste. Usually, their secondary plastic products are of inferior quality when competing in the international market, encountering lower profitability and marketability. With an increasingly complex mixture of plastics used in new products discarded, these plants are almost incapable of recycling the waste of these new products.

<b>The Impact of COVID-19 on Marine Plastics</b>	
<ol style="list-style-type: none"> <li>1. "Top 10 most plastic polluted rivers in the world (2019)". <i>The Thaiger</i>, 2019.</li> <li>2. "Land-based pollution". UNEP, 2020.</li> <li>3. World Bank Open Data. World Bank Group, 2020.</li> <li>4. "Thermoplastic Market – Growth, Trends and Forecast (2020-2025)". <i>MarketResearch.com</i>, Mordor Intelligence LLP, 2019</li> <li>5. Valuing plastics: The business case for measuring, managing and disclosing plastic use in the consumer goods industry. Raynaud, J., UNEP, 2014. p.27.</li> <li>6. "Plastic recycling: PET and Europe lead the way – Petrochemical special report". <i>S&amp;P Global Platts</i>, 2019.</li> <li>7. "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050". World Bank Group, 2018</li> <li>8. Ibid.</li> <li>9. "Reduce, reuse, and recycle: the 3Rs in South Asia." Visvanathan, C. &amp; Tenzin N., 3 R South Asia Expert Workshop. 2006.</li> <li>10. "The Recycled Plastics Market: Global Analysis and Trends." Locock, K. E. S., (2017).</li> <li>11. "Growing plastic pollution in wake of COVID-19: how trade policy can help". UNCTAD, 2020</li> <li>12. "COVID-19 has hobbled Asia's recycling trade as demand for recycled plastic dips and recyclers face ruin". <i>Hicks, R., Eco-Business</i>. 2020.</li> </ol>	<p>The COVID-19 pandemic in 2020 has further intensified the usage of single-use plastics due to hygiene reasons. Aside from the increasing use of personal protection equipment in medical institutions, governments worldwide, including the SAR, have also passed laws to require compulsory face-covering in public spaces, which a considerable portion of the public wearing single-use plastic masks. With the national economic lockdown to curb the spread of COVID-19, orders on online and food delivery platforms have increased considerably, so do single-use plastics.<sup>11</sup> Plastic boards are seen to be installed in restaurants between seats to enforce social distancing, and personal protective equipment, including face covers and full-body suits, are provided for staff.</p> <p>The use of these plastic products for hygiene purposes is understandable. The sudden surge of use of plastic products for hygiene purposes and the accumulation of plastic waste would undoubtedly pose challenges to the waste management system, particularly in the SAR, potentially increasing the improperly plastic litter disposed of in the waterways. Most recycling systems are manual and have been shut down due to fears of cross-contamination or lockdown measures.<sup>12</sup> Even for those few operating recycling plants, proper sanitization is needed. Non-regulated medical plastic waste such as masks and face covers worn by the public before recycling is unlikely to be recycled by recycling plants due to the additional investment needed. This means that plastic waste may not be recycled in full, and more of it may be sent to landfills and later in the marine and terrestrial environment.</p>

### The potential impact of marine plastic pollution

Although the study of the impact of MPP is still incomplete, there is already alarming evidence that MPP negatively affects the environment, social and economic wellbeing.

13. "Global ecological, social and economic impacts of marine plastic." Beaumont, Nicola J., et al., *Marine pollution bulletin* 142 (2019): 189-195.
14. "The Regional Assessment Report on Biodiversity and Ecosystem Services for Asia and the Pacific". Ipbes, 2018.
15. "Mixing it up in the oceans carbon cycle and the removal of refractory dissolved organic carbon." Yuan, S. & Benner, R., *Scientific reports* 8.1 (2018): 1-9.
16. "Marine microplastic debris: An emerging issue for food security, food safety and human health." Barboza, Luís Gabriel Antão, et al., *Marine pollution bulletin* 133 (2018): 336-348.
17. "Marine plastic litter in East Asian Seas: Gender, human rights and economic dimensions.". United Nations Environment Programme, Coordinating Body on the Seas of East Asia & Stockholm Environment Institute, Bangkok: UNEP, 2019
18. "Open burning of waste: a global health disaster." Cogut, A., *R20 Regions of climate action 2016*.
19. United Nations Environment Programme, Coordinating Body on the Seas of East Asia & Stockholm Environment Institute, 2019. Op cit.
20. "Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change". UNEP, Nairobi. 2016.
21. "The State of World Fisheries and Aquaculture 2018-Meeting the sustainable development goals." FAO, Licence: CC BY-NC-SA 3.0 IGO (2018).
22. "The economic cost and control of marine debris damage in the Asia-Pacific region." McIlgorm, A., Campbell, H.F., and Rule, M.J., *Oceans & Coastal Management* 54.9 (2011): 643-651.
23. UNEP. 2020. Op cit.

Most species are negatively affected by MPP, ranging from moderate to severe irreversible impact. Bacteria and algae, which are both harmful to the habitat, are the only species that benefit from MPP and irreversibly increase their population.<sup>13</sup> The SAR hosts 6% of the world's coral reef, an essential habitat of 250 coral and 1200 associated fish species. It has been found that the coral reef would be both directly and indirectly impacted by MPP through entanglement or obstruction from receiving the sunlight. Almost 70% of the coral reef in the SAR has already suffered damage, severely threatening biodiversity and disrupting the ecological food chain.<sup>14</sup> Also, MPP weakens the ocean's ability to dissolve and store carbon, potentially exacerbating climate change severity.<sup>15</sup>

Aside from a decline in biodiversity, the marine ecosystem will also ingest microplastics that will be passed on in the food chain, ultimately reaching humankind. Research suggests that human beings may experience immune system issues when consistently consuming microplastic, which could eventually lead to some degree of brain damage.<sup>16</sup> Some evidence also shows the potential for neurobehavioral disorders in males and early sexual maturation in females.<sup>17</sup> Three out of eight countries in the SAR are currently consuming seafood as a major source of animal protein. The trend of consuming seafood in the region is likely to increase in the near future, highlighting the food safety risk that microplastics pose to the south Asian population.

Communities and workers near the plastic recycling or disposal sites face a higher risk of cancer and weakened immune and respiratory systems. Open dumpsites transmit chemical compounds to the nearby area, and regular garbage burns emit toxic substances like dioxin to the environment. Toxic compounds have been found in the breast milk of residents living near the dumpsites, heightening concerns over infant mortality rate and health conditions.<sup>18</sup> MPP includes a considerable amount of large plastic litter like abandoned, discarded, and lost fishing gear, which poses a threat to maritime safety. There have been reports of sea vessels having their propellers damaged by plastic litter in the ocean, potentially undermining seafarers' security.<sup>19</sup>

Economically, MPP reduces national income and simultaneously increases social expenditure, particularly in cleaning programs and preventative measures. Economies that heavily rely on tourism or fisheries are the most badly affected. For example, the Maldives receives almost 25% of its GDP from the tourism industry and another 3.9% from the fishery industry. But the Maldives receives plastic pollution from mismanaged continental waste and plastic packaging because it lacks recycling and waste management capacity. Such environmental damage has made tourists reconsider their travel destinations and lowered the fish produces, including quality and quantity of hauls, hampering the national economy.<sup>20,21</sup> It is estimated that MPP has caused a loss of USD 1.26 billion to the APEC economies, annually.<sup>22</sup>

### Plastic regulation and implementation in South Asia

Due to inadequate and overwhelmed waste management systems, open dumping, storms, and rainwater, the land-based sources of pollutants often leak into rivers, coastal areas, and oceans. An estimated 80 percent of plastic waste that gets into the oceans comes from land-based activities, and the remaining 20 percent comes from marine activities.<sup>23</sup> The severe MPP in South Asia is primarily due to inadequate waste management systems and inefficient informal plastic recycling sector. The consequences of MPP in South Asia have a significant impact on wildlife, community health, and economic losses.

Bangladesh first introduced policies on plastic products ban in South Asia in 2002. Currently, seven out of the eight countries in the SAR have implemented a plastic ban at either municipal or national levels. Nepal introduced a plastic bag ban in 1995 but was implemented ineffectively due to the civil war outbreak. Efforts to impose plastic bans in the SAR in the previous decade could not succeed due to the authorities' poor implementation. The plastic bans in SAR range

from banning certain types of materials or thicknesses from circulation in the market to a complete ban of plastic related activities such as manufacturing, sales, importation, and purchases. Violators are subjected to fines or a maximum sentence of 10 years.<sup>24,25</sup>

Laws regulate microplastic like plastic bags (larger than 5mm), but there is none in place in the SAR to control microplastics' release (smaller than or equal to 5mm). Daily activities like exterior painting, driving, and clothes' washing release microplastics that accumulate in the marine environment.<sup>26</sup> The exact impact of microplastics in the marine environment has yet to be understood but poses an alarming concern. Even with the plastic ban legislation, many countries in the SAR have a track record of not implementing the plastic bans effectively and consistently due to insufficient resources at the local level.

Evidence from Bangladesh, Bhutan, India, and Pakistan shows a lack of enforcement measures for implementing the plastic ban legislation and regulations. The local governments often receive limited resources and training from the central government, making it difficult for frontline officials to enforce the law. Research has also shown that the severity of the penalty for breaking the plastic bans law is insufficient in altering the public's behavior.<sup>27</sup>

Since the likelihood of being fined or jailed for breaking the plastic ban is low, the population uses plastic bags in their daily life. For instance, business owners, especially hawkers and roadside vendors, tend to store banned plastic bags and find ways to purchase banned plastic bags for their daily operation to reduce their operating costs.<sup>28</sup> As the informal sector consists of over 82% of the non-agricultural sector in the region, many economic activities are out of the official monitoring network, posing a challenge for authorities who wish to tackle plastic use in daily business activities systematically.

- 24. "Legal Limits on Single-Use Plastics and Microplastics: A Global Review of National Laws and Regulations". UNEP, 2018a
- 25. "Single-use plastics: A roadmap for sustainability". UNEP, 2018b.
- 26. "Mapping of global plastic value chain and plastic losses to the environment: with a particular focus on environment." Ryberg, M., Alexis L., and Michael Z.H., (2018).
- 27. "What makes a ban on plastic bags effective? The case of Nepal." Bharadwaj, B., Baland, J. M. & Nepal, M., Environment and Development Economics (2019): 1-20.
- 28. "Challenges and opportunities: plastic waste management in India." Bhattacharya, R. R. N., et al., 2018.

Member State	Earliest year of introduction	UNEP recognition and implementation level	Legislation Content
<b>Afghanistan</b>	2012	No, National	Ban on the import and usage of plastic bags in all shops in the cities and provinces across the country.
<b>Bangladesh</b>	2002	Yes, National	Ban on polyethylene plastic bags.
<b>Bhutan</b>	2009	Yes, National	Ban on plastic bags.
<b>India</b>	1998	Yes, National, State, and Municipal	Ban on non-compostable plastic bags <50µ.
<b>Maldives</b>	N/A	N/A	N/A
<b>Nepal</b>	1995	No, Municipal	No persons can import, produce, store, sale and distribute plastic bags of thickness less than 30µ; Retailers need to collect and return all plastic bags to importers; Individuals and retailers have to reduce the unnecessary use of plastic bags, depending on municipals.

<b>Pakistan</b>	2013	Yes, Municipal	Ban on manufacture, sales, importation, purchase, and use of non-biodegradable plastic bags, depending on municipals.
<b>Sri Lanka</b>	2017	Yes, National	Ban on the import, sale, and use of polyethylene bag <20μ and Styrofoam containers

Source: UNEP, 2018a & 2018b

## Community and international engagement on marine plastic pollution

Although authorities in the SAR have passed legislation to reduce single-use plastic, the dominant forces leading the battle against MPP in the region are civil society, the informal sector, and international organizations.

The SAR has the largest informal sector in the world, and it has been on the frontline of plastic reduction and recycling. The informal sector in the region has provided labor and primitive technology in practicing plastic recycling from waste picking to small recycling plants. Civil society has also led the drive to educate communities in plastic recycling and reducing plastic use. They have mainly tried to promote recycling and better waste management practices while organizing mass participatory events and activities to raise awareness.

In Mumbai, India, an inspiring young environmentalist, Afroz Shah, has organized the most extensive beach cleanup project in the world. He spread his message of a clean ocean by arranging door to door campaigns and mobilizing over 5,000 volunteers to join his movements over a single weekend. Throughout two-years, his initiatives have removed over 13,000 MTs of waste from the beaches, most of it being plastic.<sup>29</sup> In Bangladesh, the Environment and Social Development Organization also acted as a significant driver in raising awareness of the nationwide plastic ban legislation. The ban, which was initially only planned to be implemented within the capital, eventually became a national policy.<sup>30</sup> As for improving waste management practices, civic society members have helped those in the informal sector work with the authorities to mobilize resources from both the private and public sectors. In Pune, India, the Kagad Kach Patra Kashtakari Panchayat acted as a bridge between the informal sector and the local authority in helping the informal sector engage in the municipal waste collection service as a service provider and allowed the informal waste pickers to segregate recyclable materials from the other waste left for the local authority to dispose of and process safely and adequately.<sup>31</sup> Similar NGOs have come forward into the solid waste management sector in Bangladesh. With the active engagement of the civil society and the private sector, it can increase the region's capacity in mitigating MPP.

International organizations have provided financial assistance, technological support, and frameworks for nations to develop their recycling industries and improve waste management practices. Regionally, the South Asia Association for Regional Cooperation was established in 1985 to facilitate regional cooperation and the South Asian Centre for Environmental Programme (SACEP) to promote regional efforts specifically on environmental issues. The SAR countries are also signatories of the Basel Convention. This international agreement aims to establish a legally binding framework to control transboundary movements of hazardous waste and its disposal, including plastic waste. Notable international organizations like the World Bank and the Asian Development Bank also cooperate with regional organizations or countries to support different initiatives to curb MPP.

## Policy priority for tackling marine plastic pollution in the South Asia region

With an already alarming situation, the SAR needs to take steps to achieve SDGs 11.6, 12.5, and

29. UNEP. 2018b. Op. cit
30. "Beat the Plastic Pollution, Ban the Bag. Bangladesh NGO Pioneering Move to Worldwide Plastic Bag Ban". Environmental and Social Development Organization, 2018.
31. "Closing the Loop: Pune, India Case Study". UNESCAP, 2019
32. "Metadata: SDG indicator 14.1.1". UNSTATS, 2019.

14.1 by 2030 to tackle MPP systematically. Despite the current situation, many good practices are being displayed around the world, especially in European countries. The SAR should replicate by adapting the relevant policies to suit their unique situations.

*(a) Develop the baseline data on marine plastic pollution and waste management at city, national and regional levels and facilitate knowledge exchange*

As highlighted in the SDG Progress Report 2020 prepared by ESCAP, data availability has been a critical issue in monitoring progress and achieve SDGs. One of the fundamental challenges for MPP when designing a corresponding policy is the lack of reliable and constantly updating official statistics. Without the relevant data, it is highly challenging for authorities to identify the policy, technology, and resources gap and therefore make necessary interventions. The South Asian region needs to improve its waste management and recycling system. It is understandably challenging as a significant portion of such functions lie within the informal sector, where the government would have difficulty obtaining accurate estimations. However, given the importance of such data, authorities must find ways to establish the baseline data and periodically update the relevant information. They must also partner with notable and large-scale civil society associations, private sector, or cooperate with an international organization to develop infrastructure to collect critical data.

Once the data collection points are established at the local level, countries in the region should clean and aggregate the data before making it available to the public. The region should share a knowledge base, data, and information by establishing a regional indicator monitoring mechanism and baseline data or integrated into the SDG tracker. This would facilitate stakeholders at the national and international levels to make periodic impact assessments across the regional terrestrial, aquatic, and marine ecosystems so as to tailor regional initiatives.

**Monitoring indicators and data collection point**

MPP is the concern of SDG 14.1, indicator 14.1.1b being specifically designed to monitor the severity of MPP. This indicator focuses on the combined information of 3 main plastic pollution types: 1) plastic debris washed or deposited on beaches or shorelines, 2) plastic debris in the water column and seafloor and, 3) plastic ingested by the biota (sea birds). The indicator is expected to be operational for tracking SDG 14.1 in 2021 whilst beach litter is currently being used as a proxy indicator for marine plastic litter.<sup>32</sup> To curb MPP completely, it will also involve the effort in achieving SDG 11.6 and 12.5, where SDG indicator 11.6.1 and 12.5.1 are the relevant indicators that could help evaluate some aspects of MPP.

However, SDG indicator 14.1.1b is yet to be readily available in the South Asian region. Information with some degree of utility is available only from India and Sri Lanka. There are no accepted or uniformed methodologies in the region for collecting, analyzing, and interpreting marine litter data in the region. As beach litter is used as a proxy indicator, estimations of the severity of marine plastic pollution in the region are often relying on beach cleanup campaigns or surveys conducted by the local communities or NGOs.<sup>33,34</sup> Similar situation is observed for SDG indicator 12.5.1, where only India had relevant data for the indicator. The data of SDG indicator 11.6.1 is more completed with 7 out of 8 countries in the SAR having relevant data but the latest data was from 2012, with some countries having data from 2003 as the latest available data. Given the timeliness and availability of data related to marine plastic pollution, it is very challenging for policymakers to evaluate the situation and react correspondingly.

In order to collect data on marine debris in the water column and on the seafloor, more sophisticated equipment and professional personnel are required. Research vessels, sightings,

- 33. "Marine Litter in the South Asian Seas Region". South Asian Cooperative Environment Program, 2007
- 34. "Guidelines on the monitoring and assessment of plastic litter and microplastics in the ocean" GESAMP, (Kershaw P.J., Turra A. and Galgani F. editors), (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP/ISA Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 99, 130p. 2019

and satellite remote sensing data could be used to obtain floating plastic debris data in the ocean. Underwater instruments, including scan sonar and remotely operable vehicles, would be needed for the seafloor plastic debris. One possibility for collecting such data is to use the existing Indian Ocean Observing System, which is currently primarily used to collect scientific data for climate science, to observe the styrene oligomers (SOs) level in the ocean. SOs are low molecular weight chemicals derived from polystyrene, the main chemical compound in all kinds of plastic. The concentration of the SOs level in the ocean could be used to deduce the amount of plastic waste in the nearby ocean area.<sup>35</sup> Data for SDG 11.6.1 and 12.5.1 would also require additional investment and resources to collect better and update the data.

*Source: Compiled from UNEP, UNSTATS, CLIVAR, GESAMP and Kwon, Bum Gun, et al.*

***(b) Support structures that help improve the waste management system***

In general, the waste management system in the SAR has a lot of room for improvement. Firstly, the area covered by organized waste collection services needs to be extended in urban and rural areas. The current waste management systems and collection rates in the region are far from ideal, allowing a considerable leakage of plastic waste. The lack of organized waste collection services is also encouraging illegal dumping and littering, increasing the chances for plastic and other waste to enter the marine environment. Following the example set by the Kagad Kach Patra Kashtakari Panchayat in Pune, India, the SAR may want to utilize the existing informal economic sector to facilitate better and more efficient waste collection services. Also, addressing leakages across the plastic waste value chain from generation to collection, segregation, processing, and disposal would be highly significant.

Another significance of establishing a sound waste management system is to allow waste segregation. To establish a more recycling friendly waste management system, authorities should start promoting household waste segregation to allow easier waste classification later at the collection stage. Waste labels should also be introduced to identify different types of materials for disposing or recycling purposes. After the waste collection stage, the municipal waste should go through a reprocessing and recovery phase before disposal to allow municipal waste to better decompose after the disposal. This stage enables waste to be sorted for mitigating MPP and systematically screen out the recyclable plastic waste for secondary plastic production. This helps the recycling plants secure a stable plastic feedstock source for their business activities, creating a healthier environment for the plastic recycling industry to develop. Although it requires a significant financial investment to establish the necessary infrastructure, it should be considered a long-term investment that facilitates the respective nation's sustainable development.

Dumpsites are harmful to the nearby communities and lead to a much higher chance of plastic waste leakage. Ideally, sanitary landfills should replace the existing dumpsites, but due to the enormous population and high population density in the region, social anxiety is likely to be strong. Since plastic is a petroleum product, plastic waste has high potential energy extracted and utilized. To properly dispose of waste while contributing to the SDG agenda, the region could consider disposing of the waste, especially plastic waste, in the form of incineration coupled with energy recovery in an area far away from residential districts. If appropriately implemented, incineration with energy recovery offers one possible solution to waste disposal, including plastic waste, and reduces plastic waste leakage into the environment.

***(c) Better enforcement of plastic bans and utilization of economic instruments***

Most countries in the SAR are now incorporating plastic bag bans into their legislation; this is an

35. "Monitoring of styrene oligomers as indicators of polystyrene plastic pollution in the North-West Pacific Ocean." Kwon, Bum Gun, et al., *Chemosphere* 180 (2017): 500-505.

encouraging development and shows the willingness of authorities to take responsibility for achieving the sustainable development agenda. It is recommended that the Maldives, which does not have any form of plastic ban legislation, to speed up the process and explore more feasible ways of legislating to suit their tourist-oriented economy. Nonetheless, having legislation in place is only a preliminary step. The relevant authorities must implement the policies effectively to successfully achieve the policy's aim – a reduction in single-use plastics.

Authorities need to address the main issues of i) insufficient resource allocation for local authorities and ii) the lack of consistent enforcement of the legislation. To properly implement the plastic ban, authorities need to rely on local governments to appropriately enforce the law. Sufficient training and equipment for law enforcement are required to ensure they have the ability and knowledge to uphold the rules. A certain degree of flexibility can be used when enforcing the law to educate the public on single-use plastic. Still, the prosecution of lawbreakers with a proportionate penalty is necessary after an appropriate grace period. Strict enforcement of the plastic ban would also encourage innovation and the usage of existing available plastic alternatives, thereby immediately reducing MPP's source. After the successful implementation of the plastic bag ban, authorities in the region may consider exploring the legislative measures on other unnecessary usages of macroplastics and microplastics, which are currently unregulated by the law.

Aside from the existing plastic ban legislation, economic instruments are currently under-utilized. Since not all single-use plastic is banned in the SAR (depending on the material, thickness, and business activity), the authorities can consider taxing the permitted single-use plastics to further reduce their manufacture and distribution. Extended producer responsibility schemes (EPR) should also be widely adopted in the SAR to lower plastic usage and encourage plastic recycling activities. An EPR framework on plastic has been proposed in India in recent years but is yet to be adopted. However, due to the informal economic sector's size, implementing taxation and EPR might be challenging. Alternatively, the authorities can also consider providing incentives for developing community waste management, introducing deposit schemes, investing in plastic alternatives, public awareness campaigns, and waste infrastructure to change its plastic usage behavior.

*(d) Engaging all stakeholders, including NGOs, private sector, regional and international organizations*

Civic society has already played a leading and essential role in promoting plastic recycling and reduction. Engaging all stakeholders is crucial in the SAR as the informal economic sector's size is so significant that the authorities may have difficulty engaging with it. Governments should recognize NGOs' efforts and support their work with measures like tax exemption, financing, or partnerships. Governments should also take the initiative and mobilize resources themselves to reach out to the public directly. However, before that can be achieved, authorities should work closely with NGOs to identify the existing policy gaps and better understand the difficulties communities face to tailor more effective plans to reduce MPP with a hybrid of a bottom-up and top-down approach. Authorities also need to establish infrastructures and mobilize resources to reverse existing MPP. There have also been several voluntary/unpaid labor initiatives from the civic society that have attempted to address MPP's problem. Given the severity of the issue, it would require close cooperation of all parties to tackle MPP fundamentally.

Given the transboundary nature of MPP, a regional and international effort is also critical for completely resolving the issue. Since the SAR is relatively tight on resources, wider cooperation in addressing MPP is crucial. To achieve this, high-level collaboration and coordination is needed between the countries in the region. Countries should establish a platform to exchange data,

technology, experiences, and best practices in tackling MPP. To ensure the data collected in the region relate to similar indicators and, in so doing, facilitate cooperation, the SAR countries should reach a consensus on the requirements of the data beforehand. The function of the SACEP should be strengthened, and governments should set aside the necessary resources to allow more initiatives to be launched in the region. Also, MPP has become increasingly concerning at a global level, and it can be expected that more relevant research and information will be made available. Taking part in international organizations would allow the region to receive additional funding opportunities and learn about world-leading technologies and best practices. The recent support from the World Bank Group, with USD 40 million on the SAR's plastic-free river and sea initiative, shows the international community is in solidarity with tackling MPP. Engaging in the global exchange of relevant information and experience would only benefit the regional efforts to combat the issue.

ESCAP-SSWA Policy Briefs communicate findings and policy lessons of ESCAP analysis for policy makers and development practitioners.

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