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# MARINE ENVIRONMENTAL PROTECTION IN THE SOUTH CHINA SEA: ADVANCING STRONGER PEOPLE-TO- PEOPLE COOPERATION ON PLASTIC WASTE MANAGEMENT

Policy Report

Margareth Sembiring

April 2024

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**NANYANG  
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**Policy Report**

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## **Executive Summary**

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The South China Sea (SCS) holds immense importance, not only due to its geopolitical significance but also because of its rich biodiversity and vital role in supporting livelihoods and ensuring food security through fishing activities. Protecting the marine and coastal environments of the SCS is crucial, particularly in the face of escalating pollution, biodiversity loss, and climate change impacts. While regional cooperation mechanisms exist to address transboundary environmental challenges, there is a need for enhanced people-to-people collaboration among the countries bordering the SCS. Strengthening such cooperation is especially pertinent in tackling the marine plastic debris issue, as its root causes are deeply intertwined with human choices, behaviours, policies, and practices.

# Introduction

The SCS spans 3.2 million square kilometres, with coasts shared by Brunei Darussalam, the People's Republic of China (China), Indonesia, Malaysia, the Philippines, Singapore, the Republic of China (Taiwan), and Vietnam.<sup>1</sup> Beyond its geopolitical significance, the region is marked by longstanding territorial disputes among some of the countries, adding to its volatility.

The SCS plays a pivotal role in global fishing, accommodating over half of the world's fishing boats<sup>2</sup> and yielding more than 10% of the annual global catch.<sup>3</sup> Its diverse ecosystems host a significant portion of the world's biodiversity. Forty-five out of 51 mangrove species in the world,<sup>4</sup> 50 of 70 coral genera,<sup>5</sup> 20 of 50 seagrass species,<sup>6</sup> seven of nine giant clam species,<sup>7</sup> and 450 coral species<sup>8</sup> are found along its shores.

Like other marine environments, the SCS faces numerous environmental pressures. Twenty of the world's most polluting rivers are found in Asia, with China's Xi, Dong, and Zhujian Rivers discharging approximately 0.106 million tonnes of plastic waste per year into the SCS via the Pearl River Delta.<sup>9</sup> In 2015, around 2.56 to 7.08 million tonnes of plastic marine debris from six SCS-bordering countries<sup>10</sup> accounted for approximately 65% of the world's top 20 contributors to

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<sup>1</sup> Aldo Chircop, "Regional Cooperation in Marine Environmental Protection in the South China Sea: A Reflection on New Directions for Marine Conservation," *Ocean Development & International Law* 41, no. 4 (2010): 334–356.

<sup>2</sup> Jiajun Li, Yongsong Qiu, Yancong Cai, Kui Zhang, Peng Zhang, Zhiyou Jing, Qiaer Wu, Shengwei Ma, Huaxue Liu, and Zuozhi Chen, "Trend in Fishing Activity in the Open South China Sea Estimated from Remote Sensing of the Lights Used at Night by Fishing Vessels," *ICES Journal of Marine Science* 79, no. 1 (2022): 230–241.

<sup>3</sup> Hongzhou Zhang, "Fisheries Cooperation in the South China Sea: Evaluating the Options," *Marine Policy* 89, (2018): 67–76.

<sup>4</sup> Mark Spalding, François Blasco, and C. D. Field, eds., *World Mangrove Atlas* (Okinawa: The International Society for Mangrove Ecosystems, 1997).

<sup>5</sup> Tomas Tomascik, Anmarie Janice Mah, Anugerah Nontji, and Mohammad Kasim Moosa, *The Ecology of the Indonesian Seas - Part 1* (Singapore: Periplus Editions (HK) Ltd, 1997).

<sup>6</sup> S. Sudara, M. Fortes, Y. Nateekanjanalarp, and S. Poovachiranon, "Human Uses and Destruction of ASEAN Seagrass Beds," in C.R. Wilkinson (ed.), *Living Coastal Resources of Southeast Asia: Status and Management. Report of the Consultative Forum Third ASEAN-Australia Symposium on Living Coastal Resources* (Thailand: Australian Agency for International Development, 1994): 110–113.

<sup>7</sup> Tomas Tomascik, et al. (1997), op. cit.

<sup>8</sup> UNEP, "National Reports on Coral Reefs in the Coastal Waters of the South China Sea," *UNEP/GEF/SCS Technical Publication No. 11*. (2007); UNEP, "National Reports on Mangroves in South China Sea," *UNEP/GEF/SCS Technical Publication No. 14*. (2008).

<sup>9</sup> Laurent C. M. Lebreton, Joost van der Zwet, Jan-Willem Damsteeg, Boyan Slat, Anthony Andrady, and Julia Reisser, "River Plastic Emissions to the World's Oceans," *Nature Communications* 8 (2017): 15611.

<sup>10</sup> The six countries were China, Indonesia, Malaysia, the Philippines and Vietnam.

plastic waste.<sup>11</sup> Aside from plastic pollution, human activities and climate change have significantly degraded the SCS coral reefs since the 1960s.<sup>12</sup>

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<sup>11</sup> Jenna R. Jambeck, Roland Geyer, Chris Wilcox, Theodore R. Siegler, Miriam Perryman, Anthony Andrady, Ramani Narayan, and Kara Lavender Law, "Plastic Waste Inputs from Land into the Ocean," *Science* 347, no. 6223 (2015): 768–771.

<sup>12</sup> KeFu Yu, "Coral Reefs in the South China Sea: Their Response to and Records on Past Environmental Changes," *Science China Earth Sciences* 55, (2012): 1217–1229.

## Cooperation on Marine Environmental Protection in the South China Sea

The transboundary environmental challenges in the SCS call for a collaborative regional approach to address them effectively. Moreover, regional cooperation on marine environmental protection and conservation has long been recognised as a means of managing conflicts in the SCS. Following the Informal Workshop on Managing Potential Conflicts in the SCS in 1991, several joint biodiversity projects involving experts and researchers from different countries were undertaken in uncontested areas of the SCS in the early 2000s.<sup>13</sup> The Declaration on the Conduct of Parties in the SCS (DOC) issued in 2002 also emphasises marine environmental protection as a key area for cooperation.<sup>14</sup>

These are in addition to various regional mechanisms covering larger areas beyond the SCS that include the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA),<sup>15</sup> the Coordinating Body on the Seas of East Asia (COBSEA),<sup>16</sup> the Asia-Pacific Economic Cooperation (APEC),<sup>17</sup> and the ASEAN Working Group on Coastal and Marine Environment (AWGCME).<sup>18</sup>

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<sup>13</sup> Yann-huei Song, "A Marine Biodiversity Project in the South China Sea: Joint Efforts Made in the SCS Workshop Process," *The International Journal of Marine and Coastal Law* 26 (2011): 119–149.

<sup>14</sup> "Priority Areas of Cooperation," Association of Southeast Asian Nations, <https://asean.org/our-communities/asean-political-security-community/peaceful-secure-and-stable-region/situation-in-the-south-china-sea/priority-areas-of-cooperation/>

<sup>15</sup> Five out of 11 PEMSEA country partners share borders with the SCS.

<sup>16</sup> Six out of nine COBSEA participating countries share borders with the SCS.

<sup>17</sup> All countries bordering the SCS are part of the 21 APEC member economies.

<sup>18</sup> Six out of 10 ASEAN member states share borders with the SCS.

## Marine Plastic Pollution and People-to-People Engagements

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The existing regional mechanisms have adopted a multi-sectoral approach to addressing the marine pollution issues. For instance, ASEANO, a Norway-funded initiative led by the Norwegian Institute for Water Research (NIVA) and the Center for Southeast Asian Studies (CSEAS) Indonesia in collaboration with PEMSEA and AWGCME, employed a multi-stakeholder approach in studying plastic pollution in the Citarum River in Indonesia and the Imus River in the Philippines.<sup>19</sup>

However, current cooperation modalities primarily focus on capacity building in member countries. They comprise mainly project implementation, formulation of regional guidelines and roadmaps, and sharing of best practices through regional workshops, educational materials, and awareness-raising campaigns. For example, COBSEA, in partnership with the United Nations Environment Programme (UNEP) and UN-Habitat, initiated the SEA Circular projects to examine plastic waste leakage in select cities in Cambodia, Vietnam, Malaysia and Thailand. The projects also recommended ways to address the issue.<sup>20</sup>

The emphasis on capacity building in regional cooperation, which often occurs at the government level, is insufficient for solving marine plastic pollution. Marine debris is a complex problem closely linked to the choices, lifestyles, and behaviours of the general population. While government-led policies and initiatives play a significant role in shaping behaviours conducive to reducing plastic debris, broader societal involvement in the cooperation efforts is essential for a comprehensive and impactful intervention. Stronger people-to-people engagements are pivotal to tackling such challenges effectively.

Enhanced people-to-people engagements will enable a broader and deeper understanding of the diverse societal contexts and capacities that influence plastic use and waste management practices across countries. Visits to the various countries can also highlight the successful initiatives and identify the less effective ones. This will lead to more realistic expectations of collective achievements in the near and long term, thereby mitigating the tendency to assign blame, particularly when pollution sources originate from other countries.

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<sup>19</sup> "Phase 1 (2019-2022)," ASEANO 2, NIVA, <https://www.niva.no/en/projects/aseano/Phase-1>.

<sup>20</sup> UNEP, COBSEA, Sweden, and UN-Habitat, *Identifying Plastic Waste Leakage Hotspots and Flows in South-East Asia*, (2022).



# Policy Recommendations

To enhance people-to-people engagements, focus can be placed on three key areas of cooperation: reducing plastic use, managing plastic waste, and improving the recycling sector. Government support, both politically and financially, is crucial to ensure the sustainability and effectiveness of these efforts. Here are some recommended approaches to achieve this objective.

## 1. Increase cross-site visits to expose people to different approaches

Plastic reduction requires changing habits, but regulations to encourage better behaviours often vary between countries. While some nations have banned or levied fees for single-use plastics, other plastic uses, such as packaging and portable items, remain largely unregulated. For instance, the Philippines' "sachet culture" presents challenges to banning plastic sachet packaging.<sup>21</sup>

Increasing cross-site visits to regions like Indonesia's Bali Province and various cities in Malaysia, Singapore, Vietnam, and Brunei Darussalam, where plastic reduction measures are implemented,<sup>22</sup> can provide firsthand exposure to diverse policies, infrastructure, awareness strategies, school curricula, and voluntary business initiatives for plastic alternatives.

ASEANO and COBSEA can arrange visits to their respective project sites for government officials, researchers, media influencers, youth and environmental groups, and representatives from riverbank communities. ASEANO offers visits to locations such as Indonesia's Citarum River and the Philippines' Imus River for ASEANO; while COBSEA's Sea Circular project includes sites in Kep and Sihanoukville (Cambodia), Seremban (Malaysia), Chonburi (Thailand), and Tam Ky and Hoi An (Vietnam).

These visits will enable participants to assess the adequacy, functionality, and strategic placement of existing waste infrastructure (such as barriers, traps, track racks, bins, and trash carts) near residential areas. Participants can also observe the community's waste disposal practices and determine whether the

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<sup>21</sup> Norway, PEMSEA, NIVA, CSEAS, and ASEAN, *The Situation and Causes of Plastic Pollution in the Imus River, Cavite*, (2020).

<sup>22</sup> Lewis Akenji, M. Bengtsson, and M. Kato, et al. *Circular Economy and Plastics: A Gap-Analysis in ASEAN Member States* (Brussels: European Commission Directorate General for Environment and Directorate General for International Cooperation and Development; Jakarta: Association of Southeast Asian Nations, 2019).

incentives for better waste management and frequency of waste collection are adequate.

The exposure will provide government officials with ideas for policy enhancements in their own regions. It will also enable media influencers and youth groups to share observed best practices, along with insights into the societal, cultural, and technical factors affecting plastic reduction efforts, with their communities.

## **2. Enhance people-to-people engagements by initiating collaborative projects focused on technology development**

Countries vary in their access to essential waste management technologies, which are crucial for locating, tracking, and filtering plastic waste from entering the ocean, as well as for cleaning up coastal and sea areas.

Technological cooperation would present an opportunity to strengthen people-to-people engagements. For instance, a study has revealed inadequate barriers and trash tracking infrastructures in rivers within the Indonesian cities of Denpasar, Makassar, Manado, Medan, Padang, Pontianak, and Surabaya.<sup>23</sup> Cooperation opportunities can be created among countries such as China, Singapore, and Taiwan, which have advanced technologies to prevent waste from entering the seas. Taiwan utilises the Azure Fighter cleaning boat<sup>24</sup> and Artificial Intelligence (AI)-enabled drone monitoring technology,<sup>25</sup> while Singapore employs the Beach Bobcat and Robocut Beach Cleaning Machine, an autonomous flotsam clearance vessel,<sup>26</sup> along with 5G-powered river cleaning robots.<sup>27</sup> China also utilises a 5G-powered boat for river cleaning.<sup>28</sup>

Technology-driven cooperation could involve the formation of a consortium comprising academic researchers in robotics and information technology, as well as industrial players across SCS-bordering countries. This would help to identify

<sup>23</sup> World Bank Group, Kementerian Koordinator Bidang Kemaritiman, Embassy of Denmark, and Royal Norwegian Embassy, *Indonesia Marine Debris Hotspot Rapid Assessment: Synthesis Report*, (2018).

<sup>24</sup> "Video. Taiwan: Environmental Group Designs Marine 'Vacuum Cleaner'," Euronews, September 18, 2021. <https://www.euronews.com/video/2021/09/18/taiwan-environmental-group-designs-marine-vacuum-cleaner>

<sup>25</sup> Jennifer Jieh, "Taiwan Develops AI Technology to Detect Marine Waste," TVBS, January 30, 2023. <https://news.tvbs.com.tw/english/2028717>

<sup>26</sup> Singapore's Ministry of Sustainability and the Environment, *National Action Strategy: Addressing Marine Litter in Singapore*, <https://www.mse.gov.sg/images/nasml/nasml.pdf>

<sup>27</sup> Ibid.

<sup>28</sup> "5G-powered River-cleaner Robot Debuts in Shanghai," CGTN, July 29, 2020. <https://www.youtube.com/watch?v=t3kfy5oolfQ>

the technological gaps in each country and facilitate the transfer of resources and knowledge to improve their capacity to prevent plastic waste from entering the sea.

Another potential mode of cooperation involves extending the use of advanced technologies owned by certain countries to other SCS-bordering countries. This approach could mirror initiatives like the Ocean Cleanup, an NGO headquartered in the Netherlands, which deploys its cleaning boats in various countries.<sup>29</sup> Such collaborations would require coordination not only among relevant government agencies and officials, but also among crew members involved in the clean-up operations.

### **3. Foster people-to-people cooperation by establishing a sustainable ecosystem and market for the recycling sector**

For plastic waste to become economically viable, it must be integrated into a functional recycling ecosystem. Currently, goods made from recycled materials are often more expensive than brand new products, and there is limited market demand for them. Governments need to incentivise the use of recycled products and explore markets beyond their borders to create a sustainable demand. Collaborations among government officials from SCS-bordering countries can lead to harmonised policies, standards, and practices, facilitating a larger market for recycled products.

Differences in recycling technology and capacity among countries further highlight the need for cooperation. For example, Indonesia's waste management sector lacks funding, leading to inefficiencies and high operating costs,<sup>30</sup> with formal recycling systems processing less than 5% of the waste generated.<sup>31</sup> In contrast, Singapore recycled 57% of its solid waste in 2022.<sup>32</sup>

COBSEA's Sea Circular project allows for collaboration among academic and research communities and technology providers to strengthen the technological and financial capacity and capability in countries with weaker recycling sectors. In addition, collaborations between government and the recycling technology industry across SCS-bordering countries will enable the

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<sup>29</sup> "The Ocean Cleanup," <https://theoceancleanup.com/>

<sup>30</sup> World Bank Group, et al. (2018), op. cit.

<sup>31</sup> Ibid.

<sup>32</sup> Abigail Ng, "About 6% More Waste Generated in Singapore in 2022; Recycling Rate Increased Slightly," Channel News Asia, May 3, 2023. <https://www.channelnewsasia.com/singapore/recycling-rate-waste-generated-statistics-singapore-nea-2022-3460796#:~:text=Of%20the%207.39%20million%20tonnes,52%20per%20cent%20in%202020.>

identification of opportunities for foreign direct investments in the recycling sector.

Another important aspect is the sourcing of materials for recycling. Efficient waste collection strategies are crucial in fostering a robust recycling sector. The engagement of fishing communities in collecting used fishing nets by Taiwan's Kaohsiung city government is a successful example. Fishermen receive rewards for returning nets, which are then processed into recycled materials for various industries.<sup>33</sup> Government support is essential in supplying these materials to recycling enterprises and establishing industries that utilise recycled materials in their processes.

Thus, collaborative projects involving local governments, fishing communities, youth and environmental groups, recycling enterprises, and industrial users in SCS-bordering countries can enhance the recycling sector. A robust regional waste collection system will facilitate plastic waste trade and increase the recycling rate in the region.

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<sup>33</sup> Juvina Lai, "Taiwan Introduces Recyclable Fishing Nets, Moving towards Sustainable Dev. Goals," *Taiwan News*, March 23, 2018. <https://www.taiwannews.com.tw/en/news/3388968>

## **Conclusion**

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Stronger people-to-people engagements are crucial for protecting the marine environment in the SCS, especially in combating marine plastic pollution. Regional cooperation, facilitated by cross-site visits, joint technological projects, and the establishment of viable recycling ecosystems, will enhance waste management capacity at the country level and deepen understanding of waste management practices in SCS-bordering countries. This will encourage the behavioural changes necessary to tackle plastic waste and safeguard the marine environment.

## About the Author

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## About the Centre for Non-Traditional Security Studies (NTS Centre)

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The **S. Rajaratnam School of International Studies (RSIS)** is a think tank and professional graduate school of international affairs at the Nanyang Technological University, Singapore. An autonomous school, RSIS' mission is to be a leading research and graduate teaching institution in strategic and international affairs in the Asia Pacific. With the core functions of research, graduate education, and networking, it produces research on Asia Pacific Security, Multilateralism and Regionalism, Conflict Studies, Non-traditional Security, Cybersecurity, Maritime Security and Terrorism Studies.



**NTS Centre** conducts research and produces policy-relevant analyses aimed at furthering awareness and building the capacity to address non-traditional security (NTS) issues and challenges in the Asia Pacific region and beyond. The Centre addresses knowledge gaps, facilitates discussions and analyses, engages policymakers, and contributes to building institutional capacity in Sustainable Security and Crises. The NTS Centre brings together myriad NTS stakeholders in regular workshops and roundtable discussions, as well as provides a networking platform for NTS research institutions in the Asia Pacific through the NTS-Asia Consortium.

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