

STATUS OF RESEARCH, LEGAL AND POLICY EFFORTS ON MARINE PLASTICS IN ASEAN+3

A Gap Analysis at the Interface of Science, Law and Policy



This report was prepared by a research team from several research centres at the National University of Singapore (NUS) under the coordination of the Centre for International Law (CIL) and support from the Coordinating Body on the Seas of East Asia (COBSEA), with support from the Global Partnership on Marine Litter (GPML) and the SEA circular project implemented by COBSEA and the United Nations Environment Programme (UNEP), as well as support by the Singapore Maritime Institute under CIL-MPA Oceans Governance Research Programme - Project ID SMI-2019-MA-03 and the National Research Foundation of Singapore. The report was prepared with the aim of supporting and strengthening marine litter research and informing more robust policy making, in line with the COBSEA Regional Action on Marine Litter (RAP MALI) and other regional actions plans applicable in ASEAN+3. However, this report represents the opinion of the authors writing in their academic capacity. It does not purport to represent the view of COBSEA participating countries nor has been vetted by COBSEA governing bodies. But it has been shared for information with COBSEA participating countries.

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The Coordinating Body on the Seas of East Asia (COBSEA) is a regional intergovernmental mechanism and one of 18 Regional Seas programmes. It is the decision-making body for the East Asian Seas Action Plan, bringing together nine countries – Cambodia, China, Indonesia, Republic of Korea, Malaysia, the Philippines, Thailand, Singapore and Vietnam – in protection and sustainable development of the marine and coastal environment. COBSEA focuses on marine pollution, ecosystem-based marine and coastal planning and management, and ocean governance. The COBSEA Secretariat is hosted by Thailand and administered by the United Nations Environment Programme (UNEP). www.cobsea.org

The Global Partnership on Marine Litter (GPML) is a multi-stakeholder partnership that provides a unique mechanism to bring together all actors working to prevent marine litter and microplastics, with the aim of sharing knowledge and experience and advancing solutions to this pressing global issue. Its mission is to protect the global marine environment, human wellbeing and animal welfare by addressing the global problem of marine litter, in line with Target 14.1 of the Sustainable Development Goals (SDGs). Any entity working to prevent and reduce marine litter can join the Partnership at: www.gpmarinelitter.org

The SEA circular project is implemented by the United Nations Environment Programme (UNEP) and the Coordinating Body on the Seas of East Asia (COBSEA), with support from the Swedish Government. SEA circular works in partnership with governments, businesses, civil society, academia, and international partners to reduce and prevent plastic pollution. The initiative promotes market-based solutions and enabling policies to transform plastic value-chain management, strengthens the science base for informed decision making, engages consumers and disadvantaged groups through targeted outreach, and leverages COBSEA's regional mechanisms to tackle the transboundary challenge of marine litter. www.sea-circular.org

EXECUTIVE SUMMARY

STATUS OF RESEARCH, LEGAL AND POLICY EFFORTS ON MARINE PLASTICS IN ASEAN+3: A GAP ANALYSIS AT THE INTERFACE OF SCIENCE, LAW AND POLICY

Scope and Content

The **scope** of this study is pollution from marine plastic in Southeast Asia and East Asia, with a focus on the 13 member states of ASEAN+3: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, The Philippines, Singapore, Thailand and Viet Nam (Vietnam), plus The People's Republic of China (China), Japan and The Republic of Korea (RO Korea)

The **objective** is to provide a comprehensive review of the current knowledge and scientific research on pollution from marine plastics in ASEAN+3, as well as the approaches and work streams on this topic by international and regional intergovernmental bodies and initiatives that have a relevant mandate or scope in this sphere. The study is divided into two main parts.

Part 1 focuses first on reviewing the status of scientific research on pollution from marine plastics in ASEAN+3. It includes an overall regional summary of this status and an analysis of the findings. Second, it reviews and discusses the mandates, approaches and status of work by international and regional intergovernmental bodies, as well as relevant regional public-private and fully-private initiatives that seek to combat pollution from marine plastics.

Part 2 is a gap analysis between the scientific research and the information needs for policy-making purposes, with a focus on the Regional Action Plan on Marine Litter (RAP MALI) of the Coordinating Body on the Seas of East Asia (COBSEA) and the ASEAN Framework of Action on Marine Debris (FAMAD). The work of other regional bodies is also considered. This part also discusses regulatory approaches and obstacles to combat pollution from marine plastics based on four previous reviews. - Recommendations on research needed and ways to improve the science-policy-law interface are provided at the end.

Findings in Scientific Research

This study includes a stock-taking inventory of 371 scientific publications on pollution from marine plastics in ASEAN+3 from 2001 to 2019. The inventory is publicly available online at <https://cutt.ly/kstW1Qy>.

Of these publications, 145 are from ASEAN countries and the remaining 226 are from the three East Asian countries. Scientific research in marine plastics is an important and ongoing effort within ASEAN+3, particularly as most of the 145 research papers from the ASEAN countries were published from 2017 onwards. However, an analysis and comparison of the scientific research reveals a more nuanced picture. First, only RO Korea and Japan have published research in the full range of possible research areas. They both have publications in all 10 of the research clusters identified in this report. Second, China, Indonesia and Malaysia follow closely with nine out of 10 research clusters, although China has substantially more publications than the other two states. Finally, over the years, research foci on marine plastics in China,

Country	No. of scientific publications
China	129
RO Korea	67
Indonesia	64
Malaysia	36
Japan	30
Philippines	15
Singapore	9
Thailand	9
Vietnam	4
Cambodia	3
Myanmar	3
Brunei	2

Japan and RO Korea have expanded from examining the distribution and presence of plastic debris in the environment and within organisms, to investigating the impacts of plastics in organisms through experiments and predictive models to improve environmental monitoring.

Of the 10 research clusters reviewed, the **weakest research clusters** relate to:

- ◇ the **interactions of plastics with the marine environment**, such as the impacts of plastic-associated (organic and inorganic) contaminants to the marine environment and organisms;
- ◇ **social perceptions and behaviour** in the context of measures to combat pollution from marine plastics;
- ◇ **fragmentation, degradation patterns, behaviour and transport of plastic particles**; and,
- ◇ **contribution of plastics from marine fisheries** (including ALDFGs) as well as other sea-based sources of pollution (including shipping and offshore installations).

Specific **gaps within research clusters** are:

- ◇ a lack of **baseline on the distribution and abundance of plastic debris** on the seabed and in the subsoil at the regional scale, including a lack of understanding of **sources and pathways**;
- ◇ **plastic polymer-specific research** (e.g. PP, PE, EPS, PET) based on their presence in the marine environment, and potential biological toxicity to marine biota;
- ◇ research on ecological and environmental impacts such as the **physical and physiological impacts of marine debris in biota and marine habitats**, including uptake and accumulation in the organisms' bodies (e.g. respiratory and branchial systems), transfer of plastic particle through the food chain;
- ◇ research on **microbial assemblages** found on plastic debris in biota; as well as
- ◇ research on socio-economic impacts such as **human health, food safety, and economic loss** to quantitatively assess socio-economic costs due to marine plastic pollution in local communities.

Findings in the Work of Governmental Institutions and Other Initiatives

This study also analysed the work of seven global bodies or regimes that have a particular interest in marine plastic pollution. Three of these international bodies/regimes stood out with their interest in most research topics considered: UNEA and UNEP; the LC/LP, the body in charge of regulating disposal of waste at sea; and GESAMP, a UN research body. The critical work undertaken under the auspices of the Basel Convention to combat marine plastic pollution would therefore benefit from greater cooperation and outreach with these bodies at global and regional levels.

At regional level, five regional bodies that include different combinations of most of the ASEAN+3 countries are engaged in combatting pollution from marine plastics: the ASEAN, ASEAN+3, EAS (the East Asia Summit), COBSEA and APEC (the Asia-Pacific Economic Cooperation). The extent to which on-going research efforts are sufficient to support the work of these bodies as well as approaches to ensure mutually supporting efforts are included in the gap analysis and in the recommendations.

Gap Analysis at Regional Level

Whilst ongoing research is providing critical information to inform the work of intergovernmental bodies, as well as to engage other public or private initiatives involved in addressing pollution from marine plastics, there are several factors that limit the guidance that this research can provide to the identification of specific response measures:

1. Scientific uncertainty and risk assessment

Whilst understanding of exposure and ingestion of plastic has progressed greatly, there remains areas of uncertainty that limit the clarity needed by governments to adopt effective measures. This includes in particular, an understanding with sufficient granularity of:

- (i) The status of plastic pollution in the marine environment with adequate baselines in different environs and at a scale where policy measures can be adopted;
- (ii) The transformation and fate of plastic particles in the marine environment (i.e. degradation, fragmentation, transport, sinking rate, etc);
- (iii) Presence and persistence of different polymers in the marine environment and their toxicity to human health and marine ecosystems, including through associated organic and inorganic contaminants. Areas that need further research include the understanding of uptake by marine organisms through other paths than ingestion, experimental studies of physiochemical impacts, relative exposure of different species and ecosystems to entanglements, composition of microbial assemblages and trophic transfer; and
- (iv) Different sources and pathways of plastic debris into the marine environment which are likely to be specific to activity and geography in order to adopt activity-specific measures and regulations that may be effective in decreasing input of marine plastics.

2. Priority in waste management: Closing the tap

The global discourse on combatting plastic pollution emphasises the development of a circular economy in order to reduce the production of plastic that may reach the natural environment. It is a mid- to long-term goal that all the UN documents emphasise and most agree on, even if as a conceptual goal. Whilst regional instruments also refer to the development of a circular economy, specific actions within these instruments focus instead on waste management, an immediate concern for most countries in SEA. Consistently, this report highlights the general focus of ASEAN+3 countries on waste management and their timid steps towards an Extended Producer Responsibility (EPR) approach which would make producers responsible for the full management of their product's life cycle. The EPR measures adopted to date focus on involving private actors in the management of the post-use of the products distributed by them to consumers. Further elaboration of the components of a circular economy in SEA is necessary before specific measures can be effectively adopted on this path. This should include shared and agreed definitions of the meaning of biodegradability in the context of plastic materials, as well as their recyclability. Research and development in waste management, low cost-low and technology recycling technologies, biodegradability and new plastics are therefore critical. In this context, the clean-up measures highlighted in several regional action plans appear realistic and necessary until waste management measures become effective.

3. Research and protocol fragmentation

COBSEA RAP MALI and ASEAN FAMAD include the development of several guidelines, standards and national reporting with a coordinated approach. Common objectives include the development of regional guidance for the monitoring of marine plastic pollution and for standardised methods. The ASEAN FAMAD also proposes the development of baselines for pollution from marine plastics. As a number of guidelines and protocols are being used in ASEAN+3 that suit different context and available technologies, research on comparable measures and/or bioindicators would be useful for that purpose.

The number of articles in ASEAN+3 that discuss methodologies and surveys (66%) suggests that the region is ready to develop its own adequate standardised methodology or a set of methodologies that result in comparable measures of marine plastic pollution. Importantly, such methodologies should have both a scientific and a policy-making aim and build on existing guidelines such as those from GESAMP and IOC WESTPAC. For such standardized methodologies to be commonly used by scientists, they have to be vetted by the specialised research community of the region on this subject area, which means that they would have to be developed in consultation with both the scientific community and governments. Similarly, research could better inform national policy through improved communication channels between both spheres of work (research and governance/policy), whether directly or through regional organisations. Finally, buy-in of other relevant stakeholders is also critical to ensure implementation of policy. This suggests the need for further research cooperation that integrates public, civil society and private efforts. An example of this is the SEA of Solutions held at the UN regional headquarters in Bangkok in October 2019.

Recommendations

A dominating feature of this study is the multi-layered complexity of the issues raised by pollution from marine plastics globally, as well as at regional level, in ASEAN+3. This complexity includes 1) the number of intergovernmental institutions involved and the resulting fragmentation of the governance framework (if not conceptually, at least at human level), 2) the diversity of stakeholder groups, and 3) unresolved scientific questions and risk assessment of the impact of marine plastics on human health and on marine ecosystems. Recommendations are divided into four axes of work:

1. Substantive issues in need of further research

This is a summary of the most pressing research needs according to this study:

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https://www.yunbaogao.cn/report/index/report?reportId=5_13832

