

## SECTION 7 – 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, in particular, in ASEAN+3. Characteristics of this complexity include:

- The number of intergovernmental institutions involved (50+) at international and regional levels;
- The number and diversity of stakeholders from governments, industry, civil society and academia;
- Unresolved scientific questions such as the impacts of marine plastics on human health and marine ecosystems, as well as emerging issues such as leakages of nurdles into the marine environment and the treatment of newly created materials;
- Disconnection between the legal and policy guidance and the reality of pollution pathways; and
- Need for better coordination and context-relevant technical discussions.

In this context, recommendations are divided around four axes of actions: (i) substantive issues in need of further research framed through a risk assessment approach; (ii) horizontal research coordination and stakeholder consultation; (iii) vertical research coordination; and (iv) context-specific outreach and education.

### 1. SUBSTANTIVE ISSUES IN NEED OF FURTHER RESEARCH

The research study pointed to six areas of research with specific sub-topics which would inform better policy making. Of note, most of these areas focus on downstream issues and processes. The scope of this study only extends to upstream processes to the extent that they are necessary to the consideration of pollution from marine plastics. This study is therefore limited to a selection of upstream issues which are relevant in this context.

#### 1.1 Risk assessment approach: Characterising the magnitude of the risk

Risk management has progressively become a key management tool for governments as well as corporations. Under international law, a characterised risk of environmental harm also triggers an obligation to adopt a precautionary approach and measures to mitigate the risk. Lack of scientific certainty cannot be a justification for no measures being taken. In risk management, the key is to balance the response measures to the extent of the risk. In the context of pollution from marine plastic, the extent of this risk is still unclear. Understanding of exposure has greatly improved in the last five years (although not yet for micro and nano sizes through atmospheric processes), but not that of the magnitude and variations of this magnitude depending on polymers, associated contaminants, climate and ocean processes as well as local and socio-economic circumstances.

In order to inform a risk assessment approach as it is understood by governments and corporations, research on pollution from marine plastic must provide measures of potential impacts in units that are relevant to governments and relevant industries. This may include particular measures of exposure of

different coastal populations to pollution from marine plastics, or exposure of marine resources of particular commercial value or ecological sensitivity.

## **1.2 Standardisation of definitions for plastic products and biodegradability**

This study has relied on a very wide definition of plastic, embracing this variation across different authors and reports in order to provide a comprehensive review. This approach has highlighted uncertainties on the definition of plastic products and of biodegradability (including the conditions for biodegradability to occur in the marine environment). This would be useful in the monitoring of plastic debris and modelling of their impact (in order to distinguish plastic particles according to their toxicity and biodegradability), as well as for waste separation, recycling and waste management purposes in general. A task-force to propose a standardised definition would be desirable at a global or regional level for use by policy, industry and civil society. New plastic products, including those that are described as being plant-based, are for example an area for clarification.

## **1.3 Sources and pathways into the marine environment**

Most model simulations incorporating baselines of plastic particles in the marine environment are still relying on proxies based on population density and general assessment of waste management standards. More granularity is necessary for the relevant adequate measures to be identified and adopted at national and local levels. These must take into account riverine inputs and coastal activities including coastal industries, landfills and maritime activities (e.g. offshore fisheries and aquaculture) from which plastic debris may originate. Waste management practices are also a key input. In this context, a risk approach would focus on identifying where areas of exposure are greatest (through accumulation or concentration of plastic particles) and vulnerability or sensitivity are also greatest (due to the presence of vulnerable communities, commercially or ecologically sensitive resources, species or habitats). Clean-up strategies of the most polluted areas may be directed through this approach.

## **1.4 Persistence, transformation, transport and fate in the marine environment**

The lifetime and state of polymers vary depending on their type and condition in which they are introduced into the marine environments (e.g. exposure to light, oxygen, temperature, etc.). Plastic particles thus will evolve differently depending on where they end up in the oceans (e.g. water column versus seabed sediments). Their degradation and toxicity can vary also. In this context, a risk approach would focus on mapping the transport and fate of different polymers in different water bodies with priorities on areas of particular value or sensitivity. This should include a categorisation of fate in different parts of the marine environment (including accumulation in mangrove as sinks or other parts of the marine habitat, as well as different intake processes into marine organisms).

## **1.5 Measures of pollution: baseline and monitoring with standardised or comparable measures**

The need for baselines and regular monitoring is not debated, and many surveys have already been undertaken, including on extensive areas of coastlines surveyed for marine plastic. However, the studies so far have focused on the distribution of plastic in one-off surveys that are mostly localised

and/or done in non-comparable units. Future studies are needed to provide a more comprehensive survey and greater granularity of distribution and types of marine plastic debris in ASEAN+3 as a whole. A key gap is the establishment of baseline and monitoring of micro- and nano-plastics in ASEAN+3. Recent research suggests that plastic particles smaller than 100µm are more abundant than larger ones in the water column. This must include the distribution and concentration of microplastics in sediments, on the seabed and in the subsoil, in coastal and marine areas.

Measures to fill these gaps are of particular relevance to ASEAN+3, given the high quantity of marine plastics believed to be present in the seas of the region. Baselines of potential impact and toxicity from plastic particles are included below.

### 1.6 Impact on marine ecosystems and on human health

This last axis of focus is critical, yet only at an early stage of research. A risk assessment approach to impact on the marine environment would focus on first identifying types of impacts to assess their potential magnitude to different systems of particular importance. Several assessment models are developing with different plastic particle toxicity factors, including exposure time, particle size and shape, concentration, polymer type, particle condition, species and environmental condition. It would be useful for the region to also adopt some reference models for comparison between marine and coastal sub-areas. Equally important is research of marine plastic pollution on human health and food safety (e.g. fisheries products). Importantly, this topic extends, beyond impact from plastic found in the marine environment, to all plastic debris, including airborne plastic particles. It is therefore a very vast research area. However, research on exposure and magnitude of risk on different coastal communities of the region that would draw on findings from human health research, is recommended.

## 2. RESEARCH DEVELOPMENT AND COORDINATION

This axis of work focuses on the development of horizontal coordination across same and different stakeholder groups. Regional Seas bodies can play a critical role in such exchange, especially through the multi-stakeholder nodes of the GPML.

The following components would usefully support research that better responds to policy making needs for a science-based response to pollution from marine plastics:

- *Regional expert community to develop specialist epistemic communities*  
In order to have fluidity and to be open to new comers, this could involve informal expert groups connected through virtual communications (e.g. rotating webinars organised by regional institutions on a voluntary basis), thereby creating an opportunity for continuous exchange.
- *Knowledge-management*  
Data sharing platform (whether as a flexible open platform or series of platforms managed by a pool of regional universities or a centralised data repository with a clearing house mechanism or a combination of both approaches).

➤ *Stakeholder engagement and consultation*

Several mechanisms and tools can be developed including networking events (such as the 2019 SEA of Solutions), stakeholder consultation processes before adoption of standards or guidelines (e.g. through an online process where a survey or a draft is opened for comments during a particular timeframe), topic-specific online dialogue platforms for stakeholders to ask questions or share useful content, etc.

### 3. COOPERATION BRIDGES BETWEEN RELEVANT GOVERNMENTAL AND INTERGOVERNMENTAL INSTITUTIONS

This axis of work focuses on the development of coordination structure between organisations such as international, regional and specialised intergovernmental bodies and working groups involved in different aspects of pollution from marine plastics. This would include integration between the relevant international, regional and national bodies as well as across regional bodies.

It is recommended that the three mechanisms of coordination among non-governmental stakeholders be also used by these intergovernmental groups to reach out and organise consultations on different issues they are working on. It is also recommended to take account of ASEAN's principle of centrality and ensure that intergovernmental processes of exchange include all ASEAN member states. This should support improved coordination in the work of the bodies concerned.

### 4. DEVELOPMENT OF CONTEXT-SPECIFIC OUTREACH AND EDUCATION

This last axis of work focuses on education and social behavioural sciences:

- To ensure *effective transfer of knowledge and capacity building* in local coastal communities as well as more generally, plastic producers and retailers; and
- To ensure that measures that are being devised are *realistic, feasible and can be implemented*.

It has been identified in this study as one of the lagging but critical areas of research for response measures to be effective in mitigating pollution from marine plastics.