

6. MYANMAR

Summary of research topics: *The few marine plastic studies published in Myanmar concern four out of 17 research foci. The primary efforts deployed to date concern surveying and monitoring in three marine and riverine habitats (i.e. coastal beaches, upstream river basin and coastal surface waters and in coastal fish).*

Summary of understanding at national level: *There is a limited understanding of pollution from marine plastic in Myanmar at the national level, with only three research studies with a limited scope. A seminar has been conducted for capacity building in scientific research, including monitoring marine plastic pollution. Also of note is another ongoing surveying and monitoring project of marine plastics in coastal areas.*

Keywords/research fields: *National approach; solid waste; trade of plastic waste; research foci; marine environs; surveys and monitoring; contribution from rivers; main players*

6.1 Context

6.1.1 National approach to plastic waste and its management

With an increase in plastic waste, the Environmental Conservation Department in Myanmar's Ministry of Environment Conservation and Forestry is in the process of developing a 'Master Plan for Solid Waste Management', which would cover the plastic waste issue and its management. Regarding plastic recycling, there is however a lack of information available. There is a movement towards the reduction of plastic use, fronted by campaigns carried out by Thant Myanmar, a grassroots movement formed in 2018.

Information and policies on plastic waste management in Myanmar is generally lacking, but it was reported that almost 119 tonnes of plastic waste enters the country's largest river, Ayeyarwady River, on a daily basis (non-peer reviewed report by Jeske (2019) and survey on plastic waste in the Ayeyarwady: available <https://www.thantmyanmar.com/en/riversurvey>).

While there appears to be some waste collection and plastic use reduction in some of the major cities in Myanmar (Premakumara et al., 2016), improper disposal of plastic waste is still a prevalent issue. In 2018, a fire broke out at Yangon's Htein Bin landfill, which holds waste generated from the city. The fire burned for 14 days, covering the city with smoke, polluting the air and affecting human health (The Guardian, 2018: available <https://www.theguardian.com/cities/2018/may/17/yangon-two-week-landfill-fire-raises-burning-questions-for-authorities-myanmar>).

6.1.2 Plastics as a proportion of solid waste

In 2016, the municipal solid waste (MSW) for Myanmar was estimated at 7.5 million tonnes, and with a projection of reaching 9.32 million tonnes in 2030 and 11.2 million tonnes in 2050 (Kaza et al., 2018).

The composition of plastics in solid waste generated in Myanmar was estimated at 16% (Hoornweg and Perinaz, 2012) and at 8-13% for various major cities (Jeske, 2019).

6.1.3 Illegal trade of plastic waste

Following China's 2018 ban on plastic waste imports, Greenpeace's 2019 Policy Brief reported a 103% increase in plastic waste import into Myanmar, from 688 tonnes in early 2016 to 71,050 tonnes in end 2018, out of which, 61,500 tonnes were imported from Thailand.

6.2 Research review of pollution from marine plastic

6.2.1 Research overview

There are only three studies on marine plastics in Myanmar. They were conducted in 2016, 2018 and 2019 and have a small geographic coverage only at selected coastline beaches.

Of the three published studies, two were on the surveying and monitoring of the pollution status. One examined microplastics presence and abundance on coastal beaches that are potential sea turtles nesting sites (Balasubramaniam and Phillott, 2016), and the other examined floating macroplastics in the Ayeyarwady River Basin of Myanmar which leaks out to the ocean (Jeske, 2019). The other study was a literature assessment of the marine debris in coastal mangrove ecosystems (Min, 2018).

Table 1.2.6.1. List of published work identified and examined in this study for Myanmar.

Published Peer-Reviewed Work/Research Team	Aim of Research	Period of Study
Jeske (2019) FFI Myanmar; Thant Myanmar	Quantifying, identifying and characterising floating macroplastics in 5 strategic rivers of the Ayeyarwady River Basin of Myanmar	Nov, Dec 2018; Jun 2019
Min (2018) Uni of Yangon	Reviewing of literature and assessing marine debris in coastal mangrove ecosystems, its gaps and challenges	N.A.
Balasubramaniam and Phillott (2016) Asian Uni for Women	Quantifying, identifying and characterising of microplastics on sea turtle nesting beaches around the Indian Ocean, in relation to further examinations of the potential of microplastic threat to sea turtles	N.A.

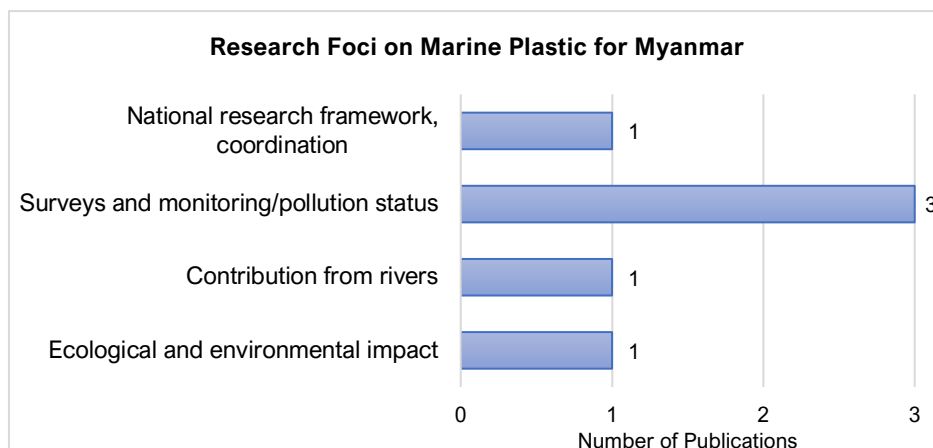


Figure 1.2.6.2. Research foci of marine plastic research conducted in Myanmar.

In addition to these published studies, there was one seminar and one ongoing research project with relevance to marine plastic pollution in Myanmar. The seminar was held in June 2014 under the Bay of Bengal Large Marine Ecosystem (BOBLME) project of the UN Food and Agricultural Organisation (FAO). Based on information available online (<https://niva.brage.unit.no/niva-xmlui/handle/11250/282228>), this seminar facilitated knowledge sharing between the Norwegian Institute for Water Research (NIVA) and experts from the University of Yangon, Department of Chemistry, and led to planning for capacity building in addressing marine pollution and water quality monitoring issues in Myanmar. This seminar also highlighted the lack of research capacity on marine plastic pollution in the country, which in turn explains the limited research done.

The latter ongoing research project is under FAO's programme of 'Supporting the Application of the Ecosystem Approach to Fisheries management considering climate and pollution impacts' (EAF-Nansen Programme). This project aims to monitor microplastics in coastal areas (sea-surface and water-column) and in fish in several regions of the Indian Ocean using the research vessel 'RV Dr Fridtjof Nansen'. Monitoring was conducted in August and September 2018 off the Rakhine State in the Ayeyarwady Region and Tanintharyi Region in Myanmar. The findings have not been published yet as this research is still ongoing and is expected to continue in the coming years. Given its significance, this research project is included in the following analysis.

6.2.2 Types of research conducted

Types of plastics research foci

With the limited research done, there was no discernible emphasis on research foci. Two studies focused on microplastics-only, while one study focused on macroplastics-only (Figure 1.2.6.3.). Of note, the assessment of marine debris in coastal mangrove ecosystems by Min (2018) had no definition or indication of the type and size of marine debris.

No polymer nor its associated organic or inorganic contaminants were identified.

Coverage of marine environs

Of the research studies, two looked at plastics in the sea surface/water column, while one studied plastic in the marine biota and one on the shoreline (Figure 1.2.6.4). There was no study investigating the presence of marine plastic in the seafloor and subsoil.

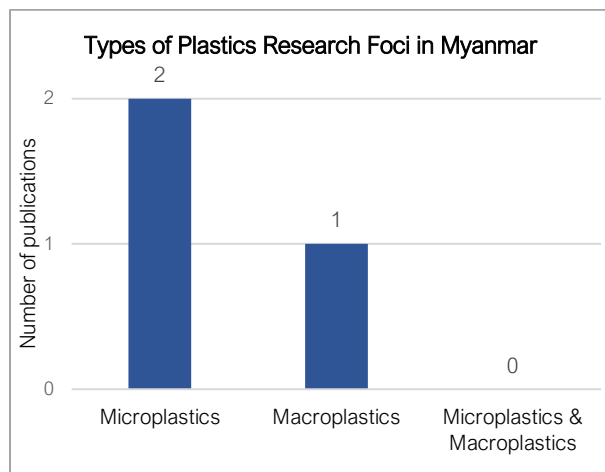


Figure 1.2.6.3. Distribution of marine micro-/macro-plastics researched in Myanmar.

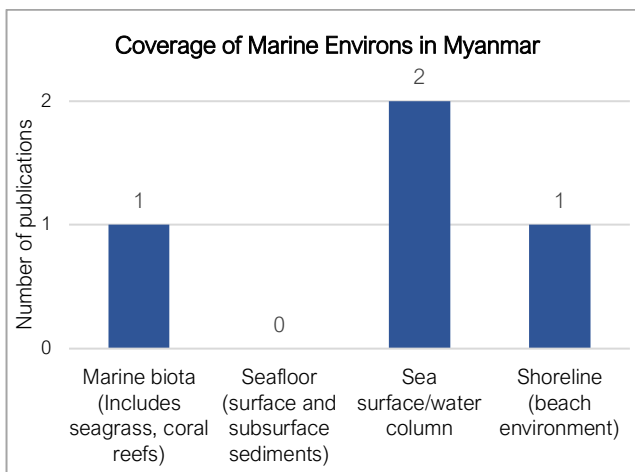


Figure 1.2.6.4. Distribution of marine environs researched in Myanmar.

6.2.3 Survey and monitoring

The three surveying and monitoring research articles from Myanmar provide some quantification of marine plastics in various environs.

The research led by Jeske (2019), under the FFI Myanmar Programme, investigated the abundance of floating macroplastics in various river systems in the Ayeyarwady River Basin. While this is an investigation on a riverine system, the waters of the Ayeyarwady River Basin flow into the Andaman Sea. An understanding of the movement of plastic debris in this river is therefore critical to the understanding of the status of marine plastic pollution in Myanmar. The macroplastics collected using manta trawl sampling on rivers led the researchers to conclude that there was a high contamination of 119 tonnes plastic waste entering the Irrawaddy River. The researchers also thought that urban regions were contributing more riverine plastic than non-urban regions. This study did not classify macroplastics into categories of functional use. Nevertheless, it is useful in reporting the high contamination and possible leakage of plastic into the aquatic environment.

Earlier in 2018, a month-long survey on microplastics was carried out by a Norwegian team on the research vessel 'RV Dr Fridtjof Nansen' to quantify microplastics in the water and in fish at regions in western Myanmar (i.e. Tanintharyi, Ayeyarwady and Rakhine states). This study was deployed in the context of the implementation by FAO of an initiative designed to support the application of the ecosystems approach to fisheries management which considers climate and pollution impacts. No information could unfortunately be found on the methodologies employed in this survey and on the specificities of the microplastics found, in terms of their sizes, polymer types or forms. Preliminary findings that were shared in a 2019 workshop on plastic pollution in Myanmar with a focus on the Ayeyarwady River revealed a high microplastic contamination reaching up to 28,000 items of

microplastics per km² along Myanmar's coastline. The Myanmar government has shown its support for the continuation of this research in the coming years.

Microplastics have also been quantified and found to be abundant on potential sea turtle nesting beaches, especially in the form of microfibrils (Balasubramaniam and Phillott, 2016).

6.2.4 Source differentiation and pathways

There is no published peer-reviewed study on source differentiation of marine plastics.

6.2.5 Movement of plastics, accumulation and hotspots

There is no published peer-reviewed study on the movement, accumulation and hotspots of marine plastics other than movement on the Ayeyarwady River.

6.2.6 Ecological and environmental impacts

Balasubramaniam and Phillott (2016) examined the presence/absence of microplastics on coastal shores which are potential sea turtle nesting sites. Their study found microfibre contamination on Myanmar's shores, and suggested that this might be a potential threat to the health of sea turtles.

Though not formally presented in any scientific analysis, there are concerns regarding the impacts of marine plastics on marine biota along the coastline of Myanmar. Their impacts on sea turtles have been highlighted in relation to concerns over their breeding, nesting and survivability (FFI, 2019: available <https://www.fauna-flora.org/news/plastic-pollution-piles-pressure-myanmars-troubled-turtles>).

6.2.7 ALDFG

There is no published peer-reviewed study on abandoned, lost or otherwise discarded fishing gear.

6.2.8 Social perceptions and socio-economic impacts

There is no published peer-reviewed study on social perceptions and socio-economic impacts of marine plastics.

6.3 Main players in marine plastic research

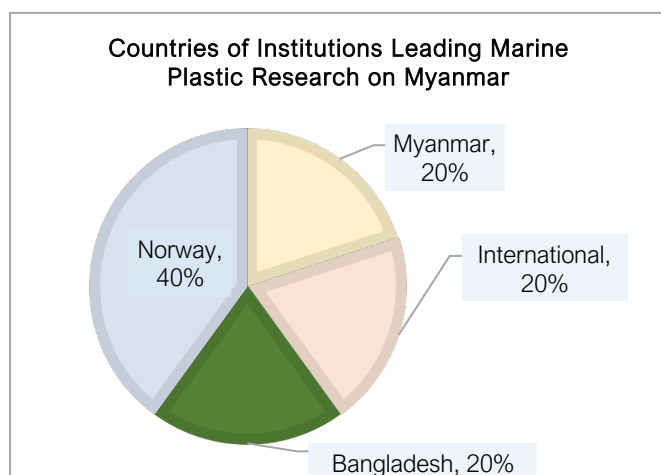


Figure 1.2.6.5. Composition of research efforts in Myanmar.

Marine plastic research appears to be not of top priority in the local scene from national organisations to universities, although researchers from the University of Yangon appear to be in a suitable position to continue marine plastic research following the 2015 seminar. Marine plastic research appears to be primarily pushed and supported by efforts from outside Myanmar (e.g. from Norway, Bangladesh, FFI and FAO).

6.4 Summary of understanding

There is a small number of limited studies on pollution from marine plastics in Myanmar. Not all environs have been investigated and quantification efforts are still unspecific (i.e. there is a lack of debris type, shape, polymer type, size, units of weight or number per area or volume). Survey and monitoring efforts have primarily validated the prevalence of marine plastic pollution.

More complete studies of different marine environs are necessary for a better understanding of marine plastic pollution in Myanmar. These should also include studies on degradation, fragmentation, downstream socio-economic impacts, and impacts on marine biota and ecosystems in general, including from toxicity of ingestion or leaching of associated contaminants.

With respect to waste management, and to deal with increasing volumes of waste, run-offs from the accumulated landfills are potential leakages of plastic into the aquatic environment, further research is needed to examine upstream leakage of plastic including from the transport of plastic waste into water bodies and into the sea.

With its extensive coastline and marine fisheries being an important sub-sector in Myanmar, the possibility of lost gears leading to ALDFG is also a potential issue that needs further examination.