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Marine Environmental Emergency Preparedness and Response
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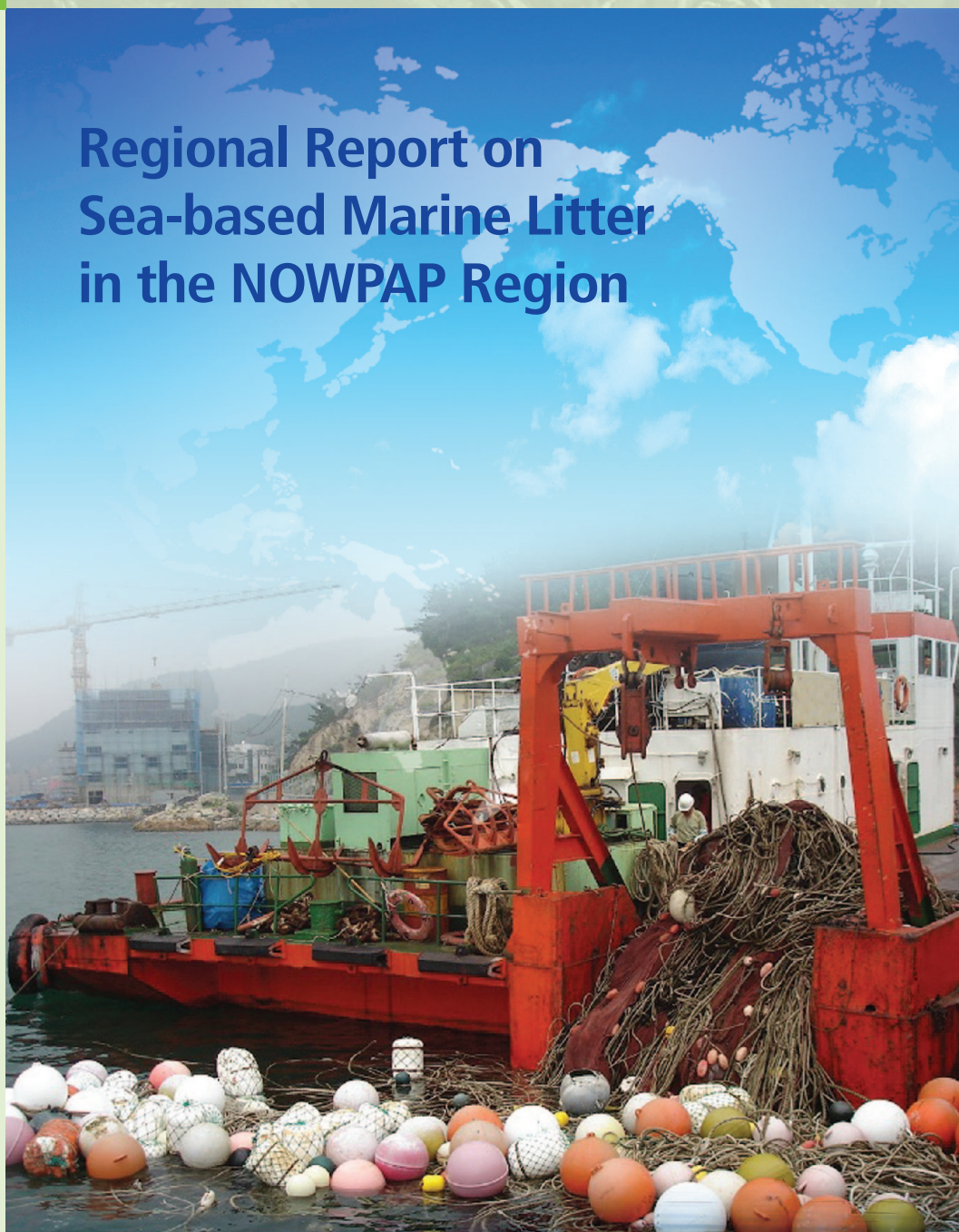
Regional Report on Sea-based Marine Litter in the NOWPAP Region



Regional Seas

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Regional Report on Sea-based Marine Litter in the NOWPAP Region

The document was prepared by the Marine Environmental Emergency Preparedness and Response Regional Activity Centre of the Northwest Pacific Action Plan (NOWPAP MERRAC) under MERRAC Specific Projects, based upon the National Reports developed by the NOWPAP member states. The following individuals contributed to writing various drafts of the document and to the overall editing of the document: Ms. Hyon-Jeong NOH, Dr. Seong-Gil KANG and Dr. Jeong-Hwan OH of NOWPAP MERRAC. The document was circulated to NOWPAP member states and NOWPAP Regional Coordinating Unit (RCU), and then revised according to the comments that were received.

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1. Introduction

Marine litter is now recognized as one of the major problems of marine pollution that destroys the ecological, economical and cultural values of the marine environment. Marine litter can be found in the water column and on the seafloor as well as on beaches in the Northwest Pacific region. It degrades very slowly and causes injury or death of human and other living things as well as accident or damage of the vessels.

The NOWPAP region, one of the most highly populated regions over the world, is also faced to the marine litter problem. Each member state of the region is closely affected by other countries because of ocean currents and other oceanographically characteristics of semi-enclosed sea Area. In this regard, Northwest Pacific Action Plan (NOWPAP) Marine Litter Activity (MALITA) project was implemented during 2006-2007 biennium. NOWPAP Regional Action Plan on Marine Litter (RAP MALI) was also approved for 2008-2009 biennium as the next phase of MALITA at the 12th NOWPAP Intergovernmental Meeting (Xiamen, China, 23-25 October 2007).

MERRAC, one of four Regional Activity Centres of NOWPAP, has been designated to implement activities related to sea-based marine litter. The 9th MERRAC Focal Points Meeting decided to develop the National Reports on sea-based marine litter in NOWPAP region for understanding general situation (5-7 June 2006). Based upon the National Reports, MERRAC has developed a regional report titled "*Regional Report on Sea-based Marine Litter in the NOWPAP Region*," as background information for further works on sea-based marine litter issue. This report aims to provide such general information on sea-based marine litter in the NOWPAP region.

2. Marine Litter from Sea-based Sources in the NOWPAP Region

2.1. What are marine litter and its sea-based sources?

Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Sources of marine litter can be divided into land-based and sea-based.

Possible sources of the **sea-based marine litter** are merchant shipping, ferries and cruise liners; fishing vessels; military fleets and research vessels; pleasure craft; offshore oil and gas platforms; aquaculture installations and recreational activities such as diving and marinas (Table 1).

Sea-based marine litter is mostly persistent synthetic material, non-degradable fishing nets, ropes, and sheets, which can remain in the marine environment for many years. Especially, abandoned and derelict fishing gear is a significant and serious form of marine litter resulting in consequent deaths of marine animals, i.e. “ghost fishing.”

Table 1. Sources of marine litter (modified from UNEP, 2005)

Main sea-based sources	Main land-based sources
● Merchant shipping, ferries and cruise liners; ● Fishing vessels; ● Military fleets and research vessels; ● Pleasure craft; ● Offshore oil and gas platforms; ● Aquaculture installations; ● Waterway recreational activities (such as diving and marinas)	● Municipal landfills (waste dumps) located on the coast; ● Riverine transport of waste from landfills or other sources along rivers and other inland waterways (canals); ● Discharge of untreated municipal sewage and storm water (including occasional overflows); ● Industrial facilities (solid waste from landfills and untreated water); and ● Tourism (recreational visitors to the coast and beach goers)

2.2. Distribution of sea-based marine litter in the NOWPAP member states

Although sources and types of marine litter are different depending on countries and sea areas, sea-based marine litter shows a significant portion as much as land-based marine litter in the NOWPAP region.

According to the national reports of NOWPAP member states, marine litter generated from daily life takes considerable amounts for the total litter. Nevertheless, NOWPAP member states are faced with a number of sea-based marine litter from fishing vessels and aquaculture, due to active fishing activities and aquaculture. The impact of sea-based marine litter on the environment seems to be serious. For example, “ghost fishing” could result in consequent deaths of marine species. Sea-based marine litter also brings numerous potential hazards to the marine environment.

It is expected that the marine litter from sea-based sources, especially fishery related activities, is a serious problem which needs to be solved in the NOWPAP sea areas. Quantitative research on marine litter, especially from sea-based sources, should be carried out in NOWPAP region for more understanding.

1) People's Republic of China

China has a long costal line, the length of which is more than 18,000 km, containing four main sea areas — Bohai Sea, Yellow Sea, East China Sea and South China Sea. Due to the difference of geographic, economic and marine transportation features of the four sea areas, the contribution of sea-based marine litter is also different from one another (Figure 1).

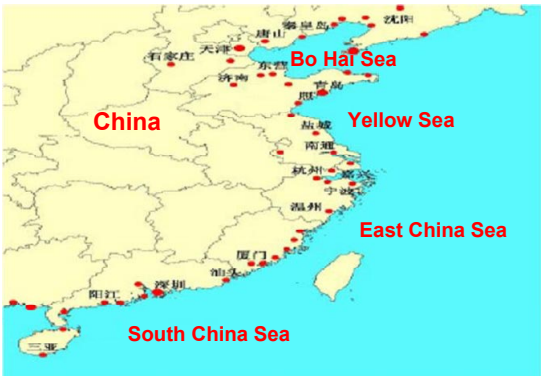


Figure 1. Main sea areas of China.

In Bohai sea area, there are several ports with capacity of ten thousands of cargo tonnage, including Dalian, Tianjin, Qinhuangdao, Huanghua, Yantai and Weihai, etc. Hundreds of merchant ships sail in and out in Bohai Sea and Yellow Sea every day. In China, all these vessels become potential sources of marine litter.

According to the statistics on 2006, the two sea areas show a noticeable decrease of sea-based marine litter due to many controls of Chinese government on sea-based marine litter. Moreover, the sea areas are in better status of sea water quality than East China Sea and South China Sea areas.

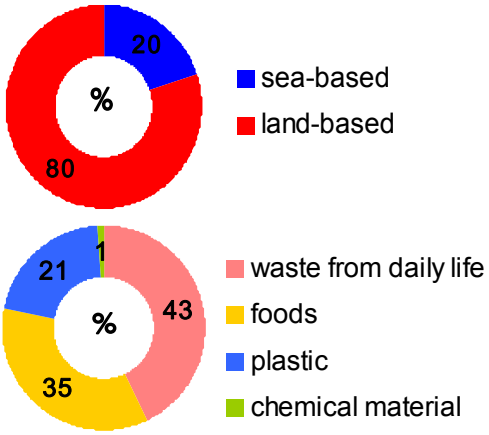


Figure 2. Distribution of marine litter in China

In China, the sea-based marine litter occupied about 20% of the total quantity. The types of the sea-based marine litter are various. The waste from the daily life occupies the largest, about 43%, the foods comes second, about 35%, the third is plastics, about 21%, and the last one is the chemical materials no more than 1% (Figure 2).

2) Japan

Although there is no available data specified for sea-based marine litter, it is speculated that merchant ships, fishing boats, pleasure boats etc, are sources.

3) Republic of Korea

The exact amount of sea-based marine litter in Korea is unknown. Based on the population in the Republic of Korea, the Korean Government has estimated that the portion of land-based and sea-based marine litter is about 70% and 30% (Figure 3). The Korean government has a plan to establish the National Basic Management Policy in 2008.

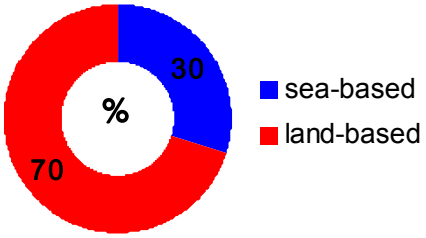


Figure 3. Distribution of marine litter in Korea.

The most common source of sea-based marine litter in Korea is from active aquaculture. It is assumed that a lot of derelict fishing gear such as nets and ropes are also generated from fishing activities.

4) Russian Federation

The length of coastline of the Russian Far East, which constitutes a part of NOWPAP, is approximately 10,000 km, including Primorsky Krai, Khabarovsky Krai, and Sakhalinskaya Oblast. The region's natural and socio-economic conditions vary greatly. About 80 % of the population resides within the near-shore zone while major settlements are the cities of Vladivostok and Nakhodka.

There are more than 10 major ports, ship repair facilities, recreational and mariculture facilities. Especially, Primorsky Krai ports serve as Russia's principal gates in the Pacific Ocean. All the ports are open for navigation year round and can accommodate deep-draught vessels. Major shipping routes linking local ports are concentrated in the Russian Far East sea areas.

Marine litter found in waters of the Russian sector varies greatly in its composition and size. While handling cargo on board, various amounts and types of marine litter can be accumulated. When handling conventional cargoes, litter from separation and package can be generated about 1 ton per 100-150 tons of handled cargo on the average in general. Whereas handling 100 tons of bulk cargoes result only in 20 kg of refuse

Garbage occupies the composition of marine litter (about 62%), following the paper and carton as about 17% (Figure 4).

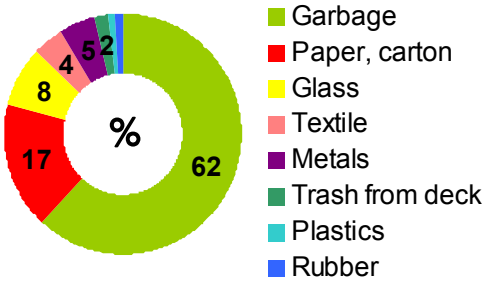


Figure 4. Distribution of marine litter in Russia.

Ports and harbors are largest sources of marine litter in terms of scale entered into the environment. Litter of sea-going vessels may be generated by (1) transshipment of cargo resulting in formation of refuse during separation and lashing procedure; (2) production operations, e.g. fishing gear and nets; (3) ship maintenance resulting in waste paint, rust, soiled and oily pieces of fabric, disabled package, refuse from tackle operations and equipment repairs; (4) household rubbish resulting from every day cleaning of accommodations; and (5) etc.

3. Impacts of Sea-based Marine Litter

A great amount of marine litter can be generated during sea-based activities due to the increased number of ships and dense intensity of marine traffic. Marine litter, including sea-based derelict fishing nets, wires, ropes, buoys, floats, traps and sheeting, mostly consists of non-biodegradable material which can remain in the marine environment over many years. A continuous input of marine litter, therefore, can result in a build up of marine litter.

Impacts on the marine environment caused by sea-based marine litter vary depending on local conditions, intensity of fishery and recreational activities, the biological diversity, climate, etc. It may be difficult to assess the impacts of sea-based marine litter on the marine environment, but people need to recognize that it can cause many harmful and serious problems and a growing threat to the marine environment.

▶ Economic losses

Abandoned, lost and derelict fishing nets, lines, pots and traps may continue to catch marine species indefinitely, namely “ghost fishing.” It could lead to decline of some fish stock and consequently pose a threat to fishing activities. Recently, “ghost fishing” has been observed in the coastal waters in the NOWPAP region. It was reported that various marine animal, such as king crab, mackerel, shellfish, starfish, etc., were caught in derelict fishing nets at the sea bottom.

▶ Endanger human health and safety

Contaminated marine litter can transfer disease and pose a risk at the public health. Sharp objects, such as broken glass and rusty metal, can cause injuries of human when people touch or step on them. In addition, abandoned fishing nets and lines can entangle scuba divers, and some divers have barely escaped the entanglement.

▶ Safety problems to vessels

Sea-based marine litter can cause costly or irreparable damage to vessels. Derelict fishing ropes and nets pose a navigational hazard to fishing and recreational boats by entanglement of their propellers or engine breakdown. Damaged vessel may not

return to shore or steer, or hard to avoid a collision. Although it even returns to shore safely, it may need considerable costs to repair. According to the national report of Korea, marine litter is one of main causes of maritime accidents in Korea. According to the study on maritime accidents during 1996-1998, 204 (9%) maritime accidents occurred due to marine litter among total of 2,273 accidents in Korea. Korea also reported that the Passenger Ship *M/V Seo-Hae Ferry* was sunken in 1993, causing 292 of human deaths, due to entanglement of fishing ropes in a right-side propeller as well as over load in bad weather condition.

▶ Injures or deaths of marine animals

Marine litter can cause injures or deaths of marine animals by entanglement and ingestion. Many animals are encircled or ensnared by marine litter, and consequently, they are unable to swim or move, even worse, wounded their body. Marine animals can be suffered from infection, loss of limbs or strangulation. Marine animals also mistakenly feed on plastic bag as food which may lead them to starvation or malnutrition. For example, according to the national report of Russia, many sea birds and sea mammals perish annually because of entanglement of fishing gear such as nets. Seabed litter can also change the natural habitat of marine animal which in turn may cause their degradation and disappearance.

▶ Aesthetic problems

Marine litter degrades and spoils the aesthetic beauty of the marine and coastal environment. Eyesore views of marine litter may lead to the decrease of tourism, and it may consequently damage coastal economy. Although there has not been any research on the economic loss of aesthetics value caused by marine litter, it may need considerable costs and time to repair the marine and coastal environment.

4. Monitoring Programmes in the NOWPAP Region

4.1. Monitoring programmes of the NOWPAP member states

The marine litter monitoring programmes are important in that information and data could be used for marine litter assessment and development of reduction strategy. Through the monitoring, the basic information on the sources, quantities, and types of marine litter could be collected at ports, harbours, beaches, shorelines, coastal water and open sea.

At present, the NOWPAP member states have recognized the need of systematic monitoring programmes and implemented their own regular monitoring programmes. Although some NOWPAP member states do not have such programmes, they have tried to identify distribution of marine litter in their countries.

For example, Russia attempted to research on drifting marine litter and potential concentrated areas in 2006, although regular marine litter monitoring has not been carried out. In China, in addition to integrated monitoring system for sea water quality which combines 7 monitoring stations and more than 17 networks, Chinese Government has dispatched more than 20 patrolling boats and 3 airplanes to monitor illegal discharge and dumping in Bohai and YellowSea area. Moreover, other techniques are also used for marine litter monitoring, such as aerial remote sensing and satellite.

NOWPAP member states also actively support monitoring and assessment through volunteers and NGOs along the beach and underwater to detect and collect marine litter.

For example, Korean Government has supported NGOs, i.e. Korea Marine Rescue Center (KMRC). About 20 local areas have been monitored at shoreline and underwater since 2000 through partnership between Ministry of Land, Transport and Maritime Affairs (MLTM), former Ministry of Maritime Affairs and Fisheries (MOMAF), Korea Maritime Institute (KMI) and NGOs.

Two data sheets are used in Korea; one is the data sheet of the Ocean Conservancy (OC) and the other is the revised data sheet of OC adding 10 items such as fishing gears, firecrackers, and canned fuel, considering the characteristics of marine litter in Korea.

4.2. Floating litter monitoring

Sea-based marine litter can also be transported by winds and currents in the NOWPAP region. The Japan Meteorological Agency (JMA) has been monitoring floating plastics as one of the marine pollution observations including oil pollution and heavy metals in the seas adjacent to Japan and Northwest Pacific region.

JMA has been monitoring floating plastics along several observational lines (Figure 5) including 137° E line, which was established in 1977. Floating pollutants are counted by continuous observation from the bridges of research vessels during the daytime. When observers find a floating pollutant, they record its location and type.

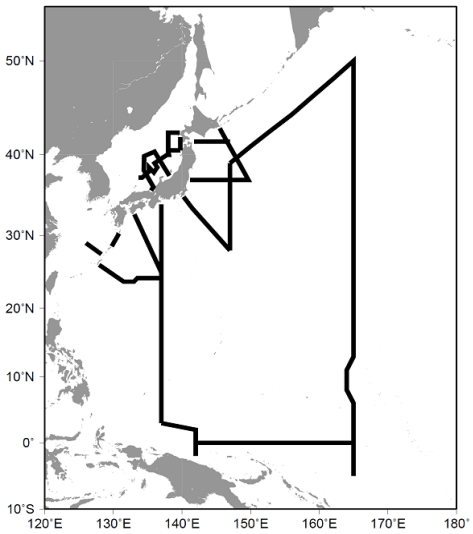


Figure 5. Observation lines of JMA research vessels (2007)

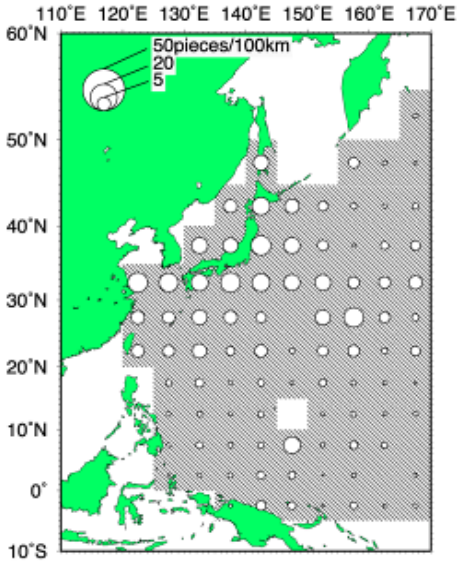


Figure 6. Average distribution of floating plastics between 1981 and 2000

Figure 6 shows the number of floating plastics found annually every 5° longitude and latitude in the areas from 1981 to 2000. In general, the number of floating plastics becomes smaller with the distance from the continent. Also, the number of floating plastics found in the sea adjacent to Japan is larger than those in the areas around 20° N and in the sub-arctic region. Relatively many floating plastics were found between 30-35° N, south of the Kuroshio and the Kuroshio Extension.

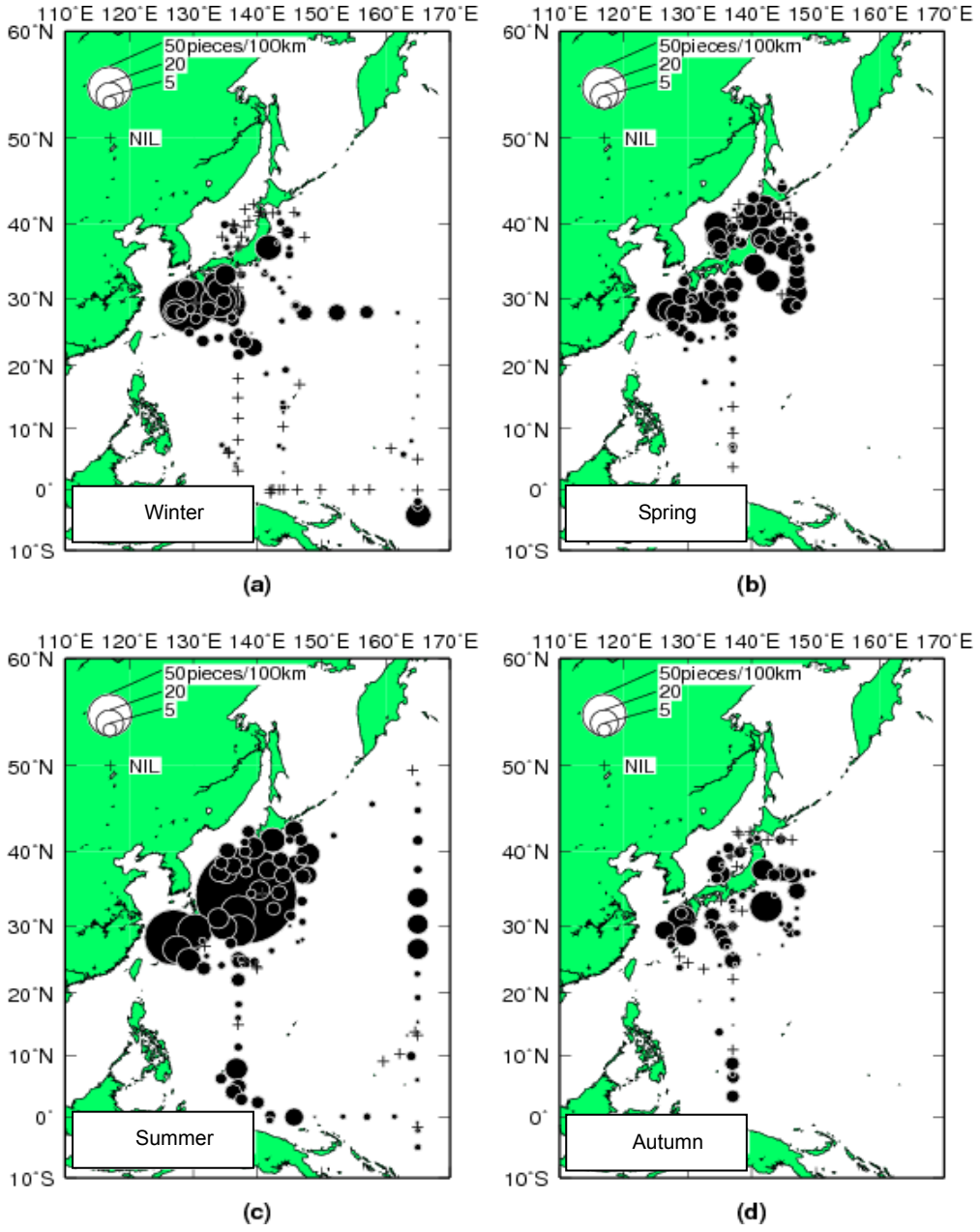


Figure 7. Floating plastics observed in 2007

Figure 7 shows the distriution of floating plastics observed in 2007 (a) winter, (b) spring, (c) summer and (d) autumn. The size of black circles corresponds to the number of floating plastics per 100 km. “+” simbols denote that no plastics were found during the daytime.

In some parts of the sea adjacent to Japan, more than 50 pieces/100 km were found from winter to summer of 2007. In addition, 10-20 pieces/100 km were also found around the Kuroshio and the Kuroshio Extension.

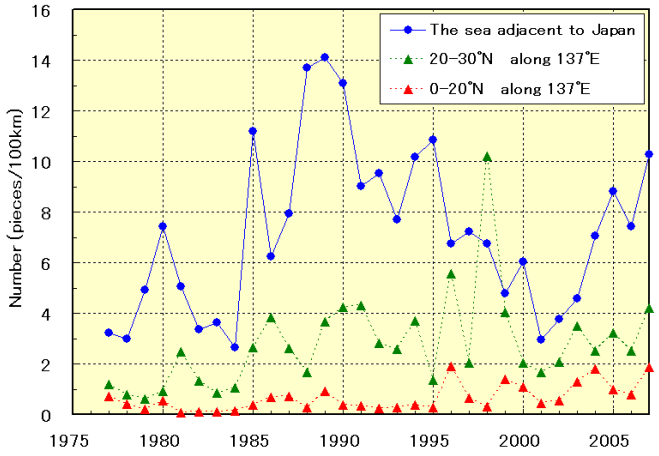


Figure 8. Time series of the number of floating plastics

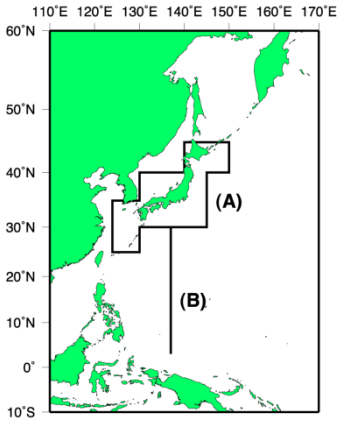


Figure 9. Data area

Figure 8 shows the time series of the floating plastics (in pieces/100 km) found in the sea adjacent to Japan (blue line) (area (A) in Figure 9), in 20-30 °N along 137 °E (green line) and in 0-20 °N along 137 °E (red line) (line (B) figure 9). The number of floating plastics in the seas adjacent to Japan had a peak during 1988–1990. Since then, the number decreased until 2000, after which it gradually increased again.

5. Law and Policies to Manage Sea-based Marine Litter

5.1. Laws and regulations related to marine litter

In response to growing concern on marine litter, the NOWPAP member states have already tried to manage marine litter, including the one generated from sea-based sources, by establishing laws and regulations. These legal systems regulate marine litter management on ships, in harbours and ports.

"Regional Overview on Legal Instruments, Institutional Arrangements and Programmes Related to Marine Litter in the NOWPAP Region (UNEP/NOWPAP/DINRAC/Publication No.8)", compiled by DINRAC during the MALITA project, provides more detailed information on the national legislation related to marine litter of the NOWPAP member states.

1) People's Republic of China

As early as 1974, China enacted the first environment protection law – namely, the **Interim Regulations on Pollution Prevention in Coastal Waters**, which regulates the treatment of garbage from ships. In 1982, the **Law on Marine Environment Protection** was established, which constitutes the basic law for protecting the Chinese marine environment and specifies the provisions on prevention of marine pollution by garbage from ships.

*Based on **Law on Marine Environment Protection**, several sets of relevant administrative rules, regulations and standards have been promulgated in China.*

- ***Administrative Rules for Prevention of Marine Pollution from Ships***
- ***Administrative Regulations for Prevention of Inland Water Pollution from Ships***
- ***Administrative Regulations for Environment Protection in the Transportation Sector***
- ***Standards on Discharge of Pollutants from Ships***
- ***General Technical Requirements on Degradable Tableware Used on Board Ships***

Meanwhile, China has also formulated some regional regulations for application in the heavily polluted areas,

- ***Administrative Regulations for Prevention of Pollution of the Yangtze River** aims to prevent garbage from ships and by solid wastes along the riversides (adopted in 1997)*
- ***Bohai Blue Sea Action Plan** aims at marine pollution prevention from ships and protection of the biological environment in the Bohai sea area (from October 2001)*

2) Japan

In Japan, discharge of wastes from ships, offshore facilities and others is restrained by the **Law Relating to the Prevention of Marine and Air Pollution and of Maritime Disasters** based on MARPOL Convention.

*Requirements for discharge of wastes from ships, offshore facilities and others are provided in the **Law Relating to the Prevention of Marine and Air Pollution and of Maritime Disaster** as follows (penalty is involved).*

- ***Prohibition of discharge of wastes from ships or others** (except discharge for secure safety of ship and discharge of domestic wastes other than plastics);*
- ***Requirements for garbage management plans;***
- ***Requirements for shipboard wastes record book, and others***

3) Republic of Korea

The Korean government has established **Marine Environment Management Law** (former Marine Pollution Prevention Law), which is a primary law preventing pollution from ships, and MARPOL 73/78 Convention is implemented through this law. The ship-based pollutants such as sewage, marine litter, heavy metal, etc. are managed by this law.

*As well as **Marine Environment Management Law,** Korea has several laws to prevent marine pollution in Korea as follows:*

- ***Harbor Law** regulates that no person shall commit the following actions in a harbor without any justifiable reasons; i) An act which is likely to affect the depth of the harbor such as throwing out a large quantity of soil and stone or trash, etc. ;ii) Any other act as prescribed in the Presidential Decree which is likely to cause an impediment to preservation or utilization of the harbor.*
- ***Fisheries Port Law** regulates that no person shall commit the following actions in the fisheries ports; i) discarding the wreck ships; ii) placing any obstacles, iii) throwing and placing waste materials in not-designated places.*
- ***Public Water Management Law** prevents; i) discarding the wreck ships on the public water, and; ii) discharging waste materials, waste oil, wastewater, sewage, toxic materials, and other polluted materials on the public water.*

4) Russian Federation

Russia has managed the marine litter issues at the federal legislation level through laws and regulations, as well as GOSTs (All-Union State Standards), SanPiN (Sanitary Regulations and Norms), RD (Ruling Documents).

In compliance with MARPOL Convention, following national laws, regulations, and institutional and sectoral legislation are directly related to the marine litter issues.

- ***Environment Protection Law, Federal Law No. 7.***
- ***Water Code of the Russian Federation.***
- ***RF Continental Shelf Law, Federal Law No. 187-FZ.***
- ***Production and Consumption Wastes Law, Federal Law No. 89-FZ.***
- ***RF Merchant Shipping Code, Federal Law No. 81-FZ.***
- ***RF Inland Sea Waters, Territorial Sea, and Contiguous Zone Law, Federal Law No. 155-FZ.***
- ***RF Exclusive Economic Zone Law, Federal Law No. 191-FZ dated December 17, 1998***
- ***RF Government Regulation "On the Approval of the Procedure for Determination of Payment and it Limits for Environment Pollution, Waste Disposal, and Other Kinds of Abuse", No. 632 dated August 28, 1992.***
- ***RF Government Regulation "On the Approval of the State Water Body Monitoring Management Provision", No. 307 dated March 14, 1997.***
- ***RD-31.04.23-94 RF Fishery Fleet Instructions on Preventing Pollution from Ships.***
- ***RD 31.04. "Polluted Harbor Waters Cleanup Operation Rules" Compulsory Regulations on Sea Ports***
- ***Compulsory Regulations on Sea Ports.***

5.2. Policies and systems to manage marine litter

As contracting parties to International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78 Convention), the NOWPAP member states manage and regulate sea-based marine litter through relevant policies and systems in order to prevent pollution from ships and protect the marine environment.

1) Prevention of illegal discharge and dumping from ships

In accordance with relevant international and national laws and regulations, discharge of marine litter as well as sewage or other materials are strictly regulated through respective laws of the NOWPAP member states. Floating materials must be discharged offshore, more than 20 miles from shorelines in Korea, and it is prohibited from dumping into water within 25 nautical miles from the nearest land of China. Plastics are prohibited from dumping into water and must to be discharged on land by proper disposal procedures.

All NOWPAP member states regulate illegal discharges and dumping from ships in their national coastal waters. China Maritime Safety Administration (MSA) and its subsidiaries set up specialized administrative units for prevention of pollution from ships, which carry out surveillance and inspection on ship garbage management. According to the statistics, China MSA conducts up to 20,000 inspections on certificates of pollution prevention and pollution prevention equipment on board ships each year, regulates and deals with violations of more than 1000 cases each year. Japanese Government also regulates illegal discharge and punishes persons by a fine.

Remediation of White Pollution in China

In China, plastic package material causes a very serious "White Pollution", due to a large amount of disposed plastic along the Chinese railways and dumped by the cities from the Three Gorges reservoir to the Yangtze River. In 1996, the Chinese Government decided to comprehensively remediate the" White Pollution" in the Yangtze River, the Taihu Lake and along the railways, by terminating the use of disposable tableware. Thereafter, the Chinese Ministry of Communications enforced the regulations on total prohibition of non-degradable

polystyrene foam tableware on passenger ships and cruise ships which sail along the Yangtze River and the coast. In addition, all disposable tableware must be made of degradable materials.

2) Removal of sea-based marine litter

The regular removal of marine litter from the beaches and shorelines, seabed, ports and harbours in the NOWPAP region should be conducted to preserve marine ecosystem and environment. In this regard, the NOWPAP member states should establish the legislation to remove marine litter and facilitate development of the technologies and methods. Research institutes can help development of new programmes and technologies for removal and treatment of marine litter such as building and designing vessels. When technologies are developed, the government and relevant authorities can adopt them for more effective removal of marine litter.

A good example of marine litter removal can be found in Korea. Since 1999, the Korean Government (former MOMAF, now part of MLTM) has collected deposited marine litter at commercial ports, major fishing ports and grounds in cooperation with two government organizations, Korea Fishing Port Association (KFPA) for fishing grounds and Korea Marine Pollution Response Corporation (KMPRC) for the coastal waters (Figure 10).

Figure 10. Removal of deposited marine litter in fishing grounds

About 10,000 tons of marine litter removed annually, most of which were derelict fishing gear, wires and tires (Table 2). In addition, floating marine litter at commercial and fishing ports was collected by 28 cleaning vessels.

Table 2. Removal of deposited marine litter in Korea

Year	1999	2000	2001	2002	2003	2004	2005	2006
Quantity (Unit: ton)	1,138	12,844	10,798	10,112	11,916	6,072	8,430	10,505

Buy Back Programme of Korea

"Buy Back Programme (Purchase Programme)" has been successfully implemented in Korea since 2003 which encourages fisherman to bring back the marine litter collected during fishing activities, e.g. derelict fishing gear.

When fishermen pull up such marine litter like fishing nets and hooks, they generally toss them overboard. Consequently, a great deal of marine litter has been deposited in coastal areas. The Buy Back Programme is, therefore, designed to encourage that fishermen bring ashore the litter collected as part of fishing activities. Collected marine litter is packed in the sacks and transported to the appropriate port reception and treatment facilities for its treatment and disposal.

This programme is not only an efficient and cost-effective way to collect marine litter, but it also brings fishermen some extra income. Sacks are provided in three sizes: 40 L, 100 L and 200 L. When they are returned full, the Government pays the fishermen 4,000 won (US$4), 10,000 won (US$10), and 20,000 won (US$20) respectively. Another benefit of the programme is that it increases the fishermen's awareness of the destructiveness of such litter to the marine environment.

Following the first successful case of Incheon City, the Korean Government has expanded the Buy Back Programme to 12 major ports in Korea including the ports of Busan, Yeosoo and Mokpo.

6. Port Reception and Treatment Facilities

The adequate port reception facilities are important to prevent marine litter from being disposed at sea. In order not to marine litter be discarded into the sea, it is necessary to manage that discharge of marine litter to the port reception facilities by the effective provision. According to the national reports, all NOWPAP member states have made efforts to provide adequate reception facilities at ports and marinas in compliance with Annex V of MALPOL Convention.

1) People's Republic of China

For the purpose of collecting and disposal of the garbage from ships effectively, more stringent legislation and regulations on port reception facilities have been established in China. For instance, in the Marine Environment Protection Law of the People's Republic of China, it is regulated that port, dock, load-unload berth and ship recycling facilities must have adequate reception facilities in place for collecting and disposal of the pollutant and marine litter from ships, and keep all these facilities in good condition.

Over the last 30 years, China has established relevant facilities for ship generated marine litter. Many ports in China have installed garbage treatment facilities which are equipped with garbage reception vehicles and ships (Table 3).

Table 3. Quantities of reception facilities built in NOWPAP region in China

Number of the reception facilities	Receptions Equipments		Disposal facilities	Capability of deposing (M^3/H)
	Vehicle	Boat		
88	185	12	15	740

According to statistics in 2005, ports under the jurisdiction of Shandong Maritime Safety Administration (MSA) received more than 10,000 tons of garbage from ships. Also every newly built port has submitted the report on the evaluation of the environment effect of the reception facilities, which includes the status of the collecting and disposal of marine litter.

The following chart showed below is the statistics of estimated marine litter collected from ships in China within the NOWPAP region (Figure 11). After colleting, marine litter is disposed through the reception facilities of the ports.

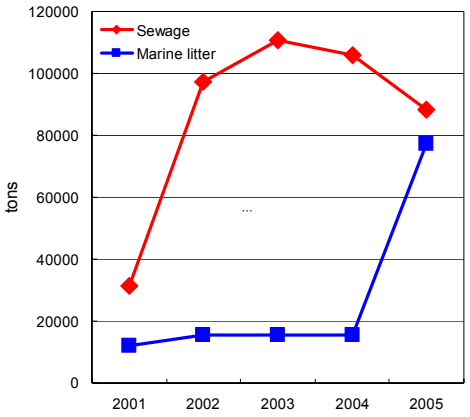


Figure 11. Estimated reception and disposal quantities in China.

Garbage Record Book

The garbage management plan is developed on the basis of the relevant IMO Guidelines, and should be implemented by designated personnel on board ships. The plan should include the written procedures for garbage collection, storage, disposal and treatment, and equipment operation procedures on board ships. All ships of 400 gross tons or above and all ships which are certified to carry 15 passengers or more should carry a garbage management plan to be observed by seafarers and carry a Garbage Record Book. On board all ships of less than 400 gross tons and all ships carrying fewer than 15 passengers, the garbage treatment information should be accurately recorded in the Ship's Log. Each discharge operation or action in relation to garbage on board ships should be properly recorded in the Garbage Record Book.

2) Japan

There are many port reception facilities in Japan as follows: Wakkanai, Otaru, Nemuro, Sendai-Shiogama, Ishinomaki, Akita, Kashima, Tokyo, Yokohama, Fushiki-Toyama, Kanazawa, Nanao, Shimizu, Nagoya, Yokkaichi, Higashi-Harima, Hamada, Uno, Tokuyama-Shimomatsu, Tachibana, Sakaide, Suzaki, Kochi, Sukumo-wan,

Hakata, Sasebo, Beppu, Maizuru, Hiroshima, Iwakuni, Mitajiri-Nakanoseki, Shimonoseki, Tokushima-Komatsujima, Kitakyushu, Kanda, Miike, Oita, Tsukumi, Imari and other ports.

3) Republic of Korea

The waste management system in land is well established in Korea, and marine litter is assumed as waste in land when marine litter is collected at sea and moved to the shore. The waste management system in land is managed by the “Waste Management Law” which is controlled by Ministry of Environment (MOE). The central government, MOE, supports the local governments for waste management financially and technically. Also, MOE publishes statistics on waste, such as generation, collection and disposal in every five years and invests in research and development of waste management. Under the waste management system in land, marine litter is classified into food waste, paper waste, plastics, etc., and placed in the designated places. Then, the marine litter, in addition to that collected from Buy Back Programme, is delivered to relevant companies for disposal. Most of marine litter is disposed at landfill or incinerated.

4) Russian Federation

In Russia, the system of managing waste generated aboard ships has been designed in compliance with MARPOL Convention requirements. Reception of marine litter from ships and collection from harbour water surface is conducted by specialized ships. There are no restrictions as to litter reception. The procedure for notifying about intention to discharge shipboard wastes is as follows: an application should be lodged at the Port Environment Protection Service to be then forwarded to the appropriate agency. Services rendered are charged according to “Rates of charges on Ships in RF Sea Commercial Ports.” Where specialized ships are not available shipboard wastes are received by collection trucks alongside. Table 4 provides a list of agencies engaged in receiving waste and the availability of skimmers and litter collection facilities in ports of Russian sector in the NOWPAP region.

Table 4. Services in receiving shipboard wastes and availability of skimmers and litter collection barges in port of Russia

No.	Port	Ship type	Quantity	Agency	Collected type	Note
Primorsky Krai						
1	Vladivostok	skimmer	3	“Trans-Eco” LLC	Shipboard waste and cargo waste (trash, cargo waste, grey water, bilge water)	Litter collected is transported by collection trucks to the municipal dump
		bilge water collection barge	2			
2	Vostochny	skimmer	2	Vostochny Branch, “Rosmorport” federal state unitary enterprise	All type of shipboard waste is collected	Litter is transported to the municipal dump
		bilge water collection barge	2			
3	Nakhodka	--	--	Vostochny Branch, “Rosmorport” federal state unitary enterprise	All type of shipboard waste is collected	--
4	Zarubino	--	--	“Sea Port in Troitsa Bay” OJSC	Solid waste collected only	Shipboard litter is transported from ships by collection trucks
5	Plastun	--	--	“Terneilles” OJSC	Solid waste collected only	Shipboard litter is transported from ships by collection trucks

Khabarovsky Krai						
6	Vanino	skimmer	2	Vanino Branch, “Rosmorport” federal state unitary enterprise	Shipboard waste	Litter is transported to the municipal dump
		bilge water collection barge	1			
Sakhalinskaya Oblast						
7	Kholmsk	--	--	“Kholmsk Sea Commercial Port” OJSC	Shipboard and cargo waste	Shipboard litter is transported from ships by collection trucks
8	Korsakov	--	--	“Grot-Oil” LLC	Shipboard and cargo waste (trash, cargo waste, grey water, oily water)	Shipboard litter is transported from ships by collection trucks

7. Outreach Programmes

Since outreach campaigns and education programmes are closely related to participation of public, the NOWPAP member states have raised general awareness through booklets, slogans, press media and workshops related to marine litter. Thanks to the efforts of the NOWPAP member states, the public has gradually realized the importance of marine pollution prevention and progressively understood the relevant laws and regulations concerning marine litter. Comprehensive strategies for public education implemented are described below.

▶ Education activities

The NOWPAP member states have implemented education campaigns and programmes series by using the relevant booklets and technical guidance and by publishing slogans to prevent careless discharge of oil and to handle wastes properly, and to enhance the ecological awareness of the marine environment. For example, Chinese Government takes an opportunity such as the World Environment Day on “Fifth of June” and Navigational Day to promote environment protection. And the Sea Protection Institute of Russia has been engaged into designing a multimedia teaching complex “Marine Ecology” targeted at teachers and students in collaboration with Russian Academy of Science Far Eastern Branch institutes, Primorsky Krai Institute for Upgrading Teachers’ Qualification, and non-governmental organizations. In addition, the NOWPAP member states use the mass media like radio and television advertisements or programmes as well as beach cleaning activities, investigation of marine litter discarded ashore, and photo exhibition to increase understanding on the importance of the marine and coastal environment.

▶ Workshops and forums

Workshops and forums are organized to learn lessons through discussion and sharing experiences such as case studies of monitoring marine litter in the NOWPAP region. The participants from authorities and organizations discuss the status, problems of marine litter and alternative policies in the NOWPAP region. The relevant organizations have reflected the opinion raised during workshops and forums.

▶ International Coastal Cleanup (ICC)

China and Russia currently joined the ICC campaigns, and Korea has participated in ICC since 2001. Japan also actively participated ICC since 1990 and conducted ICC campaigns at many coastlines to raise public awareness in cooperation with NGOs, the national government and research institutes. Participants of ICC record marine litter information on data card that identify the types, sources, and activities that produce the litter found along beaches and waterways. Information on the data card is grouped by the behavior associated with the marine litter. ICC provides useful data for government to act on marine litter and to educate the public about litter and pollution prevention.

8. Recommendations

To improve the marine and coastal environment, laws and legislations need to be assessed based on the scientific research and investigation with collaboration of the various stakeholders e.g., private sector, NGOs and the scientific community.

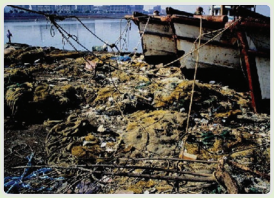
Regular monitoring should be implemented at the beaches and shorelines, and seabed in the NOWPAP region. Long-term monitoring will provide information assessing marine litter types, abundance, and its sources to develop management policies and systems. Regular removal of marine litter from polluted sea area needs to be implemented to preserve the marine and coastal environment.

When marine litter is collected, appropriate procedures of disposal should be followed. The NOWPAP member states should enforce their legislation and practices on the port reception and treatment facilities in compliance with relevant international conventions such as MARPOL convention. Through Global Integrated Shipping Information System (GISIS) which was developed by International Maritime Organization (IMO), the NOWPAP member states can provide relevant information on the port reception facilities for their country, including contact point, so that the facility users can easily find the information of port reception facilities of the NOWPAP region on the GISIS website.

The authorities, agencies and NGOs of the NOWPAP member states need to continue outreach programmes, such as International Coastal Cleanup (ICC), education campaigns and relevant workshops to increase public awareness.

Collaboration between various stakeholders is necessary to develop partnerships including local citizens; governments, agencies and authorities; institutions; international organizations; and industries. Collaboration may form essential foundation for effective initiatives to reduce and control marine litter.

The NOWPAP member states should strengthen regional cooperation in technical research, management practices and joint efforts on marine litter prevention. Regional cooperation and coordination will help to reduce input of marine litter and conserve marine and coastal environment in the NOWPAP region.



NOWPAP MERRAC

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