



Guidelines for Monitoring Marine Litter on the Seabed in the Northwest Pacific Region



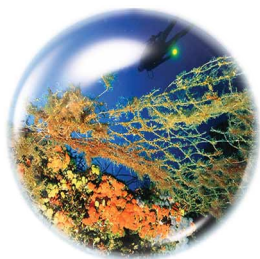
NOWPAP MERRAC

Northwest Pacific Action Plan
Marine Environmental Emergency Preparedness and Response
Regional Activity Centre



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1. Background

These guidelines were developed as a part of the NOWPAP Marine Litter Activity (MALITA) which was approved by the Tenth NOWPAP Intergovernmental Meeting (Toyama, Japan, November 2005). The guidelines are designed as a tool to assist the NOWPAP Members, including local governments, volunteers and NGOs, in monitoring marine litter on the seabed.

Most of the existing marine litter monitoring programmes are carried out on the beaches and shorelines which are easily accessible by human, and the marine litter can be collected without any special assistance such as scuba divers or ships. However, a significant proportion of marine litter discarded, disposed of or abandoned enters into the sea and subsequently remains floating on the sea surface, mixed in the water column and sank on the seabed (UNEP, 2005). Marine litter found under the sea, particularly on the seabed, can not be easily visible and recognized by the general public (Galgani et al., 2000). Therefore, such litter has not been drawn public attention, even though it causes navigation hazard and a growing threat to marine environments.

In this regard, these guidelines were developed to help in effective management of seabed marine litter, and ultimately to protect the health and safety of human and marine organisms and to preserve the marine and coastal environment in the Northwest Pacific region.



2. Objectives

These guidelines were developed to assist the NOWPAP Members in implementing monitoring surveys on marine litter on the seabed, with following objectives:

- ▶ Monitor the quantities, composition and distribution of marine litter on the seabed and assess their overall trends;
- ▶ Remove existing marine litter from the seabed in the Northwest Pacific region;
- ▶ Educate people and increase public awareness regarding the severity of the marine litter problem as a whole;
- ▶ Maintain an effective communication network among the people and organizations from the NOWPAP Members to coordinate activities related to marine litter; and
- ▶ Use the collected information from the surveys to foster positive attitudes – from the individual to the national and regional level – aimed at reducing the marine litter input to the marine and coastal environment and enhancing environmental preservation in the Northwest Pacific region.

3. Timing and Frequency

The monitoring surveys on seabed litter are desirable to be organized at least once a year, preferably in September or October in combination with the existing monitoring surveys and/or cleanup events (e.g., International Coastal Cleanup; Ocean Conservancy, 2005). The timing and frequency of the survey should be determined by the national organizers of the NOWPAP Members, considering other important variables such as fishing period, weather conditions, etc.

4. Methodology

Methods of monitoring marine litter on the seabed can be varied depending on the site situation. Two direct methodologies, scuba diving and trawling, can be applied for the monitoring of the seabed litter.

The NOWPAP Members are recommended to select at least 5-10 monitoring sites (1-3 sites for each province) in their respective countries, depending on their technical capabilities and expertise. The members already having national/local monitoring programmes on seabed litter are encouraged to continue the existing monitoring at the designated sites to ensure the long-term data collection. The location and number of the monitoring sites should be ideally kept the same for the future surveys, if appropriate, using the Global Positioning System (GPS) or other methods to determine the site coordinates.

4.1. Monitoring by Scuba Diving

Seabed litter in relatively shallow areas accessible by divers can be monitored by scuba diving.

Monitoring Sites

In general, the following areas are considered to be suitable for the monitoring survey by scuba diving:

- ▶ Areas along the coast that are well known for generating fishing-related marine litter;
- ▶ Areas near ports and harbours where marine litter is often carelessly discarded, disposed of or abandoned.

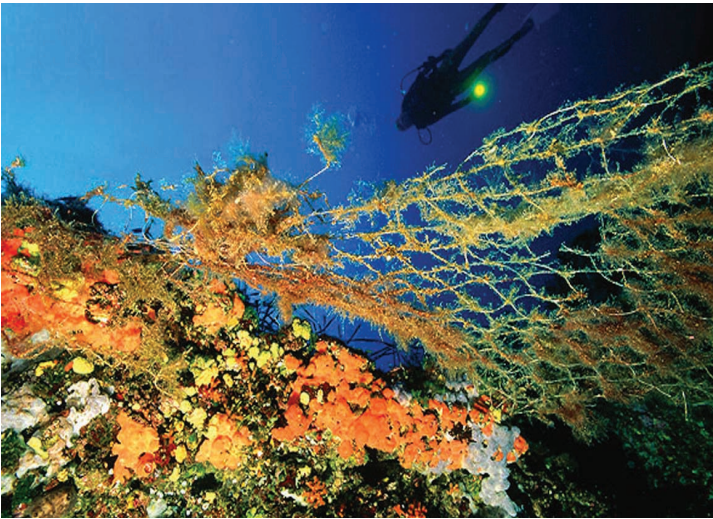
The following areas are not recommended for the monitoring survey by scuba diving:

- ▶ Navigation routes for vessels which can be dangerous to survey;
- ▶ Areas with potential risk of hazardous wastes;
- ▶ Areas with strong currents or waves.

Monitoring Procedures

Scuba diving can be implemented through the following procedures at the monitoring sites.

- ▶ Determine the approximate area of the monitoring site. Within the selected monitoring sites, it is recommended to choose 1-3 survey areas (e.g., with the approximate area of 10 m x 10 m).



- ▶ Collect all seabed litter carefully in the survey area of the monitoring site.
 - Before the monitoring survey, the scuba divers should be briefed on the surrounding environments of the monitoring sites.
 - Monitor only by skilled divers. Participating divers should never work alone. At least two divers should work together as a team to prevent any possible incidents such as entanglement with fishing nets or ropes, and to make sure of the safety during the monitoring survey.
 - Provide assistance for divers in going into and coming out of the water. Also help to pull up, separate and record litter collected during the monitoring survey.
 - Divers should be positioned against the current for clear view, and protect the fragile underwater ecosystem.
 - When seabed litter is too heavy or hazardous to collect, just record its locations and types, and if appropriate, leave neutral buoyancy as a marker.
 - Use rope or lift bag to pull up marine litter when it is hard to put in the sack.
- ▶ Take some underwater photographs of the surroundings, especially if there are any interesting kinds of litter or scenes of ghost fishing.
- ▶ When the collecting is complete, bring all litter to the designated place to safely sort out, count and weigh marine litter collected (please see section 5).

Equipment

- ▶ Scuba gear and equipment: diving suit, buoyancy control device, regulator, air tank, compass, pressure gauge, fins, gloves, knife, and boots;
- ▶ Supplies: mesh sack, rope, ruler, cutter, dive flag, dive slate, float tube, and pelican float;
- ▶ Underwater camera, lift bag, and floating fence;
- ▶ GPS.

4.2. Monitoring by Ship (Trawling)

Seabed litter can be monitored by trawling where it is too dangerous or deep to be accessed by scuba divers.

Monitoring Sites

When selecting the monitoring sites, it is recommended to have an interview with local people and/or organizations to know whether there are any locally concerned issues. People should always bear in mind that the monitoring survey by trawling might destroy the fragile benthic ecosystem. In general, the following areas are considered to be suitable to conduct the monitoring survey by trawling:

- ▶ Coastal and near-shore areas and the open sea;
- ▶ Ports and harbours.

The dangerous and hazardous areas are not recommended for the monitoring sites by trawling.

Monitoring Procedures

Trawling can be implemented through the following procedures at the monitoring sites.

- ▶ Determine the approximate area of the monitoring site.
 - The area of the monitoring site is suggested to be approximately 5 km x 5 km.
 - It is encouraged to take a pre-survey, if appropriate, using Side Scan Sonar (SSS) or underwater camera (Kang, 2004), to identify survey areas and to know the characteristics of each selected monitoring site as well as any special care needed from the ecological or environmental point of view.
 - Within the selected monitoring sites (e.g. 5 km x 5 km), it is recommended to choose 1-3 survey areas (approximately 1 km x 1 km, Figure. 1).
 - In case of port and harbour as monitoring sites, trawl the appropriate area and record the area of the monitoring survey (in km²).

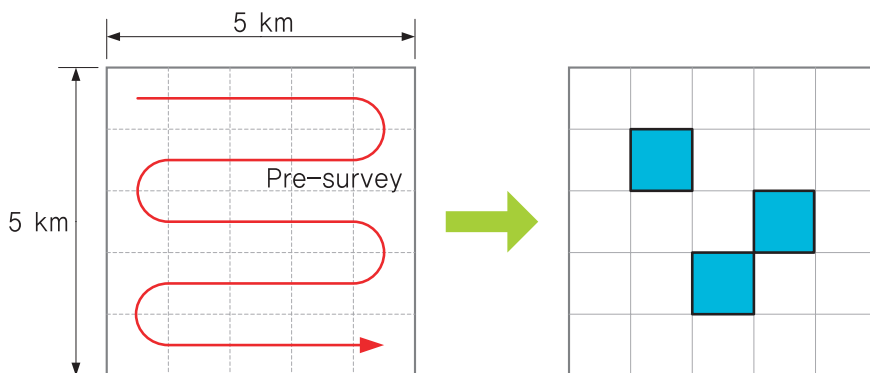


Figure 1. Schematic diagram for selecting survey areas within the monitoring site.



Figure 2. The seabed litter is collected by trawling (Kang et al., 2001).

- ▶ Collect seabed litter in the survey area of the monitoring site (Figure 2).
 - Trawling is carried out with appropriate grapnel (hook) or nets to collect marine litter depending on bottom sediment and seabed litter types.
 - Depending on the type of seabed litter and geographical conditions, the size of trawling equipment has to be determined. For example, trawl net can be of 2 cm mesh size, 2-4 m width, 1 m height and 20 m length.
 - Rope length has to be determined depending on the water depth, neither too short nor too long.
 - Ship has to go straight against the current, so that grapnel (hook) and trawl nets could be spread out straightly.
 - The trawl sampling has to be conducted at low speed, about 3-4 knots.
 - Trawling route should cover the each survey area (1 km x 1 km) with certain interval, e.g. 200 m.
- ▶ Load seabed litter on board with proper equipment such as side roller.
- ▶ Sort seabed litter out directly on board during the marine litter collection.
- ▶ After collection, bring all litter to the designated place to safely count and weigh collected seabed litter (please see section 5).

Equipment

- ▶ Ship suitable for trawling;
- ▶ Trawling tools (see examples in [Annex I](#));
- ▶ GPS.

5. Identification of Marine Litter

When the seabed litter collection is completed, the following procedures are required to identify its quantities, composition and distribution:

- ▶ Sort out the collected seabed litter according to the categories listed on the data card attached as [Annex II](#);
- ▶ Excess sand or dirt should be removed;
- ▶ Count, weigh and measure the seabed litter items within each category separately and record the numbers, weight (kg) and volume (m³) of each category on the data sheet;
- ▶ Record the location of each monitoring site, date and time of the survey on the data card; and
- ▶ Record type, size (mesh size, in case of trawl net) and pictures of equipment used.

After recording the monitoring results, the marine litter should be sent to the appropriate place or port reception facilities in order to incinerate, recycle, etc.

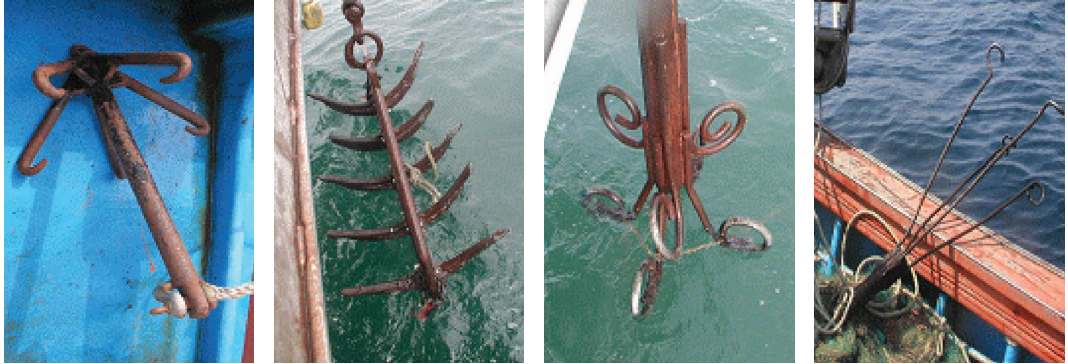
6. Data Management

The data collected should be entered on the data card attached as [Annex II](#). Each of the NOWPAP Members should designate national coordinator or focal point to collect the data generated during the monitoring survey. The national coordinator or focal point should submit the collected data to MERRAC with the site map, other relevant information available, and photographs taken during the monitoring survey (in electronic form, if appropriate). These data will be eventually entered in the NOWPAP marine litter monitoring database (maintained by DINRAC). The data will be regularly updated and be available on the website for general public.



Annex I. Trawl Tools

A. Grapnel (hook) type (from left: mud type, mud-sand type, sand type, and rock type)



B. Grasp (from left: rake and orange grapple) (Kang et al., 2005)



C. Trawl Net (Kang et al., 2001)



Annex II.

Data Card for Monitoring Marine Litter on the Seabed

Monitoring Location						
Monitoring Site: States _____ Country _____ Date: Month _____ Day _____ Year _____						
Location: N _____ E _____ ~ N _____ E _____						
Survey Time: AM/PM _____ ~ AM/PM _____						
Ship's Name: _____ Gross Tonnage: _____						
Name (Affiliation) : _____						
Method & Notes						
<input type="checkbox"/> Seaside area (underwater), <input type="checkbox"/> Coastal area (<input type="checkbox"/> Harbour, <input type="checkbox"/> near-shore, <input type="checkbox"/> open sea)						
Survey Area: _____ km ² , Velocity of Ship: _____ knot,						
Monitoring Methodology: _____, Type of Trawl Tool: _____						
Size of Trawl Tool: _____, Mesh Size: _____						
Equipment: _____						
Results						
Types		Number (ea)	Weight (kg)	Estimated Amount (m ³)	Other Remarks	
Plastic	Bags					
	Bottles					
	Container					
	Line/Rope					
	Fishing nets					
	Resin pellets					
	Others					
Sub-total						
Rubber	Balls					
	Balloon					
	Gloves					
	Rubber boots					
	Tire					
	Others					
Sub-total						
Metal	Cans					
	Fishing gear					
	Wire/Rope					

Types		Number (ea)	Weight (kg)	Estimated Amount (m ³)	Other Remarks
Metal	Plates				
	Others				
Sub-total					
Styrofoam	Container				
	Buoys				
	Others				
Sub-total					
Paper	Container				
	Packages				
	Book/Newspaper				
	Others				
Sub-total					
Wood	Timber/Log				
	Box/Basket				
	Chopstick				
	Others				
Sub-total					
Clothes and Fabrics	Blanket/Carpet,				
	Awning				
	Clothes				
	Leather				
	Others				
Sub-total					
Glass/ Ceramics	Bottle				
	Glass products				
	Tableware				
	Others				
Sub-total					
Others	Electronics				
	Sunken ships				
	Others				
Sub-total					
Total					

Note (picture, etc.)



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