



Ministry of Oceans
and Fisheries



PEMSEA

MOF/PEMSEA ODA Project

Reducing Marine Plastics in the East Asian Seas Region

MANUAL FOR Monitoring of Marine Plastic Debris



MANUAL FOR **Monitoring of Marine** **Plastic Debris**

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1. Introduction

This monitoring manual is designed to help to monitor and assess the distribution and abundance of marine plastic debris on MOF/PEMSEA ODA Project on Reducing Marine Plastics in the EAS Region

2. Objective

- a) To identify the abundance, composition and quantity of beach litters and their sources
- b) To provide essential information for evidence-based beach litter management
- c) To strengthen cooperation among stakeholders including central and local government, local people, and NGOs

3. Expected outcome

- a) List of types, quantity, and sources of beach litters and their analysis on proportions and temporal and spatial trends
- b) Data and knowledge that can be used to guide management decisions on beach litters and to educate general public
- c) Training and education of citizens to enhance their survey capacity

2

Selecting monitoring sites

- 1. Survey sites on beaches should be chosen so that they can represent the status of litter pollution of beaches surveyed.**
- 2. Beaches that meet the following criteria are selected for litter surveys.**
 - a) Length of the beaches should be equal to or greater than 100 meters
 - b) The beaches should be sandy or pebble.
 - c) The beaches should not be ones that are regularly cleaned up in order for surveyors to measure the types and amount of beach litters accumulated in two months* before a survey is conducted. Litter cleanups on the selected beaches will be carried out by participants after the survey.
 - d) The beaches should be accessible for litter cleanups on survey sites and in surrounding areas.

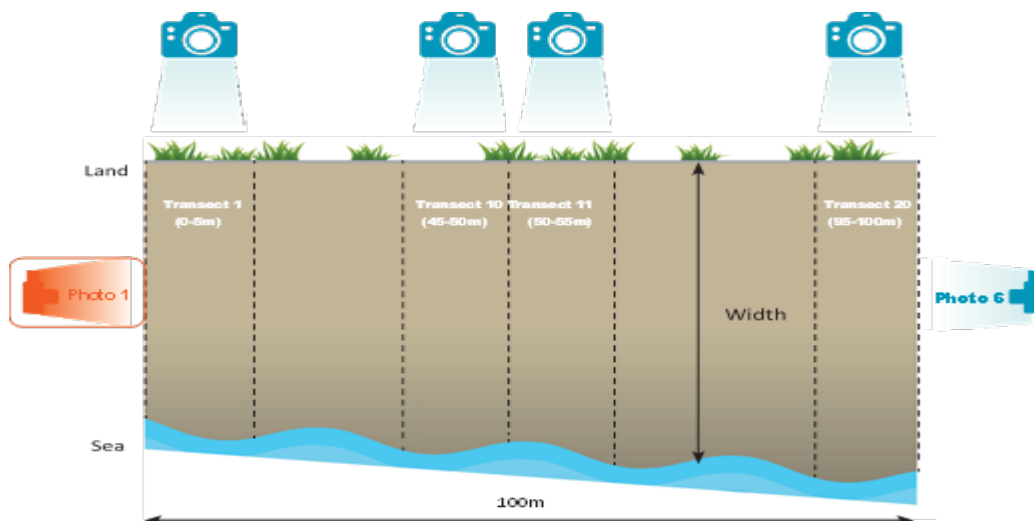


Sandy beach

* Intervals between surveys can be adjusted to detect seasonal changes.

3 Field survey procedures

1. Before you start your survey on a chosen beach, take a picture of the survey site so that the whole survey area can be seen. The photo (photo 1) can be an evidence showing the state of beach prior to the survey and cleanup.



Record the general information of the survey site on the beach litter monitoring card: survey date, name of the lead organization, site name, number of survey participants, GPS coordinates, temperature, wind direction and speed, weather, start and end time of the survey, the survey leader's name, and the latest high tide time before the survey should be entered as precisely as possible.

Beach Litter Survey Card

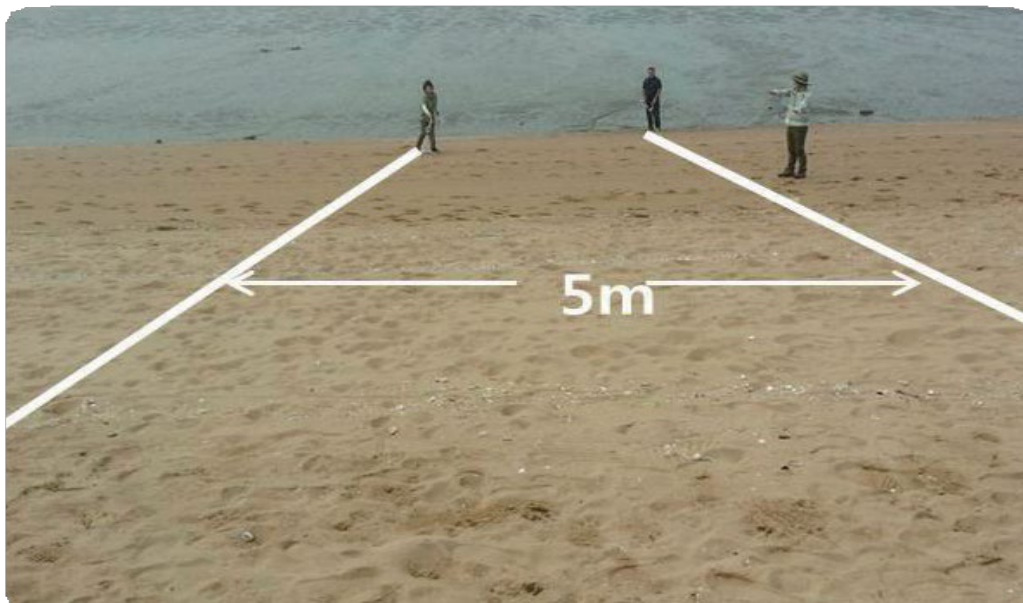
Date	Organization
Site	Number of participants
Site GPS information	Longitude
Temperature	Latitude
Wind Speed	Wind direction
Weather	
Start time	End time
Name of team leader	Latest time of high tide

Transect number		Width(m)	
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To set up the 100 m survey line, place the end tab of a 100 m tape measure at the starting point and extend it horizontally along the coastline to measure out 100 m



2. **Divide the 100 m survey line into 5 m long transects to make 20 transects. And randomly select four transects using a random number generator or a random number table (APPENDIX)**



3. Go to the first transect you selected in the step 4 and measure its width from the backshore to the water edge perpendicular to the coastal line. Record the transect number and width on the card.



Transect number		Width(m)	
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Material		Items	Number	Weight(g)
Plastic	Hard	Beverage bottle, lid		
		Disposable spoon, fork, straw, utensils		
		Food container (sauce container, red pepper paste container, etc.)		
		Toy, doll, office supply, amusement supply		
		Detergent container (for kitchen, laundry, bath supply, etc.)		
		Packaging strap		
		Lighter		
		Fire work supply, firecracker		
		Aquaculture chemical bottle		
		Plastic buoy		
		Trap (eel trap, fish trap, etc.)		
		Fake lure, fluorescent bobber, bait container		
		Pesticides bottle		
		Syringe		
		Other plastic products (boxes, water proof sheet, etc.)		
		Plastic fragment		

4. Collect beach litters larger than 2.5cm (the long axis).



5. Place the transect number indicator by the collected litter and take a picture of all the collected litter with the indicator.



6. Record the number and weight of litters collected on the survey card. For litters that weigh less than the minimum weight that the scale you use can measure, record their weight as 1 gram. The weight is measured by summing up each material.

Transect number		Width(m)	
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Material	Items	Number	Weight(g)
	Beverage bottle, lid		
	Disposable spoon, fork, straw, utensils		
	Food container (sauce container, red pepper paste container, etc.)		

P L A S T I C	Hard	Toy, doll, office supply, amusement supply		
		Detergent container (for kitchen, laundry, bath supply, etc.)		
		Packaging strap		
		Lighter		
		Fire work supply, firecracker		
		Aquaculture chemical bottle		
		Plastic buoy		
		Trap (eel trap, fish trap, etc.)		
		Fake lure, fluorescent bobber, bait container		
		Pesticides bottle		
		Syringe		
		Other plastic products (boxes, water proof sheet, etc.)		
		Plastic fragment		
	Foamed	Styrofoam buoy		
		Styrofoam food container (cup noodle container, fruit wrap, etc.)		
		Styrofoam packaging filling (for home appliances)		
		Styrofoam fish container		
		Cigarette butt		
		Others (sponge, wipe, etc.)		
		Foamed fragment		
	Fiber	String, wrapping strap		
		Net		
		Rope		
		Fishing line		
		Clothes, synthetic fabric (socks, comforter/blanket, etc.)		
		Others		
		Fiber fragment		
	Film	Plastic bag		
		Plastic food wrapper (for food, snack)		
		Film balloon		
		Others (disposable plastic glove, etc)		
		Film fragment		
	Others	Other plastics		
		Other plastic fragment		

Wood	Chopstick, ice cream bar, wood palette, construction wood, fishery/aquaculture wood, etc.		
Metal	Food/beverage can, gas can, fishing hook, spring trap, spray can, nail, iron core, etc.		
Natural fiber	Clothes, cap, socks, fabric, gloves, etc. (only natural fiber)		
Glass	Beverage bottle, bulb, pesticide bottle, fluorescent bulb, glass fragment, etc.		
Rubber	Tire, rubber balloon, rubber gloves, etc.		
Paper	Paper cup, milk carton, fire cracker wrap, etc.		
Others and mixed material	Appliances, automobile part, pottery, tile, battery, candle, etc.		

7. Repeat step 6 ~ 8 for other 3 transects you selected in the step 4

The diagram illustrates three overlapping data collection forms for marine plastic debris transects. Each form consists of a header section and a main data table.

Form 1 (Top): Header includes 'Transect number' and 'Width (m)'. The main table has 10 rows and 4 columns.

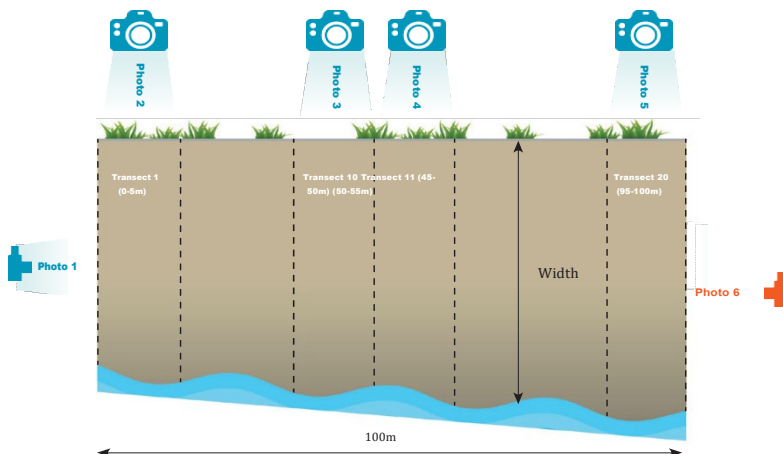
Form 2 (Middle): Header includes 'Transect number' with the value **#11** and 'Width (m)'. The main table has 10 rows and 4 columns.

Form 3 (Bottom): Header includes 'Transect number' with the value **#20** and 'Width (m)'. The main table has 10 rows and 4 columns. A red shaded area is present on the right side of the table, spanning all 10 rows.

8. After recording the composition and quantity of all litters in the four transects, collect all the litters outside those in litter bags and place them in the designated spot.



9. Take Photo 6 on the opposite side of the survey site from where you took Photo 1 so that the entire cleaned-up survey site can be seen.



-End of the field survey-

Points to remember when you record the survey results

- All the information of the survey site should be recorded on the survey card.
- Do not confuse the number of litters collected with their weight when you record the results.
- For plastics, the number of litters collected should be recorded for each specific item on the card. Weights of litters should be recorded for eight material types (plastic, wood, metal, natural fiber, glass, rubber, paper, and mixed materials), not for specific items.



4

Litter Classification

- 1. Plastics (Hard type):** Hard plastics are rigid and usually holds their original shapes. Examples are plastic bottles, lids, lighters, and hard buoys.



2. Plastics (Foamed type): Unlike hard plastics, foamed plastics are inflated with air and are pressed by hand. Examples include sponges and Expanded Polystyrene(EPS)



3. Plastics (Fiber type): Fiber-type plastics include ropes, strings, nets, fishing lines, clothes, gloves, and socks. They include only those made of synthetic or plastic materials. For natural cotton cloths, refer to 'Natural fibers'.



4. Plastics (Film type): Film-type plastics include sheet-type plastics such as disposable plastic bags and grocery bags, sachet packaging, and disposable packaging for food.



5. Plastics (Other type): This type refers to the plastics of which the type is not identifiable.

What is “fragment” in the items of plastics?

Material		Items	Description
Plastic	Hard	Fragment	If a particular item is made of hard plastics but its original usage is not identifiable, it should be recorded as a hard plastic fragment.
	Foamed	Fragment	If a particular item is made of foamed plastics but its original usage is not identifiable, it should be recorded as a foamed plastic fragment.
	Fiber	Fragment	
	Film	Fragment	
	Others	Fragment	



▲ hard fragment



▲ foamed fragment

6. Wood



7. Metal



8. Natural fiber: Today, most fibers come from synthetic clothes. Natural Fiber refers to natural fiber materials only.



9. Glass



10. Rubber: The consists of natural and synthetic rubber. Here, we're only referring to natural rubber only.



11. Paper



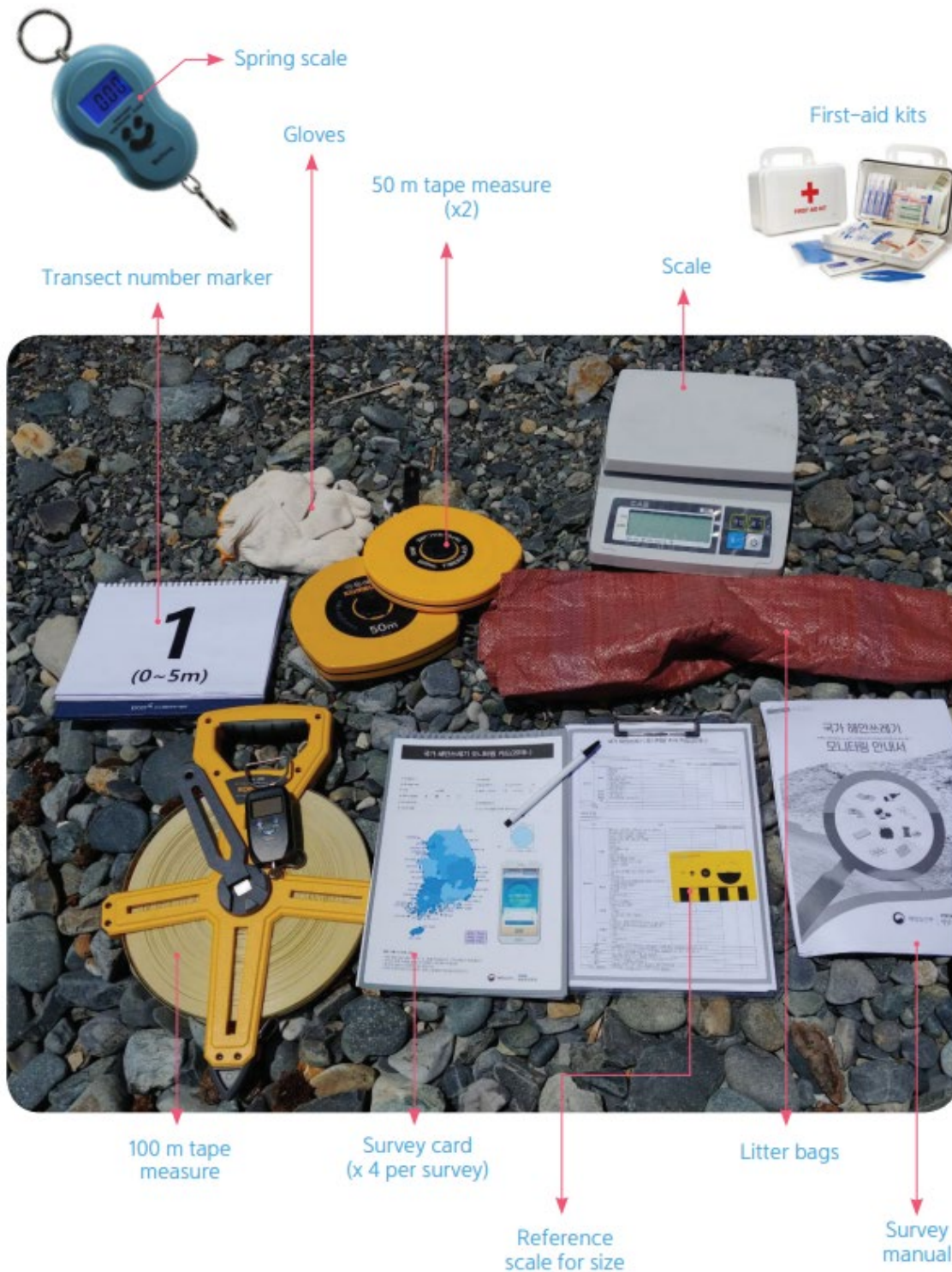
5

Safety Guide

- 1 Pack a first-aid kits whenever you travel to a survey site.
- 2 Drive safely when you travel to a survey site.
- 3 Be careful not to slip or fall, especially when you walk on wet rocks or gravels.
- 4 Watch out for falling objects such as rocks when you approach the bottom of steep slopes.
- 5 Be careful not to get bitten by bugs and watch out for grass leaves.
- 6 Wear gloves and slip-resistant shoes when needed.
- 7 Avoid long exposure in the sun by taking breaks in the shade. Wear long sleeve clothes or use protective sun creams.
- 8 Do not touch any unknown liquid or solid litter. Refrain from opening any containers with unknown contents.

6

Things you will need



APPENDIX: RANDOM NUMBER TABLE

This is a table of random number sets to use when you choose four transects for each survey site. Pick any number set randomly.

1 16 17 19	2 13 15 20	1 3 4 19	3 4 14 19	6 10 13 20	4 6 12 16	1 2 11 20	4 6 9 17
15 17 18 20	3 7 12 15	3 5 15 20	2 4 5 11	3 10 18 20	1 14 15 18	7 9 18 19	2 6 13 15
8 9 11 13	5 8 9 20	8 13 15 17	4 8 15 20	5 8 15 16	4 10 12 14	4 12 14 18	4 7 9 12
7 9 15 19	8 13 14 16	15 16 18 19	12 16 18 19	2 3 9 16	4 16 19 20	1 4 6 14	3 11 15 17
8 12 16 20	3 5 16 20	2 4 10 12	1 5 7 18	7 8 14 15	2 8 16 20	2 4 6 19	2 4 14 20
5 10 14 15	3 5 11 20	1 5 9 15	11 14 17 18	5 6 7 20	2 9 11 15	4 15 18 19	1 3 6 9
2 9 11 16	6 7 10 13	3 14 15 17	4 5 10 14	2 4 14 17	4 5 6 20	1 6 11 19	5 6 10 19
1 2 6 14	6 7 11 14	8 15 16 19	3 5 8 15	11 15 17 20	4 6 15 19	3 8 10 19	1 3 7 16
4 5 7 10	10 11 16 17	1 2 13 14	2 4 6 7	2 6 10 17	4 5 6 14	5 9 16 18	5 10 13 15
3 9 10 19	1 8 19 20	4 7 11 16	4 5 6 12	2 5 19 20	6 10 12 15	1 6 8 19	1 4 8 16
5 6 11 19	3 4 17 19	2 7 10 20	1 3 7 13	10 11 12 18	7 8 10 13	8 10 11 12	4 7 9 15
3 12 14 20	6 9 12 19	16 18 19 20	9 12 14 15	1 2 16 19	3 7 9 17	1 7 11 18	2 3 6 8
15 16 18 19	1 2 3 14	4 5 7 18	10 11 13 19	2 9 12 13	1 6 12 15	3 7 8 15	3 7 12 20
2 10 17 18	6 8 9 14	3 6 18 20	6 8 14 17	1 14 16 18	7 11 13 18	7 10 11 19	2 3 15 19
3 4 15 20	2 4 11 15	10 13 16 18	8 10 15 18	2 3 8 20	8 13 15 18	1 13 14 17	9 11 13 15
1 2 7 13	2 4 11 19	3 6 10 13	2 5 14 15	4 6 7 13	2 13 18 19	4 6 8 20	8 9 10 15
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1 4 18 20	3 10 17 18	5 10 16 17	1 4 7 19	13 16 19 20	10 14 16 18	8 10 13 17	3 11 12 14
3 6 15 18	6 7 8 12	1 8 13 19	2 9 16 19	6 7 14 20	11 13 15 17	1 2 14 16	2 14 18 20
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2 3 6 16	2 7 8 17	4 8 13 14	1 8 11 12	14 15 16 20	3 6 10 14	2 12 13 20	1 2 13 18
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