



Guidelines for Harmonizing Marine Litter Monitoring Methods Using Remote Sensing

Ver.1.0

Office of Policies against Marine Plastics Pollution
Marine Environment Division
Ministry of the Environment, Japan



Policies against Marine Plastics Pollution in Japan

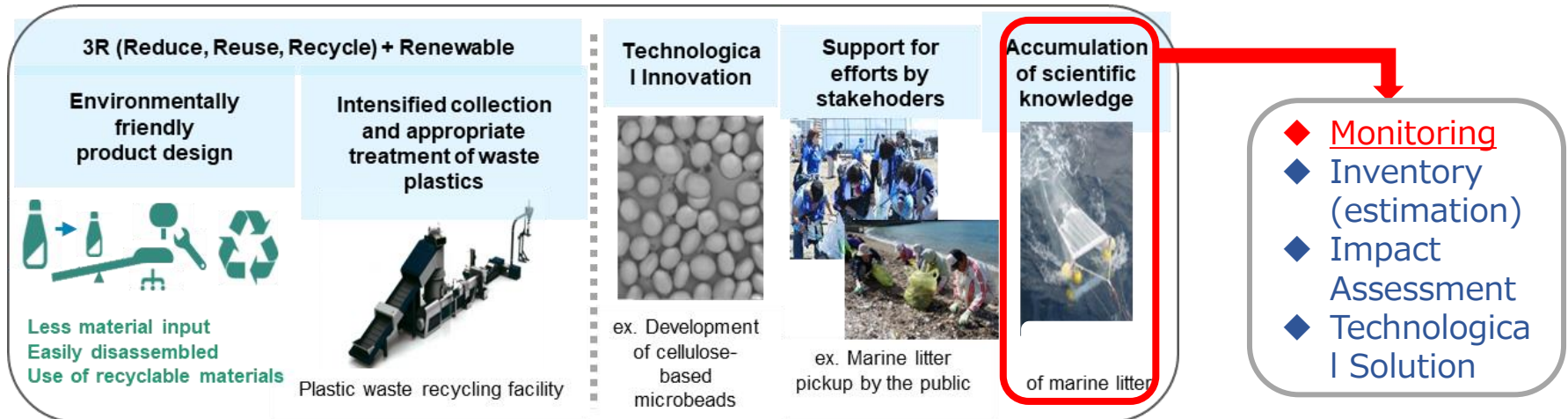
Legal / Policy Framework

- the Act on Promoting the Treatment of Marine Debris (2009, amended in 2018) → the Basic Policy on the Comprehensive and Effective Promotion of Measures Against Articles that Drift Ashore under the Act (2009, 2019) --- Promotion Council for Marine Litter Policy
- Resource Circulation Strategy for Plastics (2019)
- National Action Plan for Marine Plastic Litter (2019)
- Act on Promotion of Resource Circulation for Plastics (2021 (enforced in 2022))

Measures

Life cycle approach

Science based approach

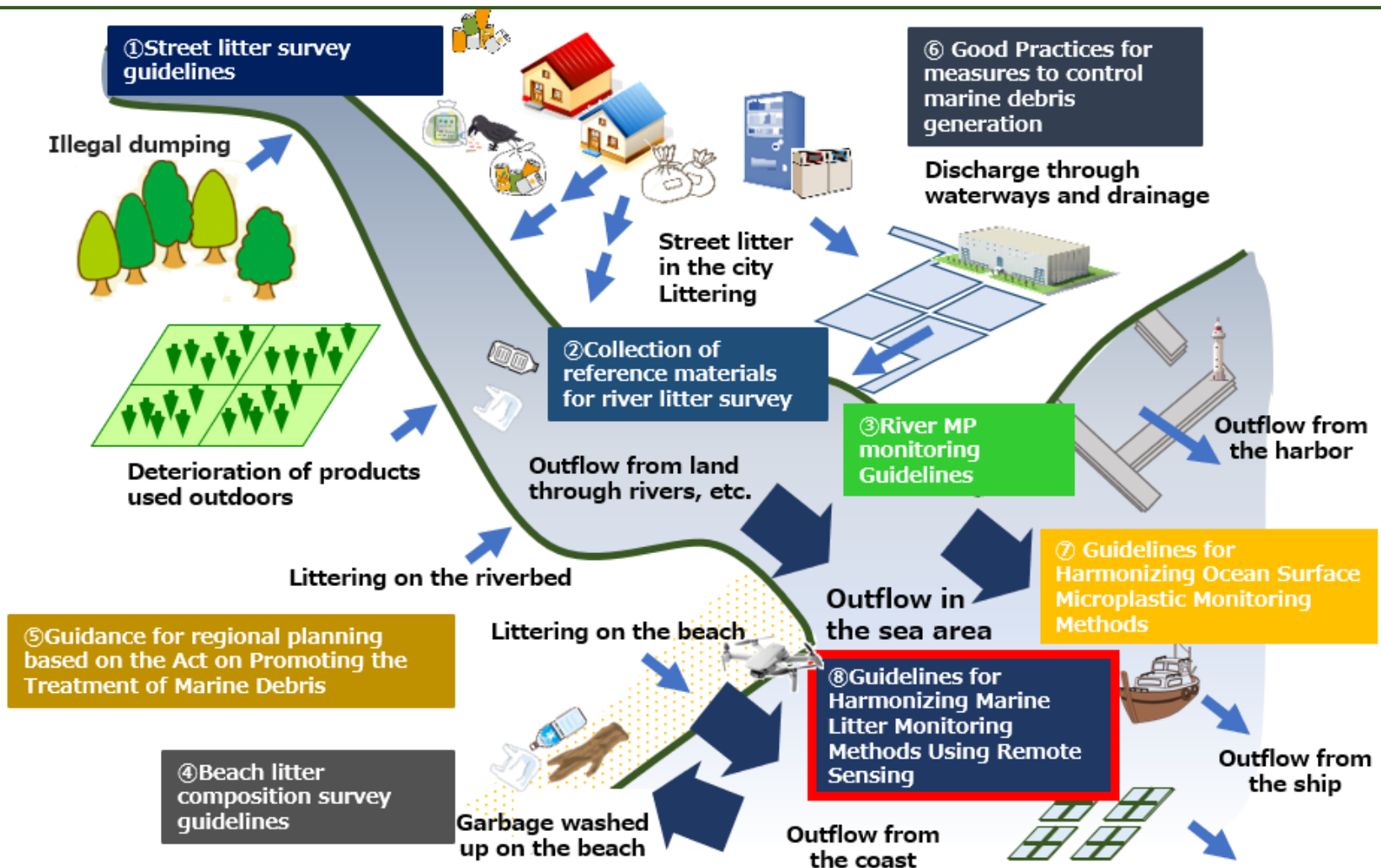


Financing

- Public finance (ex. Subsidies for clean-up activities)
- Private finance etc..

MOE's survey/monitoring/clean-up guidelines related to plastics floating into Ocean

Prepare survey guidelines and case studies to help local governments, research institutes, etc. determine the amount, composition, etc. of plastic and other litter discharged into the ocean and take effective countermeasures.

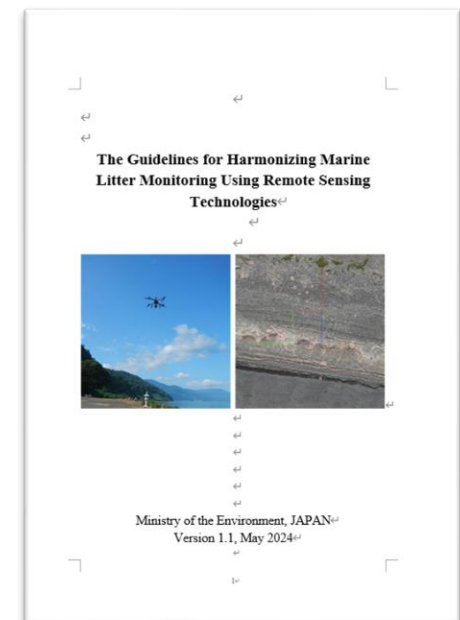


Guidelines for Harmonizing Marine Litter Monitoring Methods Using Remote Sensing

- The guidelines outline the requirements for collecting image data and analyzing images using **remote sensing technology** in order to conduct **wide-ranging, continuous, and efficient surveys** of marine litter distribution, which are necessary for promoting internationally coordinated measures against marine litter.
- The guidelines were prepared by experts incorporating the latest scientific knowledge and technical development, for **obtaining marine debris data without bias** and utilized **as information on a wider spatial and temporal distribution of marine litter** on a global scale.



- The version 1.0 (focusing on UAV) was published July 2024.
- Prepared through four international expert meetings held since FY2022, review of existing research, and demonstration testing in Japan.
- Written by 16 the international experts (Japan, U.S., Italy, U.K., India, etc.)



Overview of the version 1.0 of the Guidelines

Remote sensing technologies covered by the guidelines :

- Technologies used to gather and process information about an object without direct physical contact (ASPRES ※2024).
 - Uncrewed Aerial Vehicle (UAV) ; Stationary camera (a camera installed in the environment); Aircraft; Satellite etc

Structure of the Guidelines :

The Guidelines (main document)	■ Contents common to all remote sensing technologies ① Selection of technologies depending on monitoring purpose ② Technological maturity and challenges/limitations
Annex of the International Guideline	■ Individual technology ① Survey planning, preparation, and implementation ② Procedures for analysis and publication of survey data
Appendix	■ Demonstration test results to ensure the practicality of monitoring by individual technology (The version 1.0 of the guidelines (on UAV) was demonstrated in Japan (Ehime Prefecture).)

The version 1.0 published in July 2024 covers **UAV** that can estimate the volume of marine litter with a certain degree of accuracy.

Targeted users :

Government agencies, Academic and research institutions, etc.

Demonstration test for beach litter survey using UAVs

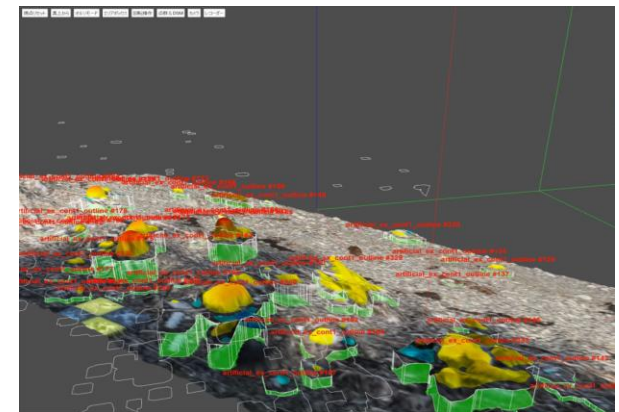
- Demonstration test is for ensuring practicality and feasibility of the guidelines.
- Monitoring beach litter using UAV and AI image analysis, estimate the volume of beach litter, and compare with the ground truth data for confirming its degree of accuracy.



- Survey period
23-29th July 2023
- Survey Points
Iyo city/ Uwajima city, Ehime
- Demonstration test Outline
 - Drone survey with automatic detection of beach litter by AI
 - Drone survey with manual detection of beach litter from images
 - On-site visual inspection
 - Collection survey

- What drone and AI can do for beach litter survey:
 - Estimating the volume of beach litter
 - Detection of the number and per-items of beach litter

- Remaining technical challenges:
 - Limitation on the size of litter that can be detected
 - A beach with high density of litters is difficult to accurately detect its number and per-item volume.



Detection and Estimation of the volume of litter by AI