Action Plan for Harmonized Marine Litter Monitoring in the Wider Caribbean Region

2021

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Disclaimer

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Glossary of terms and abbreviations

Beach cast	Material that has been deposited on beaches after being washed up by storm or tidal movement.
BLEG	OSPAR Beach Litter Expert Group
Blue Economy	Sustainable and integrated development of economic activities in healthy oceans. The Blue Economy concept provides social and economic benefits for current and future generations, and restore, protect, and maintain the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems.
CaMPAM	Caribbean Marine Protected Areas Management Network and Forum
Cartagena Convention	The Cartagena Convention has been ratified by 25 United Nations Member States in the Wider Caribbean Region. It covers the marine environment of the Gulf of Mexico, the Caribbean Sea and the areas of the Atlantic Ocean adjacent thereto, south of 30 north latitude and within 200 nautical miles of the Atlantic Coasts of the Member States. The Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region (WCR) or Cartagena Convention is a regional legal agreement for the protection of the Caribbean Sea. The Convention was adopted in Cartagena, Colombia on 24 March 1983 and entered into force on 11 October 1986. The Convention is supported by three technical agreements or Protocols on Oil Spills, Specially Protected Areas and Wildlife (SPAW) and Land Based Sources of Marine Pollution (LBS).
CCB	Clean Coast Bonaire
CEMP	OSPAR Coordinated Environmental Monitoring Programme
CLiP	Commonwealth Litter Programme (CLiP), led by the UK through the Centre for Environment Fisheries and Aquaculture Science (Cefas).
CLME+ SAP	Caribbean and North Brazil Shelf (CLME+) Vision and Strategic Action Programme (SAP) initiatives
Debris	See Litter – although the words "litter" and "debris" are sometimes used to indicate "rubbish" with different sources in this document the two words are taken to be inter-changeable. Note also that the UN resolution A/60/L.22 and supporting documents used the term "debris" but subsequent UN programmes and documentation have used the term "litter".

Dive Against Debris	An underwater citizen science litter monitoring program by Project AWARE. Recreational scuba divers collect and catalogue debris.
EIHA	OSPAR Environmental Impacts of Human Activities Committee
EMODnet	European Marine Observation and Data Network
Flux rate	Flux rate is the amount of litter that accumulates on a given length of beach over a given period of time expressed as [unit quantity of litter] per [unit length of beach] per [unit time]). See also standing crop.
GCFI	Gulf and Caribbean Fisheries Institute
GPML	Global Partnership on Marine Litter
ICC	International Coastal Cleanup
ICG-ML	OSPAR Intersessional Correspondence Group on Marine Litter
J-List/Joint List	Joint List of Litter Categories for Marine Macrolitter Monitoring developed by the European Commission Joint Research Center to provide a comprehensive list of litter types, which occur in the coastal and marine environment that can be used to enable comparable monitoring of marine litter.
JRC	The Joint Research Centre is the European Commission's science and knowledge service which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy.
LBS	Land Based Sources of Marine Pollution
LitteR	A tailor-made software for analysing the results of beach litter surveys
Litter Characterization	System used to classify different types of litter. Many different systems have been used in the literature including grouping litter based on its material composition (e.g. plastic vs wood vs metal), form (e.g. bottles vs crates vs sheets) or source (e.g. recreational activities vs fishing vs commercial transport). In this report a comprehensive litter characterization scheme has been developed that uses both material composition and form.
Litter Monitoring	Repeated surveys of beaches, seabed and/or surface waters to determine litter quantities such that information can be compared with baseline data to see if changes occur through time and / or in response to management arrangements.
Litter Survey	Structured set of procedures to provide a quantitative assessment of the amount of litter in a given location.

Marine Litter	Waste, discarded or lost material resulting from human activities – marine litter is any such material that has made it into the marine environment, including material found on beaches or material that is floating or has sunk at sea.
MDMAP	NOAA's Marine Debris Monitoring and Assessment Project
Modified OSPAR Beach Litter Monitoring	A program using an adapted version of the OSPAR Beach Litter Monitoring Guidelines wherein surveys occur 4x per year at a selected 50m coastal survey site. During the surveys, all litter items within the survey site are collected and counted using a form that incorporates OSPAR and Joint List litter items.
Moodle	A free and open-source learning management system written in PHP and distributed under the GNU General Public License.
MSFD	Marine Strategy Framework Directive
NGO	Non-Governmental Organization
NOAA	United States National Oceanic and Atmospheric Administration
OC	Ocean Conservancy
OSPAR	The 1992 OSPAR Convention is the current instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. It combined and up-dated the 1972 Oslo Convention on dumping waste at sea and the 1974 Paris Convention on land-based sources of marine pollution.
RAPMaLi	Regional Action Plan for Marine Litter
SDG14	Sustainable Development Goal (SDG) 14 - Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
SIDS	Small Island Developing States
SOCAR	The State of the Convention Area (SOCAR), a baseline assessment of the state of the WCR coastal and marine environment with respect to land-based sources of pollution.
SOMEE	State of the Marine Ecosystems and Associated Economies, a comprehensive and integrative long-term reporting mechanism that aims to bridge the science-policy gap by building a collaborative approach to monitoring the status of the marine environment and its contributions to the sustainable blue economy and to human well-being in the Wider Caribbean region.

Standing crop	Standing crop is a measure of the amount of litter on the beach expressed as the [unit quantity of litter] per [unit length of beach]). See also Flux rate.
SUP	Single Use Plastic
TIDES	Trash Information and Data for Education and Solutions - Ocean Conservancy's ocean trash data collection platform
UNEP	United Nations Environment Programme
UNEP-CAR/RCU	UNEP's Caribbean Regional Coordinating Unit
UNEP-CEP	UNEP Caribbean Environment Programme
WCR	Wider Caribbean Region
WWF-NL	World Wide Fund for Nature - Netherlands

Executive summary

Marine litter is a serious environmental, social, and economic threat to the blue economy of the Wider Caribbean Region. Due to the transboundary nature of marine litter, data-driven reduction measures are needed on a local, national, regional, and global level. To improve the knowledge base to inform the development of policies and measures in the Wider Caribbean Region, there is a need for a structured and regionally harmonized marine litter monitoring framework, aligned with global protocols.

The purpose of this report is to define an effective strategy and create a roadmap for a cost-effective and easily replicable means to collect high quality, harmonized marine litter data that can be used for driving and verifying effectiveness of reduction policies, awareness raising while ensuring that the data collected regionally is aligned with global marine litter data consolidation and analysis.

The recommendation for collaborative approaches to marine litter monitoring has been repeated frequently in regional and global fora and reports.

The action plan proposed in this report builds on the 2019 recommendations for a hybrid approach on beach litter monitoring and incorporates regional and global assessments of marine litter frameworks, best practices of the established program for beach litter monitoring in the OSPAR region, and feedback from stakeholders within the Wider Caribbean Region.

Information was gathered through literature review, questionnaires, and open-ended interviews. The findings show that the OSPAR Beach Litter Monitoring program provides a centralized organizational structure involving participating country leads who supervise or conduct routine monitoring in their respective countries, as per their monitoring obligations. In order to institutionalize a harmonized monitoring approach in the Wider Caribbean Region, there is a need for commitment from authorities and increased communication and capacity.

The recommended strategy involves the following key regional actions to secure commitment from the contracting parties:

- Designation of a Regional Coordinator to oversee and implement the program
- Establishment of a regional monitoring network
- Construction of a regional database
- Creation of a training program
- Conduction of pilot testing

The national actions include the designation of a National Monitoring Coordinator to oversee the program and Survey Coordinators to organize and conduct the monitoring surveys.

Contracting parties of the Cartagena Convention will benefit from these actions, allowing them to quantify beach litter in a quality controlled and consistent manner,

use the data to drive reduction measures, establish baselines for tracking the progress of interventions, enhance local expertise and technical capacity concerning marine litter monitoring, raise public awareness, strengthen multilateral cooperation, and establish partnerships to address marine litter.

1. Introduction

There is growing global concern regarding the impact of marine litter upon our health, environment, and economy. Marine litter monitoring is a recognized keystone instrument within any marine litter reduction strategy. Recent years have shown increased awareness in marine litter, resulting in additional capacity, collaboration, and technology. However, although the Caribbean is significantly impacted by marine litter that is generated both inside and outside of the region, there is very little quality-assured data being collected to guide policy decisions.

By gaining a better understanding of the problem of marine litter via a harmonized, regional approach, we will be better able to develop and assess targeted measures to reduce plastic and other types of marine litter pollution. This requires an integrated and stepwise approach, engagement of stakeholders, effective and cost-efficient monitoring, quality data collection and reporting, and strengthening of the capacity of countries to use an evidence-based approach to policy making.

The focus of this document is to outline concrete actions that must be taken to allow individual nations within the Wider Caribbean Region (WCR) to establish a standardized, routine beach litter survey program, and record and share data within the region in a harmonized manner using the Modified OSPAR Methodology as outlined in the report, *Harmonization of Marine Litter Monitoring in the Wider Caribbean Region* (2021). In this report it is recommended to harmonize marine litter monitoring in the WCR by using a modified version of the OSPAR Beach Litter Monitoring Methodology in a hybrid format with the complimentary Ocean Conservancy programs to build upon existing networks. The Modified OSPAR methodology was recommended because it offers an established protocol to collect quality assured beach litter data on a spatial-temporal scale in a cost effective, low-tech manner that can suit the needs of individual counties. In addition, the governance structure, communication network, reporting and data management practices used in the OSPAR region provide a roadmap to guide the replication process.

To establish a routine monitoring program that also fits with the global context and includes the most up to date methodology that is consistent with global harmonization instruments, the recommended methodology was updated in 2021 to include the recently developed *Joint List of Litter Categories for Marine Macrolitter Monitoring*.

The recommended actions included in this plan are supported by best practices and feedback from the OSPAR region, stakeholder feedback from the WCR, lessons learned from use of the Modified OSPAR methodology in the Caribbean, and research into global data harmonization efforts.

This document substantiates the background need for a harmonized beach litter monitoring program in the WCR that is consistent with global marine litter monitoring in Chapter 2. Against this background, it assesses the existing landscape of marine litter monitoring in Chapter 3. Subsequently, it reviews the practices of the OSPAR beach litter monitoring program in Chapter 4, feedback from the stakeholders of the Wider

Caribbean Region in Chapter 5, lessons learned from use of the OSPAR beach litter monitoring methodology in the Caribbean in Chapter 6, and routine monitoring considerations in Chapter 7. Existing marine litter data management options are reviewed in Chapter 8 and recommendations based on the available options and needs of the WCR are discussed in Chapter 9. Next, the insights from this review are applied to the regional and national steps needed to implement a harmonized program in Chapter 10. Before the report wraps up its main findings in the conclusions in Chapter 13, it outlines the budgetary needs in Chapter 11 and implementation timeline in Chapter 12.

2. Background

2.1 Beach litter monitoring

Beach litter monitoring is recognised as a methodology with a high level of maturity requiring a low amount of technical expertise or equipment. It is capable of being reproduced at a low cost. It requires a low to medium level of expertise allowing for use of trained volunteers or supervised volunteers. It has a high level of geographic applicability depending upon site availability and can generate a very high level of detail. (Galgani et al., 2013) For these reasons, it is recommended as the initial harmonised marine litter monitoring protocol to be developed within the WCR.

Although this report is specifically addressing beach litter monitoring, it is recognized that beach litter is not the only important indicator for marine litter. However, consistent data collection by routine monitoring is a very important first step. This project can set a foundation for growth by steps into additional harmonized data collection protocols with a potential to include other essential data such as microplastics, riverine litter, geographical sources, and biota impact in the future.

2.2 Importance of harmonized marine litter data collection

There are a multitude of beach clean-up initiatives and corresponding marine litter databases. While valuable, different programs utilize different litter categorization methods, and this results in incompatibility of global measurements and reduces the effectiveness of this important information.

An effective litter management strategy for reduction and elimination requires a comprehensive, quantitative litter monitoring program. The implementation of a long-term, large-scale, harmonized litter monitoring program at regional and global levels is an essential part of plastic reduction because it will:

- Provide a greater understanding of the problem
- Identify types of litter, source industries/behaviours/activities, abundance, trends, and distribution at different spatial scales
- Simplify data sharing locally and regionally
- Produce verified, scientifically recognized, and quality-controlled data (via guidance, updates, communication, consistent reporting formats and training)
- Drive reduction and management strategies, policies, and legislation
- Assess the effectiveness of reduction strategies, policies, and legislation
- Enable future monitoring of reduction progress
- Allow for compliance checking
- Provide data to develop local, regional, and global litter baselines
- Reinforce the need for joint action between countries and regions
- Support awareness campaigns by providing data to explain the full scope of the problem, as well as targeting specific products and human behaviours

2.3 Regional harmonization accomplishments

In 2018, the UN Environment's Caribbean Environment Programme (UNEP-CEP), and the Gulf and Caribbean Fisheries Institute (GCFI), co-hosted a workshop in Miami focused on harmonizing marine litter monitoring in the WCR. The workshop was a direct result from a commitment made by the OSPAR Commission and UNEP-CEP at a United Nations (UN) Conference held in New York in June 2017, about the implementation of Sustainable Development Goal 14 (#OceanAction17198).

Apart from the direct connection by sea, the Cartagena Convention and OSPAR Commission share several common Contracting Parties including The Netherlands, France, and the United Kingdom. In 2021, the OSPAR Commission and Cartagena Convention signed a Memorandum of Understanding outlining areas of cooperation including the item "Facilitate implementation of technical cooperation and assistance activities, for example where the experiences within the OSPAR Commission can assist the Cartagena Convention."

In 2019, the GPML-Caribe hosted a Strategic Planning Session for Marine Litter Management in the Wider Caribbean Region. The following was identified as a priority action: "Develop harmonised monitoring protocols by integrating existing programs (Trash Free Seas) with comprehensive beach monitoring protocols (OSPAR) at targeted sites."

2.4 Hybrid report recommendations

As a direct result of the harmonization workshop, the report *Harmonizing Marine Litter Monitoring in the Wider Caribbean Region: A Hybrid Approach* (Caporusso and Hougee, 2021) was prepared to evaluate a hybrid approach to data collection methods employed by OSPAR and Ocean Conservancy for the WCR. This included identifying the pros and cons of each methodology by comparing the different survey methods, field forms and databases, as well as governance of the initiatives. The assessment concluded that the Ocean Conservancy's International Coastal Cleanup Day and corresponding CleanSwell App are the main source of beach litter data in the region. While useful, there are certain limitations on what can be assessed from the data, based on the simplicity and accessibility of these crowd-sourced monitoring techniques.

The report recommends adopting a combined approach that allows for engagement with citizens for monitoring while ensuring good quality data collection on certain pre-selected sites. This is to be accomplished by continuation of support and promotion of the Ocean Conservancy's programs (ICC, CleanSwell and Dive Against Debris), as well as introduction of a modified OSPAR Marine Litter Monitoring Methodology to collect high resolution, spatial-temporal data at strategically selected sites utilizing supervised citizen scientists within the constituent countries by the institution of a similar regional manager and database structure to what is currently in use within the OSPAR region. The recommended modifications to the OSPAR methodology were primarily to adapt it

from the coasts of the North-East Atlantic to the Caribbean by reducing the required length and noting the presence of sargassum.

2.5 Joint List of litter categories

In 2021, the Joint Research Centre (JRC), the European Commission's science and knowledge service published the report, *A Joint List of Litter Categories for Marine Macrolitter Monitoring*. The list was prepared by the Marine Strategy Framework Directive Technical Group on Marine Litter, in close collaboration with EU Member States and the Regional Sea Conventions.

The Joint List combines the litter types from different marine litter monitoring, including OSPAR, into one for the purposes of providing a high-resolution classification system for litter items enabling them to be recorded in a clear, unambiguous, and harmonised way.

Although it was developed to enable comparable monitoring of marine litter across the European Seas and beyond and across different compartments of the marine environment and to support EU Member States in the implementation of monitoring programmes and plans of measures to act upon marine litter, it can also be used for the purpose of enhancing harmonization at a global scale.

For new monitoring projects, the Joint List recommends that the selection of litter types is linked with policy needs. In most cases, this will mean selecting the highest level of detail available in the Joint List to provide precision and the ability to attribute litter items to specific sources and activities. (Fleet et al., 2021)

3. Current landscape

3.1 Global considerations

Plastic pollution is a global, regional, and local problem and it is transboundary by nature. Plastic may be produced on one side of the world and transported and used on the other side of the world. When plastic ends up in the environment, it can potentially impact nature anywhere via natural transport through rivers and ocean currents.

SDG 14.1 *By 2025, prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution*

The voices for a United Nations treaty on plastic pollution are rising, from businesses, governments, and NGOs. It is widely acknowledged that in order to take targeted measures, monitoring of the extent of the plastic problem is a priority. Nevertheless, harmonizing the different measurements is a challenge. A recent UN publication reports that there are currently 15 major operational monitoring programs linked to marine litter, but that the data and information from them are largely unconnected. (UNEP 2021)

Arguably, countries in the WCR may be affected more than elsewhere in the world, due to their dependence on the 'Blue Economy.' (Diez et al., 2019) By harmonizing beach litter monitoring in the WCR with OSPAR monitoring, countries can contribute to creating a better understanding of the problem locally, regionally, and globally – and thereby speed up actions to prevent further damage.

3.2 Regional policy framework

The Cartagena Convention is the most comprehensive environmental agreement for the WCR. The Convention's Protocol Concerning Pollution from Land Based Sources and Activities (LBS Protocol) governs how countries in the WCR address pollution.

As listed in Article 13 of the Cartagena Convention, Contracting Parties have the obligation to undertake environmental monitoring, and to make sure monitoring results are compatible in the area, and parties 'shall endeavour to participate in international arrangements for pollution research and monitoring'. The LBS protocol further states that 'Each Contracting Party shall formulate and implement monitoring programmes' (Article VI, LBS Protocol) and promote cooperation in the areas of monitoring (Article V, LBS Protocol). Hence, conducting beach litter monitoring in the WCR in a consistent way and harmonising it with international methods, fits very well with the obligations from the Cartagena Convention.

Despite the monitoring obligations described in the Cartagena Convention and LBS protocol for all issues related to marine pollution and water quality, there is a gap in environmental data. Only a few countries have the systems in place to collect data,

and monitoring efforts are not yet fully integrated into relevant regional assessments and reporting efforts (SOCAR report and the report on the State of the Marine Ecosystems and Associated Economies (SOMEE) of the CLME+ SAP). (Diez et al., 2019). The costs associated with monitoring may be amongst the reasons why monitoring is not commonly done. However, beach litter monitoring can be done in a cost-effective manner and provides the necessary evidence base for policy interventions.

Ultimately, it is up to the governments of countries in the WCR to decide if marine litter is a priority, and hence needs monitoring. Given the size of the problem and the attention the issue gets, and the current gap in litter data in the WCR, the question whether marine litter monitoring should get priority seems to be a rhetorical one.

3.3 Emerging and region-specific litter Items

In order to maintain a harmonized program, it is essential to have an adaptable protocol. Within the OSPAR Beach Litter Monitoring Protocol, "other" items that are not included in the beach litter list are noted and specified as such. If a new item becomes common, it will thereby be picked up by the monitoring. This has indeed happened several times within the OSPAR beach litter monitoring protocol. (Galgani et al., 2013)

The Joint List indicates that "Litter items which are recorded as 'other' under the respective material category, because they are identifiable, but do not fit into a specific litter type category, should be noted in the remarks section of the field protocol. If such items begin to occur regularly, they could be flagged as potential candidates for inclusion in the Joint List." (Fleet et al., 2021)

This capability will also function to record region-specific litter items. In the case where OSPAR monitoring was used in Belize, the write-in item of "plastic drinking water pouches" was determined to be of local concern when it was found to be in the Top 10 item list. Without inclusion of a means to record this data within the category list, this information would have otherwise been lost. "This approach, allowing the identification of specific items in marine litter, provides useful data to help identify problem areas and provide evidence to prioritise actions." (Silburn et al., 2020)

Emerging pandemic-related litter items such as single use PPE masks and gloves have been added to the OSPAR litter list as well as the Joint List.

3.4 Additional harmonized methodologies and developments

As more attention is paid to the issue of marine litter, additional techniques and developments will emerge and should also be harmonized within the WCR. Once an established network is in place, it will be more possible to facilitate the piloting and potential incorporation of additional methodologies to monitor other important indicators such as measurement of microplastics, river litter monitoring, and harm to biota. Other information can be collected to facilitate tracking of geographical sources of litter and manufacturer recognition. There are also many new technological advancements in development to enhance the ability to understand the movement of

marine litter via modelling and remote sensing. It is recommended to continue to align additional harmonized monitoring programs with the OSPAR region to collect compatible data.

4. Practices of the OSPAR region

4.1 Survey process

Questionnaires were sent to the members of the ICG-ML correspondence group (Attachment 1). The group includes the government representatives and entities responsible for conducting surveys within the 15 OSPAR constituent countries. Participants were informed that responses will remain confidential, and the results of the survey will be pooled for analysis. Follow up interviews were conducted for further clarification where necessary. Interviews with representative(s) of the OSPAR Secretariat staff were also conducted. The goal of the process was to achieve a greater understanding of:

- Roles, responsibilities, tasks, and annual hours involved (per year) by OSPAR as the umbrella organization of the regional beach litter monitoring program
- Roles, responsibilities, tasks, and annual hours involved (per year) by government representatives as the coordinators of the national beach litter monitoring program
- Roles, responsibilities, tasks, and annual hours involved (per year) by the organizations conducting the beach litter monitoring surveys
- Approximate annual running costs and financial arrangements
- Involvement in other types of monitoring
- Communication and data reporting structure
- Data pathways, databases and software used
- Lessons learned and best practices

4.2 OSPAR and marine Litter

The OSPAR Secretariat administers the work under the OSPAR Convention, coordinates the work of the Contracting Parties and runs the formal meeting schedule of OSPAR. The OSPAR Secretariat also manages reporting of Contracting Parties on the implementation of OSPAR measures and the reporting of data under OSPAR monitoring programmes. For some issues, practical data management is handled by a lead Contracting Party or contracted to specialist data centres.

Where issues require substantial work in between meetings, informal groups may be established, such as intersessional correspondence groups that are typically convened by a lead country. In the case of marine litter, an Intersessional Correspondence Group (ICG-ML) has been convened. Within the ICG-ML the Beach Litter Expert Group (BLEG) addresses beach litter specific issues. Both OSPAR Member Parties as well as observer organisations are members of the ICG-ML. This way of working facilitates knowledge and information exchange between OSPAR members and experts and surveyors from NGOs - who often have a role in monitoring of beach litter and use the beach litter data to raise awareness amongst a broad audience.

Monitoring and assessment of marine litter is a key part of OSPAR's work on marine litter. The ICG-ML has oversight of the marine litter monitoring and assessment work and aims

to ensure close alignment between evidence and policy. OSPAR marine litter experts are also part of the EU Technical Group on Marine Litter ensuring that methods are aligned and used in the wider European context.

4.3 Communication platform

To exchange information, an online share point 'Basecamp' is used. Functions of Basecamp include:

- **Calendar** of events for meeting scheduling and deadlines
- **To-Do List** where items can be added, ticked off as complete and commented upon
- **Files** to share editable working documents for review as well as reference materials, PDFs, slideshows, spreadsheets, images
- **Messages** for direct communication where the messages are:
    - Saved on the site and organized by designated Category (i.e., Targets, Dolly Ropes, specific meetings)
    - Also delivered directly to participant's email inbox
- **Writeboard** for shared collaborative documents
- **Time** to keep track of hours worked on a project

Basecamp is used by the ICG-ML for communication within the group regarding everything from formal drafting of policy wordings, to casual sharing of pictures of unknown litter items for identification purposes. It increases efficiency and transparency by providing an easily searchable format where all important documents and workstreams are consolidated into one place.

4.4 Summary of questionnaire and interview results

On a country-by-country basis, the typical organizational structure is that there is one national lead person who is responsible for overseeing the country's beach litter monitoring program on behalf of the government.

The countries use differing strategies with regards to execution of the beach litter surveys. In a few cases, the surveys are conducted by government employees. In most cases they are outsourced to either single or multiple outside entities (depending upon the number of national sites surveyed). Primarily, the organizations are NGOs that focus on marine conservation. However, in some cases advisory companies, research facilities, local municipalities, and marine protected area management authorities are utilized.

In most cases, surveyors are compensated directly or via the entities who receive annually tendered contracts. In some cases, supervised volunteers are deployed by the NGOS. In one instance, the NGO that coordinates the national survey network receives a small annual payment from the government and the surveyors are all volunteers.

The number of routinely monitored survey sites per country varies from 4 to 50 (one reports 100+ but on a voluntary and irregular basis). The survey sites were selected

primarily based upon the length of the coastline and available resources to conduct the surveys. The site selection was based on the best spectrum of geo-spatial coverage, representativeness of coastal sites, and known litter accumulation areas.

Amongst the OSPAR countries, government officials are responsible for overseeing the beach litter monitoring. The national leads indicated they spend between 160 to 350 hours per year on coordinating the beach monitoring program (with an average of 23.5 hours being spent per year, per site). However, in the country with 50 routinely monitored national survey sites, one full-time employee is required to coordinate and report upon all surveys. In this country, the actual surveys are outsourced via paid contractual agreement.

Country budgets for the beach monitoring programs vary widely between 5,000 to more than 40,000 Euros per year per country and are financed by the respective governments. Since the abundance of marine litter is an indicator of the European Marine Strategy Framework Directive for reaching good environmental status, and EU Member States are obliged to report progress on this indicator, beach monitoring is part of an official monitoring program and is hence budgeted for.

Beach litter data is used and reported in various ways. See Chapter 8.3.1.3 OSPAR Beach Litter Database Reports for more details.

5. WCR marine litter stakeholders

5.1 Survey process

Research was conducted into various regional marine litter reduction programs within the WCR to identify potential partnerships for harmonized monitoring. The sources of information used include RAPMaLi 2014, Caribbean Marine Protected Areas Management Network and Forum (CaMPAM), GPML Caribe Marine Litter Experts Group, GPML, LBS focal points, desk research targeting organisations working in the field of environmental protection, fully- or partially dedicated to marine litter activities, including relevant authorities and administrations, research institutions, and NGOs conducting ICC or other beach clean ups.

A fact sheet providing a graphical explanation of the steps involved in setting up a routine monitoring program was prepared as well as a survey questionnaire (Attachment 2). All materials were translated into Spanish and French prior to distribution. The survey and supporting documents were emailed to 383 different entities within the Wider Caribbean Region and sent to the GPML-Caribe and GCFI for further distribution via their mailing lists. Participants were informed that responses will remain confidential, and the results of the survey will be pooled for analysis. Follow up interviews were conducted for further clarification where necessary. The goal of the process was to achieve a greater understanding of:

- Current level of involvement in marine litter monitoring
- Interest in participation in a pilot monitoring program
- Priorities for data usage
- What will be needed for implementation
- Potential partnerships

5.2 Summary of questionnaire and interview results

The survey was responded to by 48 individuals representing 23 different countries or overseas territories.

Opportunities

- Thirty respondents (from 12 countries and 5 overseas territories) indicated an interest in piloting a routine beach litter monitoring program.
- Additional potential stakeholders were identified during the survey process.
- Direct contact increased awareness regarding the drive towards harmonized marine litter data collection.

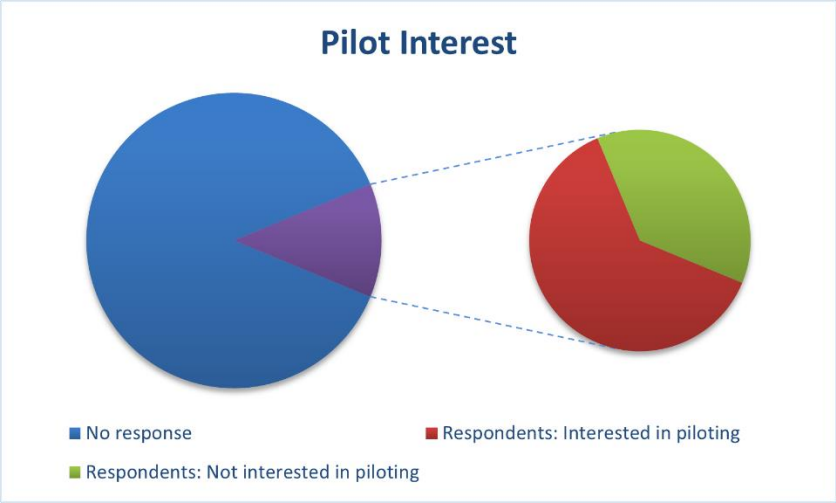


FIGURE 1 PILOT INTEREST

Roadblocks

- During the research process, it was difficult to determine the correct entity or department within a government who is or potentially could be responsible for marine litter monitoring. Stakeholder responses corroborate this by indicating that designation of a "lead" or responsible party is needed to establish routine beach litter monitoring.
- There were several instances where the perception is that yearly ICC events or intermittent non-structured monitoring are sufficient.

Respondent organizations display a cross-section of stakeholders.

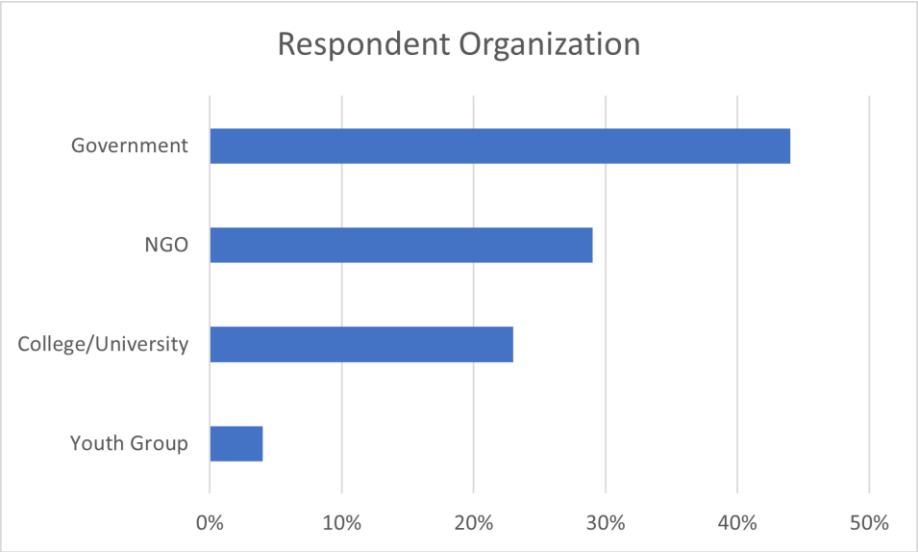


FIGURE 2 WCR SURVEY RESPONDENT ORGANIZATIONS

Twenty-two of the respondents indicated that they have some level of participation in beach litter monitoring. A combination of recognized monitoring protocols are reported to be utilized such as International Coastal Cleanup (used by 5 countries), NOAA (used in 1 country), MDMAP (used in 1 country), Coast Guardians (used in 1 country) and OSPAR/Modified OSPAR (used in 2 countries). In addition, survey respondents also indicate that more un-official methodologies are used during regular cleaning activities such as visual, anecdotal, or counting the number of bags.

The monitoring that occurs is reported to be conducted by a variety of participants, primarily volunteers.

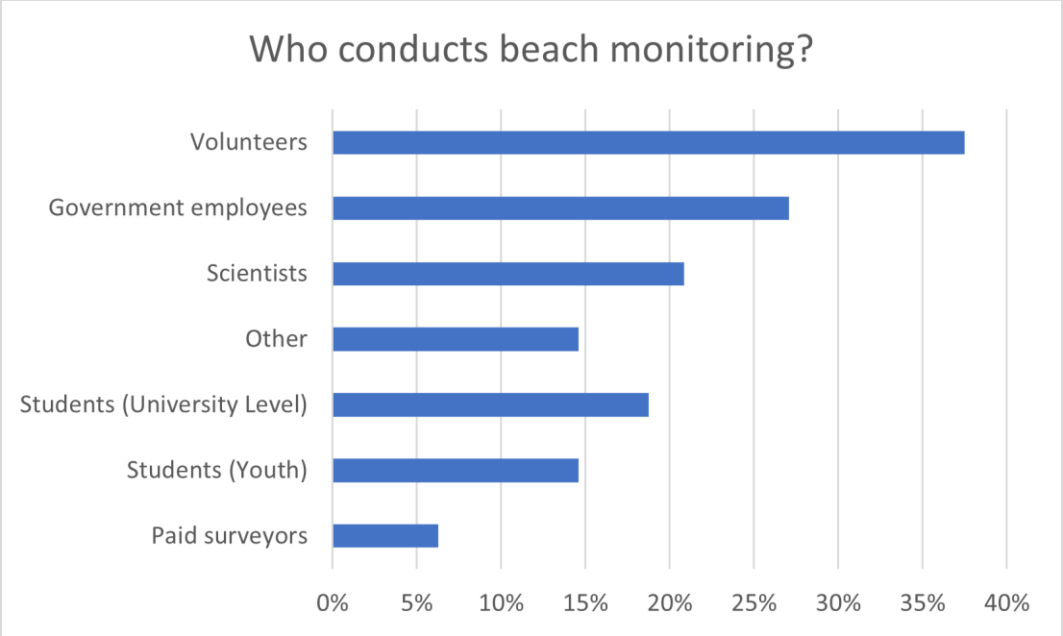


FIGURE 3 WCR BEACH MONITORING PARTICIPANTS

Respondents prioritize awareness raising while also agreeing the importance of using data to influence policy both nationally, regionally, and globally.

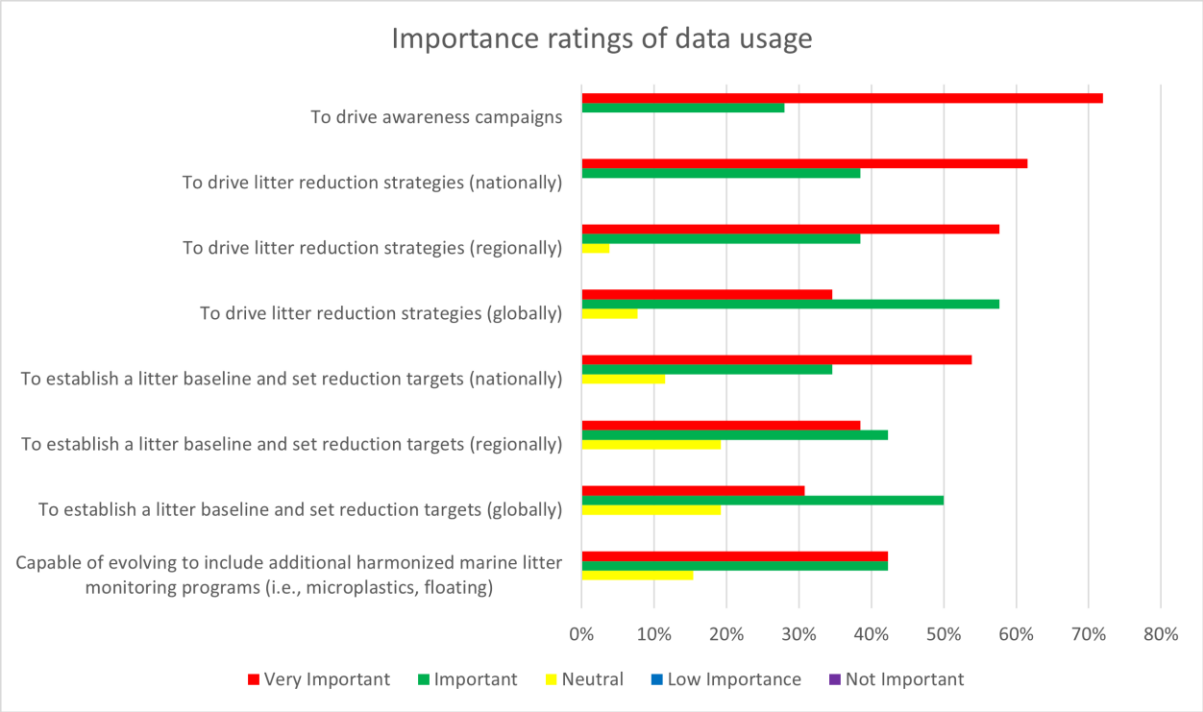


FIGURE 4 WCR IMPORTANCE RATINGS OF DATA USAGE

When asked to elaborate specifically regarding what would be needed to establish a routine beach litter monitoring program in their country, several common themes emerged:

- Funding to provide initial and ongoing supplies as well as to ensure long term sustainability
- Human capacity in terms of coordinators and volunteers
- Training for the coordinators and volunteers
- A clear understanding of the purpose and objectives of harmonized routine beach litter monitoring
- Awareness that it is a priority to ensure public buy-in
- Government support of the program
- Stakeholder support of the program
- An established reporting mechanism
- A designated lead/responsible party

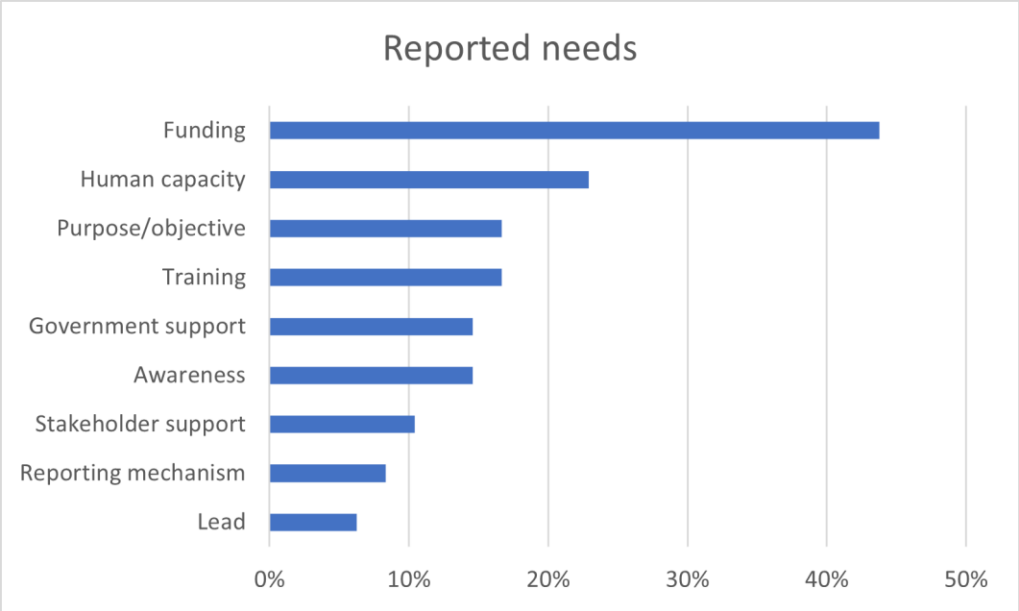


FIGURE 5 WCR SURVEY REPORTED NEEDS

6. Lessons learned: conducting OSPAR monitoring in the Caribbean

6.1 OSPAR in the Caribbean Netherlands

A routine beach litter monitoring program based on a modified OSPAR beach litter protocol has been conducted since 2018 in Bonaire. Thus far, 40 routine monitoring surveys have taken place. It is a project called Clean Coast Bonaire and is conducted by a paid coordinator via funding from WWF-NL. Three sites are monitored. Two of the sites are on the windward coastline and accumulate beach cast litter items. One of the sites is a popular beach and accumulates litter resulting from recreational usage.

Supervised volunteer citizen scientists are actively involved in the collection and counting of litter. The trained survey coordinator is on site at every survey to ensure quality control. Typical surveys can be completed within 2 hours with between 5-10 volunteers.

Hours The three survey sites are monitored four times per year, at three month intervals. Therefore, one survey occurs each month with the sites alternating sequentially (i.e., January - Site 1, February – Site 2, March – Site 3, April – Site 1, etc.). Upon review of tasks completed, approximately 20 hours are spent per month by the coordinator on the program. Within those hours, approximately 10 hours are spent on survey-specific activities such as preparation for the surveys, disposal of litter items, quality assurance, and volunteer recruitment/retention via social media and direct communication.

The remaining 10 hours are for other aspects of the program such as analysis of the data (via Excel), reporting, awareness raising via press releases, and development of methods.

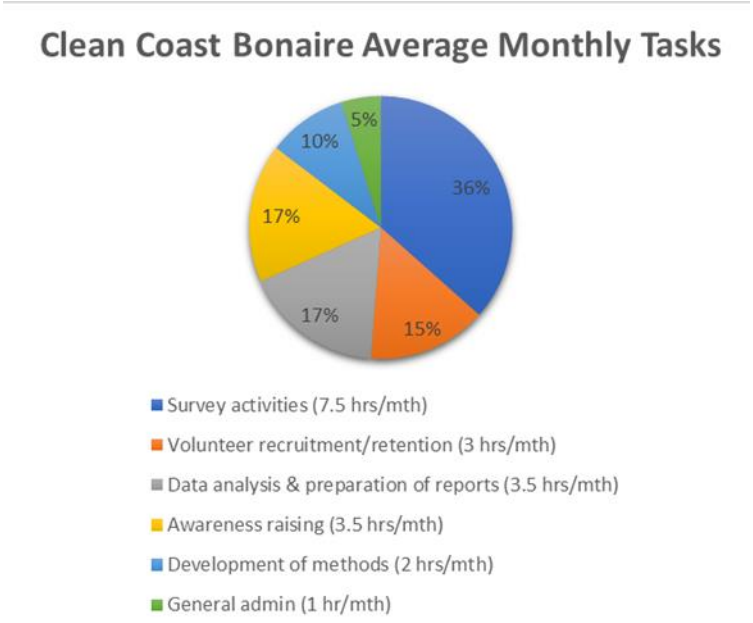


FIGURE 6 CCB: AVERAGE MONTHLY HOURS

During periods where group gatherings were restricted due to pandemic regulations, the surveys were conducted without the use of volunteers. This required multiple site visits by the coordinator to fulfil the requirement of complete litter clearance. The total hours needed to accomplish the surveys over multiple days without volunteers averaged several more hours than normally allocated for volunteer recruitment and retention.

Adaptations A few minor modifications and additions were made to the OSPAR protocol to adapt it to the region. Once such modification was to reduce the length of beach required to be cleared from 100 meters to 50 meters due to heat, sun, and large volume of debris. An addition to the protocol was to add the presence and volume of sargassum because (while not 'marine litter' by definition) it is an issue of concern in the region. Items that are not found on the *Modified OSPAR Litter Data Form* (Attachment 8) are written in and noted on the spreadsheet to track items of local concern. During periodic reviews, if specific write-in items are occurring frequently (such as plastic labels and plastic decorations), the *Modified OSPAR Litter Data Form* has been amended to include these items.

Inclusion of Joint List In June 2021, Clean Coast Bonaire added the Joint List items to the *Modified OSPAR Litter Data Form*. These additions increased the number of individual items on the form and enhanced the level of detail about some items. For example, OSPAR item number 15 – "Plastic caps/lids" is further broken down as follows:

J21	Plastic caps/lids from drinks
J22	Plastic caps/lids chemicals, detergents (non-food)
J23	Plastic caps/lids unidentified
J24	Plastic rings from bottle caps/lids

These additions were explained to the volunteer surveyors by the survey coordinator and did not add to the length of time taken to complete a survey.

Expansion When the monitoring program expanded to include another island within the Caribbean Netherlands, the responsibility for survey coordination was shared between two organizations. Funding for the purchase of initial start-up supplies was provided, but no funding was provided for personnel costs. The responsibility for routine monitoring was not built in as a required task within either organization, it was occurring on a voluntary basis. Unfortunately, the monitoring did not occur on schedule, resulting in temporal data gaps.

6.2 OSPAR in Belize

In 2019, marine litter data was collected in Belize as part of the Commonwealth Litter Programme (CLiP). Cefas scientists trained volunteers and conducted surveys on 16 coastal and 3 river sites. The methodology used by CliP was a modified version of OSPAR. There were several similarities to the findings in Bonaire: some site survey lengths were reduced from 100 meters, the presence of sargassum was found to have an influence on ability to conduct surveys, and human recreational activities on some

beaches were determined to have an influence on litter accumulation rates. In addition, during the use of the write-in "other" category, 'plastic drinking water pouches' were identified as specifically abundant region-specific item. (Silburn et al., 2020)

7. Routine monitoring considerations

It is important to establish what a routine monitoring program entails to make an informed decision about potential hours and expenses involved.

7.1 Survey coordination

It is recommended that survey coordination be a situation where an individual or entity receives financial compensation to ensure that routine monitoring occurs on schedule and in a quality-controlled manner. Depending upon the size of the county or number of individual islands within a single country, as well as available resources, this may be divided between multiple entities. Practices show that survey coordination is not typically a full-time position, but rather incorporated as an additional responsibility within an existing organization. Potential organizations that may fulfil the function of survey coordination are:

- Government departments or offices responsible for environmental protection, marine conservation, or marine litter – either on a national or municipal level
- NGOs involved in environmental or marine conservation
- Management authorities of marine protected areas – potentially incorporated with other monitoring
- Research institutions
- Consultancy/advisory companies

7.2 Use of citizen scientist volunteers

It is recommended to recruit and utilize volunteer citizen scientists. A Survey Coordinator should be on site for every survey to supervise and ensure quality control. Many litter programs globally have benefitted from the use of citizen science with professional supervision. The use of volunteers has the time and labour-saving benefit of extra hands to collect the litter and assist with the counting and cataloguing process. However, the Survey Coordinator will also need to invest time in volunteer recruitment. Creation and upkeep of a social media presence and newsletter can be an effective tool in volunteer recruitment and have the advantage of amplifying the message of marine litter reduction within the community and adding the component of public engagement in the scientific and policy-making process. (GESAMP 2019)

7.3 Selection of survey sites

The recommended criteria for selection of survey sites are that the beaches:

- be composed of sand, gravel or pebbles and exposed to the open sea
- be accessible to surveyors all year round

- be accessible to facilitate the removal of marine litter
- be a minimum length of 100 metres (can be reduced to 50 metres)
- be free of 'buildings' all year round
- not be subject to any other litter collection activities (i.e., beach cleaning)

The OSPAR methodology recommends that the survey length be 100 meters but allows for the survey length to be reduced to 50 meters if coastal topography requires. When piloted in Bonaire, the survey length was reduced to 50 meters due to high abundance of marine litter.

The selection of survey sites per country should be representative of the litter sources and cover the spatial variation within that country sufficiently.

Additional considerations may include:

- the presence of vulnerable or sensitive habitats (e.g., Marine Protected Areas)
- the distribution of activities representing potential sea-based sources of marine litter such as fisheries, aquaculture, shipping, and offshore extractive industries
- the occurrence of potential land-based sources of litter such as coastal tourism, high coastal population density and major river outfalls
- tendency to accumulate litter (GESAMP 2019)

Although these criteria should be followed as closely as possible, the national and survey coordinators can use their expert judgement, experience and local knowledge of the coastal area and marine litter situation in their country, when selecting the survey sites. (OSPAR Commission 2020)

It should be noted that, physical characteristics of the survey site as well as currents, prevailing wind and proximity to possible sources of marine litter will influence deposition and retention levels of litter and therefore litter abundance. (OSPAR Commission 2020)

It is also important to consider if the site accumulates litter that is beach cast or left behind by users. The OSPAR methodology was originally developed to measure the flux accumulation rate of beach cast litter. Therefore, at least one selected site should be accumulating primarily beach cast litter. However, there is also value to collecting data regarding items that are left behind to determine items of local concern.

It is useful to refer to the *Modified OSPAR Site Data Form*, the form that will be used to record the survey site's metadata, (Attachment 6) during the selection process to be aware of important information regarding the site.

7.4 Recommended amount of survey sites

The amount of survey sites per country can vary. It may be that the most feasible option will be to start with one and eventually expand to include additional sites. If so, then the determination should be made using local expertise based upon the OSPAR criteria listed in the section above. If possible, collection of data at between one and three sites, with a minimum of one that accumulates litter that drifts in from off shore and if

possible, one that accumulates litter based upon beachgoer activity would be recommended.

Currently, there is no agreed upon statistical method for determining the minimum number of sites to accurately represent a length of coastline. The final determination will depend upon several factors, such as:

- the accessibility of the coast
- the number of available sites that fulfil the OSPAR criteria
- available resources

Countries within the WCR have vastly differing lengths of coastline and in some cases extend over many, separate islands, so it may not be feasible or cost effective to monitor more than a few sites per country. Therefore, strategic selection of the sites is crucial. To achieve the best possible results and where resources permit, it is recommended to conduct an assessment via a pilot study surveying many sites to make a strategic selection based on a statistical analysis of the sites to remain in a routine program. (Galgani et al., 2013)

7.5 Collection of site metadata

Prior to surveying, the site metadata must be collected using the *Modified OSPAR Site Data Form* (Attachment 6) to document and characterise the site.

The information to be recorded includes the following:

- GPS coordinates of the start and end points of the survey area (GPS device for greater accuracy)
- Distance from high tide line to defined back of beach
- Prevailing direction of wind and current
- Direction the beach is facing
- Beach topographical information
- Beach usage
- Proximity to potential litter sources

This process will only need to occur once, prior to inception of monitoring. However, should an event occur that could potentially impact litter accumulation (i.e., a new restaurant opening up at the site), the metadata must be amended. (OSPAR Commission 2020)

7.6 Establishment of a routine schedule

Once the survey sites have been selected, there must be an initial clean-up that removes all litter from the designated sampling area. This is an excellent opportunity for a training session for survey coordinators and volunteer citizen scientists.

The recommendation for the frequency of surveys is four times a year, at three-month intervals. If possible, at approximately the same dates at each location per year.

The suggested survey periods are as follows (OSPAR Commission 2020), (Galgani et al., 2013):

- Winter: mid-December – mid-January
- Spring: April
- Summer: mid-June – mid-July
- Autumn: mid-September – mid-October

The September survey can coincide with International Coastal Cleanup and data collected during the survey can also be shared on the Ocean Conservancy TIDES database.

Within this quarterly schedule it is advisable to have backup dates in case of extreme weather or significant accumulation of sargassum seaweed.

7.7 Survey considerations and guidelines

Sampling area Only items within the sampling area (50 metres in length and from the waterline to the designated back of beach) are collected and counted.

Clearance All visible litter items larger than 5 mm found on the beach surface within the sampling area are collected and counted.

Counting on site It is recommended that the litter is counted and recorded on site during the collection process. If necessary, the items can be stored in bags and sorted and counted in a sheltered place or indoors. NOTE: In this case, care should be taken to prevent fragmentation and/or entanglement of the litter items, which would affect the number of items counted.

Item categorization All items or fragments of an item that are clearly recognisable as a part of a single item should be counted as one item (i.e., tangles of rope are counted as one item, a piece of a glass bottle is counted as a bottle). If an item is not found on the list but is recognizable, it should be noted in the "other" category based upon its composition. Recording information about non-listed items is important to identify possible emerging litter types or items of local concern that may be added to the form at a later date. If possible, digital photos should be taken of unknown items so that they can be identified later. Litter fragments, which cannot be identified, because they are too fragmented, are registered as either plastic or foamed polystyrene under the three different size categories of the litter type "fragments."

Survey Data Form The total amount of litter recorded in the survey area and the types of litter found can be influenced by various factors (i.e., severe weather conditions, human occurrences, shipping spills, deviation from cleaning schedule, etc.) To account for this, the *Modified OSPAR Survey Data Form* (Attachment 7) must be completed at every survey

Quality control It is important that the data generated is correct and collected by following the guidelines of the protocol. The best way to ensure this is to provide quality

training to the survey coordinators and useful tools for on-site training of volunteers, via a training manual, field guide, reference materials, and e-learning program. Survey coordinators are to:

- Ensure that the survey occurs on schedule
- Ensure that beach is not cleaned between surveys
- Ensure that guidelines are followed with respect to survey area and clearance
- Ensure that site data form is kept up to date with any changes
- Ensure that volunteers receive training and supervision
- Review and correct data prior to submission
- Contact regional coordinator for any questions

Safety Survey coordinators should brief volunteers to put safety first. Care should be taken when dealing with anything sharp or potentially contaminated. Containers with unknown liquids that could be chemicals, or potentially live ammunition. When in doubt, inform the police or authorities responsible. (OSPAR Commission 2020) (Galgani et al., 2013))

7.8 Materials and supplies

A minimal single expenditure will be needed to acquire the following materials to be used during surveys:

- Clipboards
- Pens/pencils
- Measuring tape
- Ruler
- Reusable bags for large items*
- Reusable containers for small items (can be up-cycled rather than purchased new)*
- Reusable gloves*
- First aid kit
- Insulated water dispenser
- Reusable cups*
- Digital scale
- Camera/phone (for GPS & photos)
- Hand sanitizer

In addition, for each survey the following items are needed:

- Paper tape for securing survey forms to clipboards
- Survey data form
- Litter data form(s)
- Refreshments for volunteers (if being utilized)

FIGURE 7 REUSABLE MESH BAGS USED BY CLEAN COAST BONAIRE

**Disposable, single-use plastic items can be substituted, if necessary, but it is not recommended.*

A comprehensive list can be found as Attachment 4.

7.9 Disposal of litter

The monitoring protocol requires an initial clearance prior to routine monitoring activities. It also requires that all litter items are removed as they are recorded during every survey. In addition to fulfilling the goals of a beach clean-up, this ensures better accuracy of reporting and allows for determination of litter accumulation over time.

However, at some sites, this can result in amount of collected litter that cannot be responsibly disposed by the survey coordinator. In this event, it is advisable to discuss with the municipal waste management entity how to transport and dispose of large volumes of litter and what expenses will be incurred for this service.

On occasion, there may be a large item that cannot be removed safely by surveyors. The item should be marked and recorded so that it is not recorded again during subsequent surveys. (OSPAR Commission 2020)

8. Management of marine litter data

The marine litter data collected by a regional network of surveyors will need to be entered into a centralized database, stored securely, and utilized. The routine monitoring program should have a very clear data management policy, including data capture standards, quality control, storage, sharing, analysis, reporting and communication. (GESAMP 2019)

This section of the plan addresses the following questions:

- How should the regionally collected marine litter data be stored?
- How should the regionally collected marine litter data be assessed, analysed, and reported?
- By what mechanism can the regionally collected marine litter data be shared globally?

To determine the recommended data management strategy based on what is compatible with marine litter data collected using the OSPAR beach litter monitoring methodology, the following avenues were explored:

- currently available marine litter databases
- assessment, analysis, and reporting best practices
- responses by WCR stakeholders regarding data usage

8.1 Goals of reporting

The data collected using the Modified OSPAR methodology will provide a high-resolution dataset of beach litter items on a spatial-temporal scale that can be utilized in a multitude of ways.

Awareness raising can be accomplished using simple and easy to understand graphics and fact sheets (such as Top 10 items) or figures that address specific items that are targeted by an awareness campaign.

Policy depends on sound scientific information and on fit for purpose data that allow decisions to be made based on facts. The data collected may be used for the identification of priority litter items and the verification of the successful implementation of measures. (Addamo et al., 2018)

In addition to awareness raising, beach litter data collected within the OSPAR region is used for:

- Quantification: to assess the state of the environment and to prioritise actions
- Baseline: to provide a reference for trend analysis
- Trend analysis: to identify emerging issues, and monitor of success of reduction measures
- Threshold value: to provide targets

OSPAR Beach Litter Data was used to determine the current baseline as well as set the threshold value that beaches in the EU must have less than 20 litter items for every 100 metres of coastline to stay under the threshold and reach good environmental status. (Van Loon et al., 2020)

8.2 Sharing of marine litter data on a global scale

The global problem of marine litter can be mitigated only through coordinated international action. Therefore, it is essential that data collection within the WCR should not only be harmonized regionally but also provide a consistent dataset in a format that can be shared globally. There is increasing interest in global comparability of monitoring results that will enable prioritisation at a larger scale. (Galgani et al., 2013)

8.3 Existing marine litter databases

Marine litter databases and portals are prolific. A review was undertaken of existing marine litter databases to determine if any would be a good fit for incorporation of regional data in the interest of finding a cost-effective data storage mechanism. The *Draft White Paper: A Global Platform for Monitoring Marine Litter and Informing Action* is a comprehensive review of 21 current marine litter databases developed with the goal of determining a suitable global platform and identifying 7 potential global hubs. The only ones found to be currently compatible with data collected using the Modified OSPAR methodology are the EMODnet marine litter Database, and the OSPAR Beach Litter Database. (Smail et al., 2020)

8.3.1 OSPAR Beach Litter Database

8.3.1.1 OSPAR data collection and storage process

Litter data and survey data are primarily collected on paper forms and then input into the OSPAR Beach Litter Database directly or via upload of a CSV file. Only one country indicates that a mobile app is used, but that is for data that goes to their national database rather than the OSPAR Beach Litter Database.

Several countries indicate that their beach litter data is also saved within their own national databases.

Certain countries also share their beach litter data with EMODnet, the Pan European Marine Litter Database.

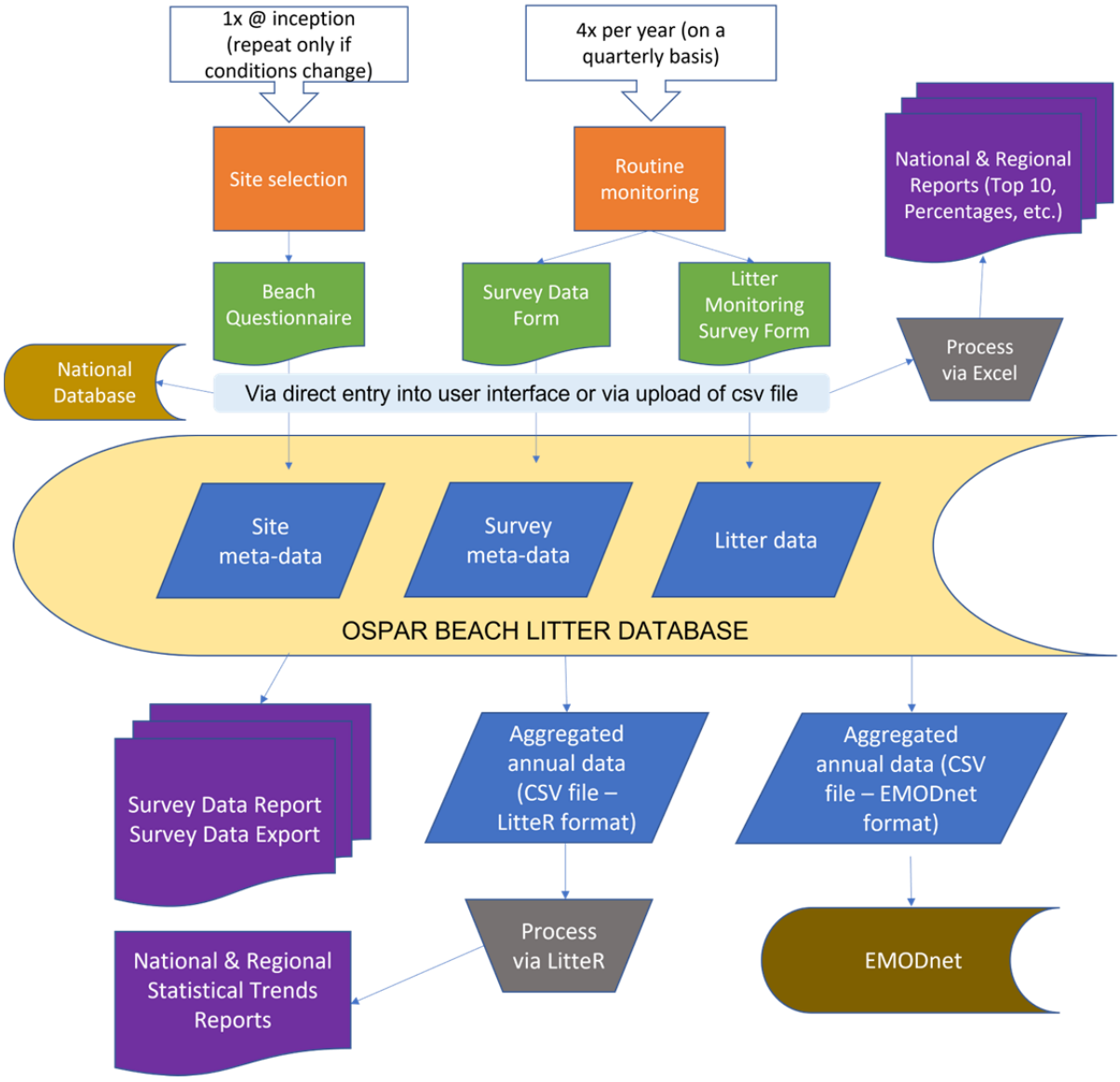


FIGURE 8 DIAGRAM OF OSPAR DATA COLLECTION & REPORT GENERATION PROCESS NOTE: PROCESS MAY VARY FROM COUNTRY TO COUNTRY

8.3.1.2 OSPAR Beach Litter Database reports

The OSPAR Beach Litter Database is capable of creating a publicly accessible "Survey Data Report" providing a graphical summary report of material types and sources by year, country, region and site. It can also generate the "Survey Data Export" detailing the following information in a CSV format:

- Reference Number
- Beach ID
- Beach name
- Country
- Region

- 100m Start N/S
- 100m End N/S
- 100m Start E/W
- 100m End E/W
- Survey entered by
- Email
- Survey ID
- Survey date
- Period
- Divert from the predetermined 100 metres?
- Divert specify
- Litter item amounts (listed by name and OSPAR code number)
- Survey: Remarks

It should be noted that this information is only publicly accessible after the quality assurance process has been taken place and has been signed off by the OSPAR EIHA committee.

8.3.1.3 Assessment and analysis of OSPAR beach litter data

OSPAR survey respondents indicate that they analyse beach litter data and prepare reports using a combination of Excel and LitteR to generate the following reports for national use:

- Top 10
- Trends over time
- Composition of items
- Analyse trends for single items
- Analyse trends for item categories
- Source characterization
- Reports according to specific awareness campaigns

Suggested improvements to the database and reporting capabilities from OSPAR survey respondents are as follows:

- Annual National Report and Time periods
- Reports of Trends evaluation
- Better source characterisation
- Better assessment of harm
- Better visibility for items described in "Other" category
- Extending the item list according to EU's extended Joint List
- Improved monitoring strategy for reporting data for mesolitter and pellets

8.3.1.4 Statistical Analysis via LitteR

Currently within the OSPAR region, complex statistical analysis of beach litter data occurs externally to the OSPAR Beach Litter Database via LitteR. LitteR was developed to provide a transparent, effective, and efficient beach litter assessment method for the analyses of state and trends of total abundance and abundance of individual litter

types. (Schulz et al., 2017) LitteR allows users to analyse beach, riverine, floating, and seafloor litter data in a consistent and reproducible way. It functions to facilitate several kinds of robust litter analysis, e.g., trend analysis, power analysis, and baseline analysis. LitteR functionality is periodically updated based upon recommendations of the OSPAR ICG-ML. Use of the program requires several steps including export of a specifically formatted CSV file. A summary of the process and information contained in LitteR reports can be found as Attachment 5.

8.3.1.5 Replication of OSPAR Beach Litter Database

It was previously recommended to replicate the OSPAR Beach Litter Database for use in the WCR. The representatives of the OSPAR region expressed a willingness to share this technology, pending an agreement between the developer and the host for the replicated database.

However, during this study it became clear that the database is over 10 years old it and runs on a scripting and programming language which reached end-of-life on 10/01/2019 (PHP 7.0). It is estimated that the software will require a complete overhaul in approximately 2 years. It should also be noted that running "relic software" will impact the hosting options as it comes with its own set of issues and could limit hosting opportunities.

The cost of migration of the database as is (not including hosting or maintenance expenses) are estimated to be approximately US$2,700. The cost estimate is based on what was involved in migrating the database from the Marine Conservation Society-UK server to the OSPAR server. In addition, further adaptations will be needed in order to customize the database to the needs of the WCR and to add the Joint List items. The risk of trying to build new features on a legacy codebase is that much of the work can entail bypassing technical limitations, and that changes to one part of the system can result in problems in unrelated areas.

8.3.2 European Marine Data and Observation Network (EMODnet)

EMODnet is a long-term flagship initiative of the EU. EMODnet has mandate and goal to deliver open access to aggregated and standardized marine data and data products across seven thematic areas, namely bathymetry, biology, chemistry, geology, human activities, physics and seabed habitats.

For marine litter, data are assembled, standardized, and aggregated from multiple gear types and the collected litter data follows the data policy defined by data originators. The EMODnet Central beach litter database is loaded with data entries from data providers and by regular harvesting from the OSPAR database. Within the process of harmonizing beach litter data collected throughout the EU, the Joint List was created.

EMODnet functions as a hub for existing datasets. It does not have a front-end user interface for direct entry by surveyors. Beach litter data can be entered only if it comes

from a pre-approved methodology (of which OSPAR is accepted) and submitted once validated via a formatted CSV file. EMODnet contains visualization products and can be utilized to generate thematic maps.

EMODnet is listed as an Existing Platform that could host or be leveraged (e.g. support a portion of the platform or supply data) to a global marine litter platform in the White Paper 2020. By collecting data and generating a report that is compatible for upload into EMODnet, WCR data can be shared on a global platform.

9. Recommended data management strategy

It is recommended that the WCR build a database that meets all user requirements and that will provide a strong foundation for future enhancements. Although this option will require more initial investment of time and resources, in the long run it will be a time-saving option with regards to maintenance and automated report generation, as well as providing a more hassle-free user experience. In addition, a standalone regional database allows for ownership and governance of the data by the constituent countries of the Cartagena Convention.

The new database should include the following features:

- Simple and streamlined user interface for data entry (via direct entry or via Excel/CSV file)
- Entry fields should appear in the same order as on the data collection forms
- Built-in analysis and robust report generation functionality
- Secured with logon ID and password for authorized users (must complete training via in-person session or e-learning for authorization)
- National data is only accessible to national coordinator and survey coordinators (and regional coordinator) until annual quality assurance and reporting process is completed
- Capable of analysing data and generating usable reports directly rather than via a multi-step manual process
- Capable of generating CSV files that are compatible with entry into the EMODnet data hub for global harmonization of litter data
- Capable of generating CSV files that are compatible with entry into LitteR for complex statistical analysis
- Available for use in regional languages
- Capable of expansion to include data collected regarding other marine litter indicators when additional protocols are added in the future

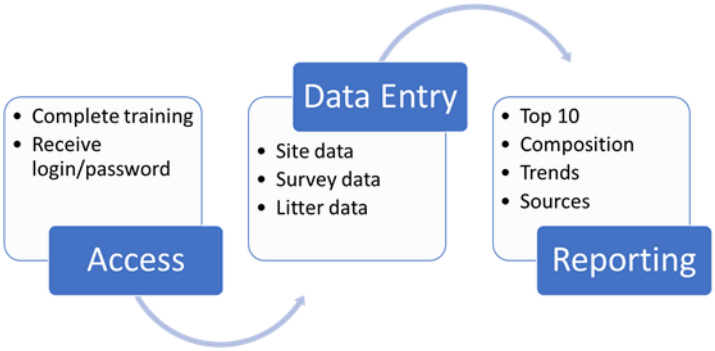


FIGURE 9 RECOMMENDED STREAMLINED PROCESS FOR NEW WCR DATABASE

9.1 Data fields included

The following types of data are to be included within the database.

Site Metadata is collected once, at the inception of the survey process. If there are significant changes to the site that may impact the accumulation of litter, then the data should be amended to reflect this.

- Collected via *Modified OSPAR Site Data Form*
- Includes approximately 70 fields
- Capability to upload images for site photos and map of area

Once a site is created within the database it receives a unique reference number. All survey metadata and litter data entered must be associated with a specific site.

Survey Metadata is collected at every survey.

- Collected via *Modified OSPAR Survey Data Form* (inc. stranded/dead animals found)
- Includes approximately 34 fields
- Capability to upload images of animals found

Litter Data is collected at every survey.

- Collected via from *Modified OSPAR Litter Data Form*
- Includes approximately 200 fields (NOTE: litter items that are not of regional concern have been omitted from the survey form to enhance ease of use, but should be included within the database in case they are found as a write-in)
- Includes "other" item for write-ins within each composition category (i.e., Plastic/Polystyrene)

Each unique litter item will have the following associated data:

- OSPAR Category
- Source category (SUP, Fisheries)
- OSPAR Item Number
- Joint List Type Code
- Joint List J-Code
- Litter item name
- Litter item description (definition from Joint List)

For example, the item data contained for a plastic shopping bag would be as follows:

OSPAR Category	Plastic/Polystyrene
Source Category	SUP
OSPAR ID	2
Type Code	pl_nn_bag_cabg_
J-Code	J3
Item Name	plastic shopping/carrier/grocery bags

Definition	Shopping bags are medium-sized bags, typically around 10–20 litres in volume (though much larger versions exist, especially for non-grocery shopping), that are used by shoppers to carry home their purchases. Shopping bags can be made with a variety of plastics.

9.2 Inclusion of emerging items or items of local concern

Emerging items Global events may drive new marine litter items, such as the emergence of single use personal protective equipment (PPE).

Items of local concern The OSPAR Beach Litter Monitoring methodology and Joint List of Macro Litter items were developed based on litter items collected in the EU. Items of local concern identified within the WCR will need to be included in the regional database. For example, in Bonaire several plastic items such as decorations and plastic labels were added to the litter data collection form. In Belize, plastic drinking water pouches were identified as specifically abundant. (Silburn et al., 2020)

A database for the WCR must be capable of inclusion of "other items" to address emerging litter items and items of local concern, including a mechanism by which they can be periodically reviewed and incorporated into database format as permanent items.

9.3 Reports

The level of detail incorporated into the survey process and inclusion of the OSPAR and Joint List categories regarding composition and source activity/industry allows for reports to be generated with a high level of granularity at both a national and regional level.

Based upon what is used in the OSPAR region and what WCR stakeholders indicated as important data usage features, it is recommended that the database can produce the following reports (by site, nation, region and from total count to category, composition, use/source, individual item) in a manner than can be utilized for awareness raising and guiding of policy:

	Select by:							**Type:**	
Report type	**Date range**	**Individual item**	**Composition category**	**Source character-ization**	**Site**	**Country**	**Region**	**Tabular**	**Graphical**
Top 10	x		x	x	x	x	x	x	
Amounts: total count	x	x	x	x	x	x	x	x	x
Amounts: median abundance	x	x	x	x	x	x	x	x	x
Geographical differences	x	x	x	x	x	x	x	x	x

Percentages	x		x	x	x	x	x	x	x
Trends over time	x	x	x	x	x	x	x	x	x
Write-ins from "Other" category	x	x	x		x	x	x	x	
CSV file formatted for import into LitteR	x				x	x	x	x	
CSV file formatted for import into EMODnet	x				x	x	x	x	

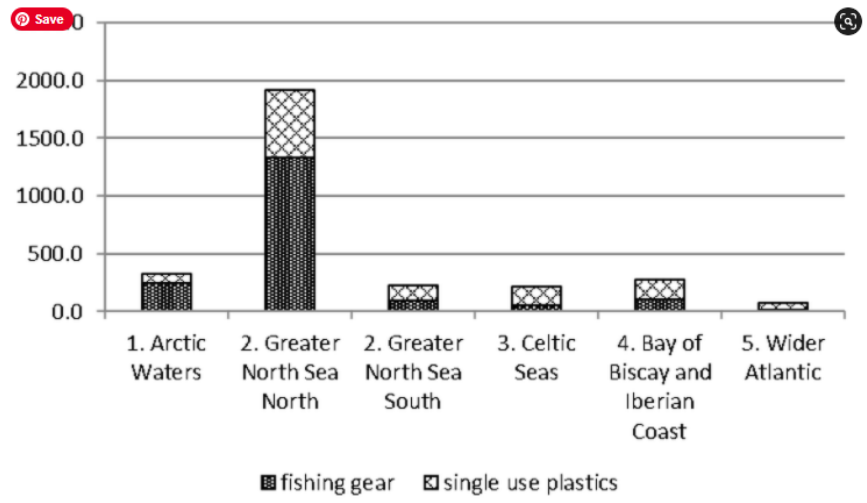


FIGURE 10 SAMPLE: GEOGRAPHICAL DIFFERENCES GRAPHIC - REGIONAL DIFFERENCES IN MEAN ABUNDANCE OF SUPS & FISHING GEAR ON OSPAR SURVEY SITES (APRIL 2012 – JANUARY 2018)

It is suggested that it will be both time and labour saving to incorporate more report generating functionality within the database rather than as an external function as occurring in the OSPAR region.

The use of LitteR for higher level statistical analysis may not be used with frequency on a national level and can therefore remain as an external process during the first phase of database construction. However, full incorporation of more robust statistical analysis capabilities into the database reporting process can be added as a future development phase if deemed necessary.

Reporting of the data in a standardized format can be made publicly available after a quality control process has been completed. A standardized annual reporting format should be developed for sharing on the Global Partnership on Marine Litter (GPML) Digital Platform, and CLME+ Hub. (Diez et al., 2019)

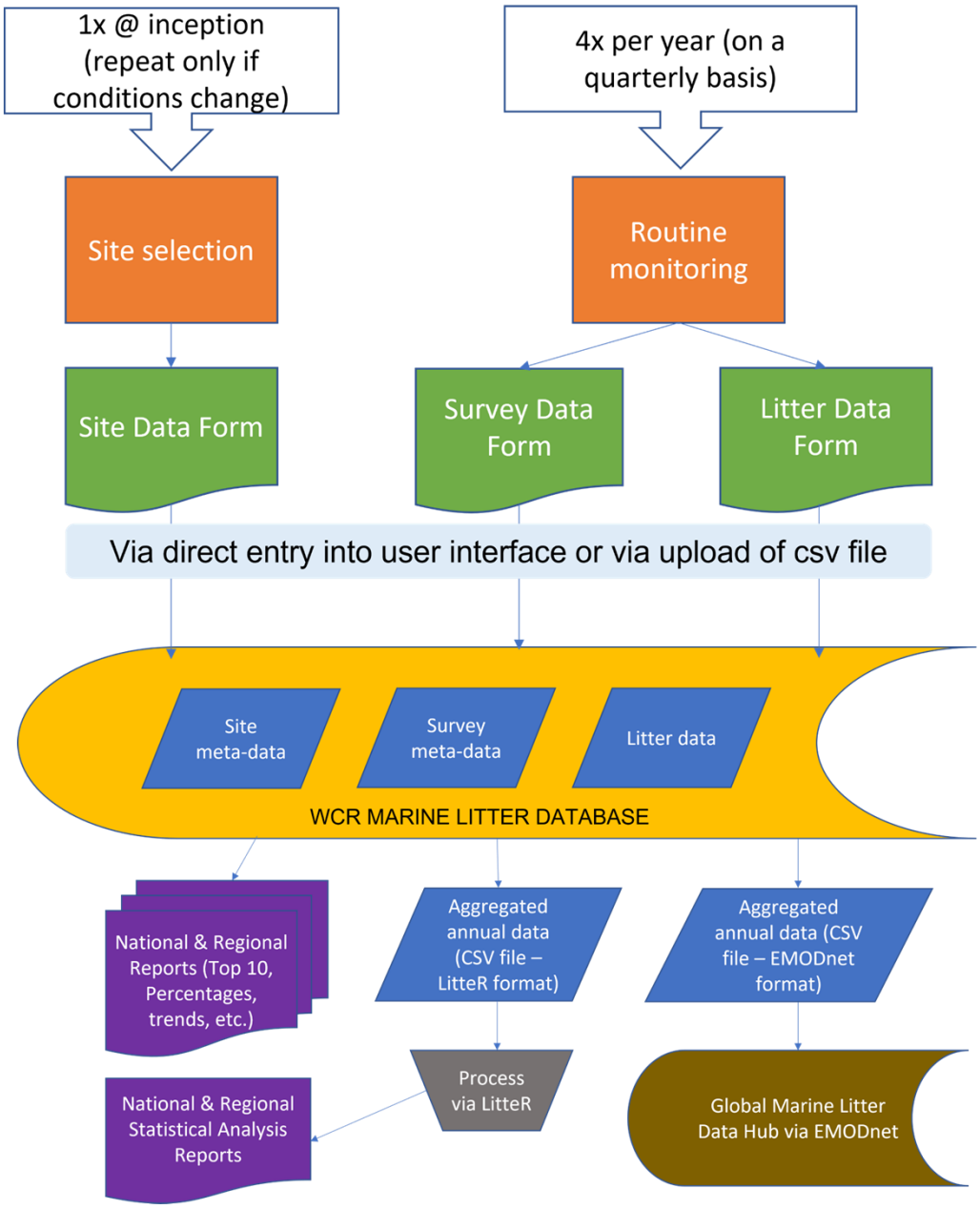


FIGURE 11 RECOMMENDED DATA COLLECTION AND REPORTING PROCESS

9.4 Phases of database creation

To ensure the success of a pilot program for routine beach litter monitoring, the data entry process should be as time-efficient and labour saving as possible. Rather than have multiple spreadsheets to consolidate at a later date, it is recommended that an official database for WCR litter data be created prior to piloting. If necessary, it can occur in phases:

- Phase 1: creation of database with data entry interface, storage, data report generation in Excel/CSV, tabular, and graphical formats
- Phase 2: translation of database into all regional languages
- Phase 3: incorporation of high-level, robust statistical analysis report capability in a manner similar to LitteR (if there is a demand)
- Phase 4: evolution to include additional indicator data and source identification data as additional monitoring methodologies are implemented within the WCR

9.5 Technical and administrative considerations for database

It was previously recommended to establish a governance structure where constituent members of the Cartagena convention have ownership and control of the data that is managed by the Cartagena Secretariat (Caporusso and Hougee 2021). The database should be hosted on a secure server that is either a part of or linked to the GPML-Caribe platform.

The database will require a System Administrator for maintenance and technical support. In addition, it is recommended to have a Regional Coordinator to provide oversight of the database including responsibilities such as:

- Granting authorized user status
- Periodic review and addition of "other" litter items
- Assistance for users
- Management of System Administrator
- Quality control of data

10. Recommended Implementation Strategy

To achieve the goal of producing beach litter data and metadata that are comparable across the WCR, using a standardized monitoring protocol, several concrete steps must take place at both a national and regional level. On the basis of the evidence gathered in the development of this strategy, the following actions have been identified:

Action 1: Commitment from contracting parties

The success and sustainability of a routine monitoring program will require government buy-in and commitment. A sustainable, routine monitoring program in the WCR should have a formal structure and mandate. If monitoring programmes are established as a matter of public policy, it is more likely that they will be supported in the longer term, with appropriate institutional and financial arrangements. (GESAMP 2019)

Objective: Securing a critical mass of constituents to agree and implement routine beach litter monitoring as part of their obligations under the Cartagena Convention and LBS Protocol.

Steps: Facilitate and implement regionally and nationally by:

- Informing constituents of the monitoring obligations under the Cartagena Convention and LBS Protocol
- Communicating about the enabling conditions that UNEP-CEP will provide (i.e., international alignment, coordination, training, compiling of regional reports)
- Preparing proposal and convene constituents to agree on unilateral action to implement routine beach litter monitoring as an official regional monitoring scheme

Lead: UNEP-CEP/Cartagena Convention

Costs: TBD

Timeline: This is the initiating action and therefore has high priority.

Action 2: Designate a Regional Coordinator

A regional coordinator will be needed to implement and facilitate the monitoring program. By centralizing the data analysis and reporting on a regional level, this will reduce the pressure and hours needed on a national level.

Objectives: To implement and facilitate the program.

Steps: Once designated, the Regional Coordinator should have the following responsibilities:

Implementation:

- Develop training program (English, Spanish and French)
- Oversee the development of the regional database (Phases 1 & 2)

- Establish pilot program in 5 countries

Ongoing annual:

- Act as liaison for new survey coordinators to guide training and implementation
- Keep the training program up to date
- Database management
    - Keeping the database up to date
    - Granting authorized user status
    - Periodic review and addition of "other" litter items
    - Technical assistance for database users
    - Management of System Administrator
- Quality control of data
- Manage communication network of monitoring stakeholders
- Disseminate information and provide feedback to surveyors
- Coordinate meetings
- Review and approval of uploaded data, clarification with national/survey coordinators
- Prepare regional reports
- Assist with the preparation of national reports (where needed)
- Ensure that methodology used is up to date with current standards and facilitate knowledge exchange by participation in national, regional, and international workshops, working groups, OSPAR ICG-ML
- Evaluate additional indicator monitoring methodologies to incorporate into harmonized program at a later date

Lead: UNEP-CEP/Cartagena Convention

Costs: Implementation – Project management estimates of Actions 5, 6, 7 and 8 are estimated to be approximately US $25,000 to $27,000 (a breakdown of costs have been listed within the respective Actions).

Ongoing – the continued management of the monitoring program is estimated to be approximately US $25,000 to $27,000 annual (but may be re-budgeted subject to yearly review).

Timeline: The implementation phase will take approximately 6 to 9 months (concurrent to database development) and should be completed prior to the pilot program inception. Subsequently, it will be an ongoing process.

Action 3: Designate a National Monitoring Coordinator on a country-by-country basis

Within each participating country, the lead ministry or department within the national government should be identified and a national lead for marine litter monitoring designated. They should be a representative of the national government who has

direct involvement in policies, programmes, projects and/or services to prevent and monitor marine litter.

Objectives: Provide a designated lead to:

- Ensure the sustainability of the national routine litter monitoring program
- Facilitate the use of the collected litter data in development of national reduction strategies
- Monitor the efficacy of national reduction strategies
- Communicate within the regional network

Steps: Once designated, the ongoing responsibilities of the National Monitoring Coordinator should include the following:

- Manage the routine beach litter monitoring program either by:
    - Supervision of monitoring conducted directly by government employees
    - Supervision of monitoring outsourced to outside entity (designated Survey Coordinator) on a contractual basis
- Representing their country in the marine litter monitoring network
- Provide input for the development of strategies, programmes, plans, documents, reports, proposals for action, projects, etc.

Lead: Individual contracting parties

Costs: Determined at a National Level

According to feedback from the OSPAR national coordinators, the time commitment for national oversight requires between 160-300 hours per year for between 4 to 100 sites. However, this includes additional responsibilities such as analysis and reporting of the litter data. It is recommended that some of these tasks are centralized with a regional coordinator and automated via the WCR database. Therefore, based on the assumption that each nation may choose to have between 1 and 3 monitoring sites, it is estimated that the national lead will spend 100 hours or less annually.

Timeline: Designation should occur within at least 5 countries during the first 6 to 9 months prior to the pilot program. Subsequently it should be an ongoing process as additional countries implement routine beach litter monitoring.

Additional considerations: A national lead within the government is recommended. However, in instances where government capacity is unavailable, participation in routine monitoring may still occur. If there is a motivated and sustainable outside entity capable of independently fulfilling the responsibilities of the Survey Coordinator, then this is a possible option to establish the monitoring program.

Action 4: Designate a Survey Coordinator on a country-by-country basis

Within each participating nation, there should be a designated Survey Coordinator. The Survey Coordinator can be from within the government (can be the National Monitoring Coordinator) or can be selected from a variety of entities, such as: a Marine Park management organization (where beach litter monitoring can be combined with other monitoring activities), a research entity, an organization involved in environmental, marine conservation or beach clean-up activities, or an environmental/advisory consultant. In the case of larger countries with more geographically disparate sites, more than one may be utilized. In the case that an outside entity is utilized, it is recommended that the coordinator receives financial compensation and that an annual contractual agreement be made between the entity and the government supplying the funding, where applicable.

Objectives: To ensure that the routine monitoring occurs on schedule, follows the protocol, and submits the litter data accurately.

Steps: Once designated, the Survey Coordinator should have the following responsibilities (further detail can be found in Attachment 3):

- Completion of training in the methodology (initial)
- Site selection and program set up (initial)
- Recruitment and retention of volunteers (if used)
- Must be present at each survey (to conduct survey and/or supervise volunteers)
- Ensure that surveys occur on schedule (quarterly basis)
- Quality control of data collected
- Submission of data to WCR database

Lead: Individual contracting parties

Costs: May vary at a National Level and will depend upon the number of sites surveyed.

Initialization costs including materials and Survey Coordinator hours for training and program set up are estimated to be approximately US $800 to $1,000.

Annual operating costs including survey supplies and Survey Coordinator hours are estimated to be approximately $2,500 to $3,000 per site annually.

The cost estimates are based upon experiences from Clean Coast Bonaire, the OSPAR region and the cost analysis from the JRC 2013 report: *Guidance on Monitoring of Marine Litter in European Seas*. The Survey Coordinator will spend approximately 10-15 hours per survey (including preparation, commute, volunteer recruitment, quality control, and data entry).

Timeline: Designation should occur within at least 5 countries during the first 6 to 9 months prior to the pilot program. Subsequently it should be an ongoing process as additional countries join the monitoring network.

Additional considerations: Based on the number of annual hours, this is not a full-time position and should be embedded as a structural requirement within a larger organization.

Action 5: Establish a regional monitoring network

Monitoring work should be supported by establishing a monitoring group of stakeholders including regional, national and survey coordinators and include government experts, managers, and scientists.

Objectives: To increase regional connectivity with respect to marine litter monitoring and to provide a communication platform for the monitoring group members to:

- Share knowledge (news, policies, techniques)
- Identify unknown items
- Identify emerging and region-specific items
- Identify quality control and other issues
- Recommend regional strategy
- Prevent duplication of work
- Conduct procedural reviews

Steps: The monitoring coordination framework could be established with UNEP-CEP and GPML-Caribe as focal point as a sub-group of Caribbean Marine Litter Regional Working Group in a manner similar to Caribbean Marine Protected Areas Management Network and Forum (CaMPAM). It is recommended to utilize a similar format to the OSPAR ICG-ML and use Basecamp as the communication platform.

Lead: UNEP-CEP/Cartagena Convention

Costs: Set-up of Basecamp for use by the network, establishing groups and disseminating instructions and permissions should be assigned to the Regional Coordinator. Estimated set up costs are estimated to be between $1,500 to $2,000. Basecamp currently has a fixed price of US$99 per month for unlimited users and projects, resulting in an ongoing annual expense of $1,188.00.

Timeline: Should occur prior to the pilot program. Renewed annually as needed.

Additional considerations: Use of the Basecamp platform could potentially be extended to other networks of the Cartagena constituency.

Action 6: Build a regional database

The monitoring data should be recorded and stored in a custom-built, centralized, easy to use and adaptable database that is based upon the functionalities of the OSPAR Beach Litter Database. Constituent members of the Cartagena Convention have ownership and control of the data that is managed by the Cartagena Secretariat. The database should be capable of generating reports in a format suitable for national, regional, and global harmonization purposes.

Objectives: To provide a secure, regional platform to enter and store national marine litter data that incorporates a cost-effective and timesaving means to analyse and report the data that is capable of growth as the needs of the WCR evolve.

Steps: Specify terms of reference for database developer. Contract database developer. Build in phases and utilize technical knowledge from OSPAR region. (Found in greater detail in Chapter 9: Recommended data management strategy)

Lead: UNEP-CEP/Cartagena Convention

Costs: Phase 1 - the creation of the initial database with data entry interface, storage, data report generation in Excel/CSV, tabular, and graphical formats is estimated to be approximately US $45,000 to $47,000.

Phase 2 - translation of the database to be functional in Spanish and French is estimated to be approximately US $4,500 to $5,000.

During the construction of the database, project management and subject matter expertise will also be needed and should be assigned to the Regional Coordinator. Estimated initial costs are estimated to be between $6,000 to $6,500.

Annual expenses for keeping the database up to date are included within the roles of Regional Coordinator in Action 6.

Operating costs for website hosting and technical maintenance are estimated to be US $1,500 annually.

Timeline: Phase 1 will take approximately 6-9 months once the developer has been contracted. Phase 2 will take approximately 1-2 months after the database has been built.

Additional considerations: Optional phases to be determined.

Phase 3 (optional) - incorporation of high-level, robust statistical analysis report capability in a manner similar to LitteR can be added as a future option if there is a demand for approximately US $5,000 to $6,000.

Phase 4 (optional) - evolution to include additional indicator data and source identification data as additional monitoring methodologies are implemented within the WCR will depend upon the complexity of the data collected and will need to be determined as/when necessary.

Action 7: Establish a training program

Although the Modified OSPAR beach litter monitoring methodology is not complex, adequate training is an essential part of the quality assurance process. An established training program will serve to increase capacity and prepare knowledgeable Survey Coordinators and citizen scientist volunteers.

Objective: Survey Coordinators and volunteers to be knowledgeable and capable of conducting accurate data collection during litter monitoring surveys.

Steps: Develop a training manual based on the OSPAR beach litter monitoring methodology guidelines, with additional information such as regional modifications, items of regional concern, and a photo reference guide and a corresponding online (e-learning) training program addressing the following topics:

- Use of methodology
- Identification of litter items by composition and category
- Commonly mis-identified items
- Use of data platform (entry, reports)
- Volunteer recruitment and retention suggestions

The program can be developed via an established online format such as Moodle with the use of educational videos, training materials in PDF format, and knowledge assessment by quiz prior to program completion. Although the primary goal is to train the Survey Coordinators, some modules of the program will also be useful for training of citizen scientist volunteers.

The training program should be translated into Spanish and French.

Lead: Regional Coordinator

Costs: Estimated initial costs are estimated to be between $7,000 to $7,500.

Annual expenses for keeping the training program up to date are included within the roles of Regional Coordinator in Action 2. E-learning host costs will be approximately US $350 per year.

Timeline: Approximately 6 to 9 months (concurrent to database development), completed prior to the pilot program inception.

Additional considerations: Where possible, on-site training at a beach clean-up survey will provide extra benefit via hands-on experience with litter items.

Action 8: Conduct pilot testing of routine beach litter monitoring

It is recommended that routine monitoring program is pilot tested in 5 nations for a minimum period of 3 years with an annual review process to assess budget, hours, resources, roadblocks, and achievements.

Piloting countries can be selected from the survey respondents who indicated a willingness to pilot a routine monitoring program and who are Cartagena constituents.

Objectives: To determine the feasibility and sustainability of the routine monitoring program and learn how to better expand it throughout the WCR.

Steps: Once Actions 1-7 have occurred, the pilot participants will:

- Participate in training program
- Determine number of survey sites based on available resources
- Select survey sites
- Acquire survey materials
- Conduct initial site assessment/clearance
- Collect site metadata
- Conduct routine monitoring 4x per year
- Submit data to regional database
- Conduct annual assessment of pilot program

Lead: Regional Coordinator (implemented by Survey Coordinators)

Costs: On a national level, the costs involved in piloting will depend upon the number of sites that will be surveyed. As listed in Action 3, initialization costs including materials and Survey Coordinator hours for training and program set up are estimated to be approximately US $800 to $1,000 and annual operating costs including survey supplies and Survey Coordinator hours are estimated to be approximately $2,500 to $3,000 per site annually.

Based upon the initial and annual costs, a **3-year** pilot will total approximately:

- US $8,300 to $10,000 to survey one site
- US $15,800 to $19,000 to survey two sites
- US $23,300 to $28,000 to survey three sites

Implementation and overall project management should be assigned to the Regional Coordinator. Estimated initial costs are estimated to be between $10,500 to $11,000.

Timeline: Once Actions 1-7 have occurred, the pilot program will run for 3 years with annual assessments.

Additional considerations: Other interested countries may also begin routine monitoring, as the ultimate goal is to expand throughout the WCR. In order to build upon momentum and encourage participation, it is possible to start routine monitoring prior to establishment of the database via data entry in Excel spreadsheets that can be made available to interested parties.

11. Budget and resources

Based upon the Actions listed above, the implantation and facilitation budget for harmonized, routine beach litter monitoring in the WCR will be as follows:

Initial The budget for the initial phase actions is estimated to be:

- Regional: $74,500 to $79,000
- National: $800 to $1,000 (per country)

Annual The budget for annual expenses is estimated to be:

- Regional: $28,000 to $30,000
- National: $2,500 to $9,000 (per country)

The breakdown by Action is as follows:

			Budget (US $)	
Action	**Description**	**National/Regional**	**Initial**	**Annual**
Action 1	Adoption by contracting parties	Regional	TBD	
Action 2	Designate a Regional Coordinator	Regional		$25,000 to $27,000
Action 3	Designate a National Monitoring Coordinator (on a country-by-country basis) starting with piloting countries	National	No cost	Determined at a national level
Action 4	Designate a Survey Coordinator (on a country-by-country basis) starting with piloting countries	National	(see pilot costs)	
Action 5	Establish a regional monitoring network	Regional	$1,500-$2,000	$1,188
Action 6	Build a regional database - Phase 1	Regional	$45,000-$47,000	$1,500
	Translate database - Phase 2	Regional	$4,500 to $5,000	
	Project management	Regional	$6,000-$6,500	
Action 7	Establish a training program	Regional	$7,000-$7,500	$350
Action 8	Conduct pilot testing of routine beach litter monitoring	National	$800-$1,000	$2,500-$3,000 (1 site) $5,000-$6,000 (2 sites) $7,500-$9,000 (3 sites)
	Project management	Regional	$10,500-$11,000	

12. Timeline

Although the Actions are placed in numerical order, many of the Actions are dependent upon each other and may occur concurrently. However, commitment is the basis of the entire program. Action 1 (commitment) and Action 2 (designation of an individual to coordinate implementation) are the foundational steps to kick start the iterative process. Once these building blocks are in place, the program may grow to include all interested constituent countries from the WCR. The timeline can be visualized in the following schematic overview.

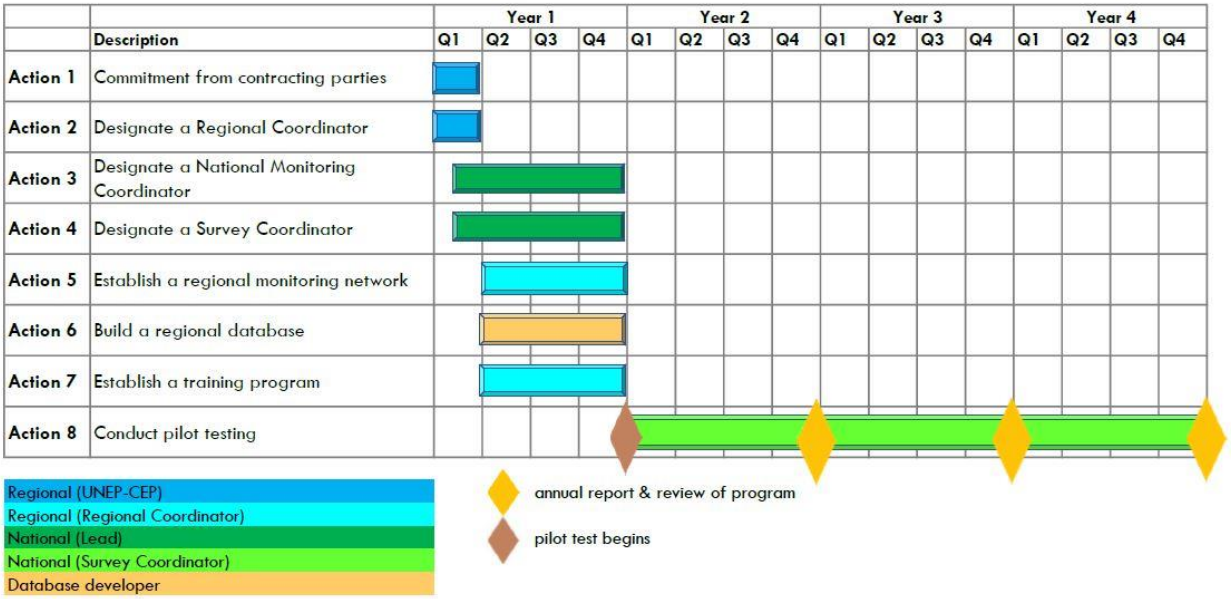


FIGURE 12 TIMELINE OF ACTIONS

13. Conclusions and recommendations

The marine litter data collection methodologies developed within the OSPAR region are at the forefront of the global marine litter conversation. The WCR can benefit from the experience and best practices, as well as the alignment of methodologies to implement a data collection that is in line with global practices.

Build upon experiences from the OSPAR region

This research investigated the appetite for implementing a harmonized monitoring methodology in the WCR based on experience from the OSPAR region. In the OSPAR region, beach litter monitoring was started from the early 2000s onwards. The Constituents of the Cartagena Convention can benefit from that experience.

Key success factors for the OSPAR Beach Litter Program:

- OSPAR secretariat provides a centralized organizational platform for technical support
- An established regional network with designated national leads from contracting parties
- Flexibility to conduct surveys by a variety of entities, depending on available resources per country
- Constituent fulfilment of their monitoring obligations under EU Marine Strategy Framework Directive
- Coordination function in place that is shared by a number of countries
- Information and knowledge sharing by working group via online platform
- Mentorship and capacity development during the historic process of piloting and establishment of the regional program

Address obstacles identified within the WCR

Over the years, several publications addressing the issue of marine litter refer to a need for harmonized data collection, both within the WCR as well as globally. The findings of this report show that there is clear interest in establishment of an official, harmonized, routine marine litter monitoring program in the WCR. At least 12 countries have indicated a willingness to participate in a pilot program. To date, one of the primary roadblocks to implementation is a lack of urgency and ownership on a national level. Another significant roadblock is the capacity to implement and sustain a program.

Recommendations

Keep knowledge and information exchange with OSPAR flowing to stay informed with cutting-edge regional and global marine litter monitoring practices.

Communicate the urgency and need for routine beach litter monitoring in the WCR to contracting parties. Secure commitment from contracting parties and encourage them to designate National Monitoring coordinators.

Provide a cost-effective means to utilize citizen scientists and maintain flexibility to choose the number of sites (and thereby the annual budget for the program) based upon available resources allowing the program to be implemented and sustained in a manner that suits the specific requirements of individual countries.

Provide a centralized hub for coordination and time-saving tools for marine litter data entry, analysis, and reporting.

Develop a training program to build national and regional capacity.

Build upon current momentum to commit to a routine, harmonized beach litter monitoring program in the Wider Caribbean Region.

References

Addamo Anna Maria, Brosich Alberto, Chaves Montero Maria del Mar, Giorgetti Alessandra, Hanke Georg, Molina Jack Maria Eugenia, Vinci Matteo, *Marine litter database: Lessons learned in compiling the first pan-European beach litter database*, EUR 29469 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-97867-8, doi:10.2760/621710, JRC112895.

Caporusso, C. and Hougee, M. (2021). *Harmonizing Marine Litter Monitoring in the Wider Caribbean Region: A Hybrid Approach.*

Diez, S.M., Patil, P.G., Morton, J., Rodriguez, D.J., Vanzella, A., Robin, D.V., Maes, T., Corbin, C. (2019). *Marine Pollution in the Caribbean: Not a Minute to Waste*. Washington, D.C. : World Bank Group.

Fleet, D., Vlachogianni, Th. and Hanke, G. (2021). *A Joint List of Litter Categories for Marine Macrolitter Monitoring*. EUR 30348 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-21445-8, doi:10.2760/127473, JRC121708

Galgani, F., Hanke, G., Werner, S., Oosterbaan, L., Nisson, P., Fleet, D., Kinsey, S., Thompson, R., van Franeker, J., Vlachogianna, T., Scoullos, M., Veiga, J.M., Palatinus, A., Matiddi, M., Maes, T., Korpinen, S., Budziak, A., Leslie, H., Gago, J., Liebezeit, G. (2013) European Commission, Joint Research Centre, Institute for Environment and Sustainability. *Guidance on Monitoring of Marine Litter in European Seas*. EUR 26113 EN, Publications Office of the European Union, Luxembourg, 2013, ISBN 978-92-79-32709-4, doi:10.2788/99475, JRC83985

Galgani, F., Giorgetti, A., Le Moigne, M., Brosich, A., Vinci, M., Lipizer, M., Molina Jack, M.E., Holdsworth, N., Schlitzer, R., Hanke, G., Moncoiffe, G., Schaap, D., Giorgi, G., Addamo, A., Chaves Montero, M.D.M., Cociancich A. (2021). *Guidelines and forms for gathering marine litter data: beach and seafloor trawlings. Version 6*, 12/07/2021, 65 pp., DOI: https://doi.org/10.6092/15c0d34c-a01a-4091-91ac-7c4f561ab508

GESAMP (2019). *Guidelines or the monitoring and assessment of plastic litter and microplastics in the ocean* (Kershaw P.J.,Turra A. and Galgani F. editors), (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP/ISA Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 99

OSPAR Commission (2020). *CEMP Guidelines for marine monitoring and assessment of beach litter* (OSPAR Agreement 2020-02)1 Source: EIHA(2) WP 20/01/04-Add.1

Schulz M, van Loon W, Fleet DM, Baggelaar P, van der Meulen E. *OSPAR standard method and software for statistical analysis of beach litter data.* Mar Pollut Bull. 2017 Sep 15;122(1-2):166-175. doi: 10.1016/j.marpolbul.2017.06.045. Epub 2017 Jun 21. PMID: 28647150.

Silburn, B., Meakins, B., Russell, J., Preston-Whyte, F., Binetti, U., van Hoytema, N., and Kohler, P. (2020) CEFAS Commonwealth Litter Programme – *Belize Marine litter monitoring and monitoring training report*

Smail, E., Campbell, J., Takaki, D., Plag, H., Garello, R., Djavidnia, S., Moutinho, J., El Serafy, G., Giorgetti, A., Vinci, M., Jack, M., Larkin, K., Wright, D., Galgani, F., Topouzelis, K., Bernard, S., Bowser, A., Colangeli, G., Pendleton, L., Mupas Segui, L., Milà i Canals, L., Simpson, M., Marino, A., Zabaleta, I., Heron, M. (2020). *Draft Version White Paper: A Global Platform for Monitoring Marine Litter and Informing Action*.

UNEP-CAR/RCU (2014) *Regional Action Plan on Marine Litter Management (RAPMaLi) for the Wider Caribbean Region.* CEP Technical Report: 72

United Nations Environment Programme (2021). *From Pollution to Solution. A global assessment of marine litter and plastic pollution* Nairobi.

Van Loon, W., Hanke, G., Fleet, D., Werner, S., Barry, J., Strand, J., Eriksson, J., Galgani, F., Gräwe, D., Schulz, M., Vlachogianni, T., Press, M., Blidberg, E. and Walvoort, D., 2020. *A European Threshold Value and Assessment Method for Macro Litter on Coastlines.* EUR 30347 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21444-1, doi:10.2760/54369, JRC121707

Veiga, J.M., Fleet, D., Kinsey, S., Nilsson, P., Vlachogianni, T., Werner, S., Galgani, F., Thompson, R.C., Dagevos, J., Gago, J., Sobral, P. and Cronin, R.; 2016; *Identifying Sources of Marine Litter*. *MSFD GES TG Marine Litter Thematic Report;* JRC Technical Report; EUR 28309; doi:10.2788/018068

Walvoort, D. and van Loon, W. (2021) *LitteR User Manual*.

Walvoort, D. and van Loon, W. (2021) *Installation manual for RStudio and litter.*

Websites:

OSPAR Beach Litter Database https://beachlitter.ospar.org/

OSPAR Commission https://www.ospar.org/

EMODnet https://www.emodnet-chemistry.eu/

GPML-Caribe https://gpml-caribe.org/

CRAN R Environment https://www.r-project.org/

Attachments

Attachment 1: OSPAR survey questions

General Information

1) Name

2) Organization

3) Title

4) What role do you play in beach litter monitoring?
- I am a surveyor
- I am a survey coordinator
- I oversee the program on behalf of my country's government

5) Country

6) Email address

7) Who conducts the OSPAR surveys in your country?

- Government employees
- NGO
- Volunteers/citizen scientists
- Advisory company
- Research institution
- Other (please specify)

8) If the beach monitoring surveys are not conducted directly by a government employee, can you please describe the agreement between the government and the outside institution conducting the beach litter surveys?

9) How many sites are regularly surveyed on a quarterly basis in your country?

10) How was the number of sites determined?
- Per kilometer of coastline
- Available resources to conduct surveys
- Other (please specify)

11) Although the "Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area" specifies the minimum criteria for selection of reference beaches, were there any other considerations used when the site selections were made in your country?

12) Are there any lessons learned from the startup phase that you can share?

Data usage and communication

13) What do you use the data for in your country?

14) Is it part of any formal assessments with respect to the Marine Strategy Framework Directive?

15) Is it or will it be part of any formal assessments with respect to the Single Use Plastics Directive?

16) Is it part of any other official assessments? Please elaborate.

17) We noticed that different countries communicate the results in different ways. Could you please indicate whether you share monitoring results with any of the following stakeholders and how?

- Other governmental departments
- Local/regional governments
- EMPDnet Pan European MLDB
- Universities & scientific organizations
- NGO and public
- Press
- Commercial sectors
- Other (please specify)

Data entry, management and analysis

18) How do you conduct data entry for each individual beach survey?

- Directly into OSPAR Beach Litter Database
- First entered into a spreadsheet and then uploaded into the OSPAR Beach Litter Database
- Other (please specify)

19) How do you analyse the data?

- With LitteR or Litter Analyst
- With Excel
- Other, please explain

20) What reports do you generate with the data?

- Top 10
- Trends over time
- Composition of items
- Analyse trends for single items
- Analyse trends for item categories
- Other (please specify)

21) What reports do you wish you could generate with the data?

22) If you could start from scratch, would you have any improvement suggestions for the database? (ease of use, data entry)

23) Can you recommend others to speak to about database options to house Caribbean beach litter monitoring data? Please provide names & contact information.

Beach Survey Techniques

24) How do you record data during a beach survey?
- By completing the data collection form on paper
- Via an App on a mobile devisce
- Other (please specify)

25) At a typical survey, how many people are utilized to conduct the survey?
- 1 person
- 2-5 people
- More than 5 people

26) Do you utilize volunteers to assist in the survey process?
- No, only surveyors who are financially compensated/employed to conduct surveys
- Yes, we use supervised volunteers
- Other (please specify)

Financial

27) Do you have an annual budget allocated for the monitoring?
Yes/no

28) What is the annual budget for the monitoring? (please share if possible)
- €5-20K
- €20-40K
- More than €40K

29) What items and tasks are included within the above-mentioned beach monitoring budget?
- Conducting OSPAR beach surveys (including preparation and travel time)
- Disposal fees for litter collected during survey
- Materials/supplies/refreshments used during survey
- Quality control
- Entering of survey data into database
- Analysis of survey data
- Communication of survey data to government
- Awareness raising with the survey data
- Communication within OSPAR network regarding beach litter monitoring standards
- Further development of methods

- Participation in national and international workshops, working groups, etc.
- Training of surveyors
- General administration of the beach litter monitoring program
- Other (please specify)

30) Approximately how many hours per year do you spend on activities that are specific to beach litter monitoring?

31) How is it financed? (i.e., directly by government office, assignment to outside entity)

32) Do you have suggestions to cover resources/finances to establish a harmonized monitoring in Wider Caribbean Region?

Other Beach Litter Monitoring Methodologies

33) Does your organization use other litter survey methodologies additional to OSPAR Beach Litter Monitoring? If yes, please elaborate and specify the name of the methodology used.

34) Do you participate in International Coastal Cleanup Day?
Yes / No

35) If yes, do you combine the survey with your regularly scheduled survey or do you run it as a standalone program?

- Combined with regularly scheduled survey
- Standalone program
- Other (please specify)

Other helpful information

36) Can you recommend others to speak to about this subject? Please provide names and contact information.

37) Lastly, what advice would you give to someone starting up a regional beach litter monitoring program?

Attachment 2: WCR survey questions

General Information

1) What is your name?

2) What is the name of your organization?

3) What is your title/function?

4) How would you best describe the type of organization where you work?

- Government
- College/University
- Private Sector
- Non-Governmental Organization (NGO)
- Other (please specify)

5) May we contact you for clarifications or further information on this questionnaire?

Yes / No

6) If yes, please provide your email address.

Involvement in Marine Litter and Marine Litter Monitoring

7) What is your involvement in marine litter? (Select all that apply)

- Beach litter monitoring
- Other types of litter monitoring (microplastics, riverine, terrestrial, floating, seabed, biota)
- Beach clean-ups
- Research
- Waste management
- Policy
- Reduction strategy
- Other (please specify)

8) Does your organization conduct or participate in beach litter monitoring?

Yes / No (if no, skip to question 15) / Other (please specify)

9) What is the name of the beach monitoring methodology used?

10) How is the beach monitoring scheduled?

- Once a year
- Quarterly
- As needed
- Other (please specify)

11) How many sites are monitored?

12) Who are the individuals that conduct the beach monitoring? (Select all that apply)

- Government employees
- Paid surveyors
- Scientists
- Students (University Level)
- Students (Youth)
- Volunteers
- Other (please specify)

13) How is the beach monitoring data being used? (Select all that apply)

- Community awareness raising
- Recorded in a local database
- Recorded in a global database
- Reported to government to drive marine litter reduction policies
- To evaluate of effectiveness of marine litter reduction policies
- Reported to scientific institution
- Other (please specify)

14) If the monitoring data is entered into a database, please specify what database.

15) If you conduct other types of marine litter monitoring, please specify the category and methodology:

- Microplastics
- Riverine
- Terrestrial
- Floating
- Seabed
- Biota
- Other

16) For NGOs, if you not conduct beach litter monitoring, why not? (Select all that apply)

- Beach litter monitoring is not relevant to our organization's priorities
- Insufficient capacity
- Beach litter monitoring is already being conducted by another organization (please specify the name of the organization)
- Other (please specify)

17) For government representatives only, if you do not conduct beach litter monitoring, why not? (Select all that apply)

- Beach litter monitoring is not relevant to our national priorities
- Because there is no mandate or obligation to conduct beach litter monitoring

- Marine litter monitoring is already being conducted by another organization with our involvement (please specify the name of the organization)
- Marine litter monitoring is already being conducted by another organization without our involvement (please specify the name of the organization)
- Insufficient capacity
- Other (please specify)

Harmonization of beach litter monitoring

Background: The GPML-Caribe hosted a Strategic Planning Session for Marine Litter Management in the Wider Caribbean Region in 2019. The following was identified as a priority action: "Develop harmonised monitoring protocols by integrating existing programs (Trash Free Seas) with comprehensive beach monitoring protocols (OSPAR) at targeted sites."

Accomplishing this action will involve commitment to a routine beach monitoring program, with surveys conducted 4 times per year that consist of cleaning and counting all litter at one or more designated sites. More information about the recommended program can be found here.

18) How important to you are the following aspects of a harmonized beach litter monitoring program?

(Sliding scale: 1: not at all important, 2: low importance, 3: neutral, 4: important, 5: very important)

- Collecting data regarding quantities and types of litter
- Collecting data to determine geographic sources of litter
- Collecting data to determine source industries/activities (i.e., fishing, shipping, recreation)
- Collecting data to track increases or decreases in litter over time
- Collecting data to determine how much litter accumulates (washing ashore/being left behind) over time
- Collecting data to assess effectiveness of marine litter reduction strategies (i.e., single-use plastic bans)
- Capable of being performed at low cost
- Capable of being conducted with limited personnel
- Capable of being conducted with supervised volunteers
- Allocation of budget for initial set-up and ongoing annual expenses
- Receiving training for national survey coordinators/supervisors via E-learning
- Incorporating a communication structure for national survey coordinators
- Collecting data that can be used to drive awareness campaigns
- Collecting data that can be used to drive litter reduction strategies (nationally)
- Collecting data that can be used to drive litter reduction strategies (regionally)
- Collecting data that can be used to drive litter reduction strategies (globally)
- Collecting data that can be used to establish a litter baseline and set reduction targets (nationally)

- Collecting data that can be used to establish a litter baseline and set reduction targets (regionally)
- Collecting data that can be used to establish a litter baseline and set reduction targets (globally)
- Capable of evolving to include additional harmonized marine litter monitoring programs (i.e., microplastics, floating)
- Easy to use database for reporting data and generating reports

19) Please choose the 3 most important requirements listed above.

20) Please explain why you think they are the most important.

21) What do you think would be needed to establish routine beach litter monitoring program in your country?

Potential Partnerships

22) Do you have recommendations regarding potential participants to complete this questionnaire? (beach clean-up groups, existing marine litter monitoring programs, research facilities, marine park managers, government departments responsible, funding opportunities, etc.) If possible, please provide names, organizations and contact information.

23) Is your organization interested in piloting a routine beach monitoring program?

Yes / No

24) Would you be available to discuss the topics of this survey further?

Yes / No

Attachment 3: Survey coordinator guidelines (set-up and quarterly actions list)

Initial Steps

Site selection

Based on modified OSPAR criteria. Preferably, the beaches should:

- be composed of sand or gravel and exposed to the open sea
- be accessible to surveyors all year round
- be accessible for ease of marine litter removal
- be a minimum length of 50 metres
- be free of 'buildings' all year round
- ideally not be subject to any other litter collection activities

Site data collection

The attached *Modified OSPAR Site Data Form* must be completed. It only needs to be filled in once (unless anything significant changes), and contains the following data:

- site location
- site measurements
- site topography
- potential pollution sources nearby

Schedule

- Sites are to be surveyed 4 times per year on a fixed schedule to determine accumulation rate
- Recommended schedule is every three months
- By scheduling surveys in March/June/September/December, the September survey can coincide with International Coastal Clean Up (select and schedule in advance via social media)

Training

Review with Regional Coordinator:

- *Modified OSPAR Survey Data Form* to be filled in at every survey
- *Modified OSPAR Litter Data Form* to be filled in at every survey
- How to handle unusual items
- How to handle small unidentifiable pieces
- Commonly mis-identified items
- Interesting marine litter items
- Adding additional items of local concern
- Quality control
- Data transmission to central data platform

- Record retention
- Reporting and data use

(Optional) Volunteer training

To raise awareness about project and to recruit volunteers, it is recommended to have a publicised, public training event in two parts.

1) Presentation: covering OSPAR monitoring protocol, objectives of program, marine litter issue, marine litter items and program standards.

2) Hands-on beach survey training: the initial clean-up survey can be used to train volunteers as well as to complete the first clearance of the survey site.

Quarterly Actions

- 1-2 weeks prior to survey: volunteer recruitment (via social media, mailing, posters, etc.)
- Prior to survey: print forms, prepare clipboards, refreshments, etc.
- Day of Survey: setup, briefing of volunteers, fill in *Survey Data Form*, clean-up/survey, quality control of *Litter Data Forms*, disposal of collected litter
- After survey: data entry into spreadsheet and/or scan and email competed survey data form and litter forms to Regional Coordinator

Attachment 4: Materials for clean-up surveys

The materials listed below are recommended for thorough and comfortable surveys. A cell phone or mobile device can be used to fulfil the function of recording GPS coordinates and taking photos of the site and litter items.

Start-up Package:

- *Modified OSPAR Site Data Form*
- Folding 4-panel clipboards (1 per litter form)
- Pens
- Reusable gloves
- Reusable bags (if possible)
- Buckets & containers
- Measuring tape
- Ruler
- Hand-held digital scale
- First Aid Kit
- Camera
- Cooler jug for water
- Reusable cups
- GPS device (phone can be used)
- Camera (phone can be used)

Survey Supplies (potential per-survey expense):

- *Modified OSPAR Survey Data Form*
- *Modified OSPAR Litter Data Forms* (1 per survey buddy team, 5 is usually more than enough)
- Sign-in sheet to collect volunteer email addresses
- Tape (to secure the 4 pages of the form to the clipboard)
- Hand sanitizer
- Sunscreen
- Bug repellent
- Ice
- Refreshments
- Garbage bags (if not using reusable bags)

Attachment 5: LitteR use and reports

LitteR is a package within the R Environment. R is an integrated suite of software facilities for data manipulation, calculation and graphical display. Prior to using the LitteR package, Individual users must first complete the following steps:

- install the R-environment
- install RStudio;
- install and update the litteR-package (and its dependencies)

Then, the users must create a specifically formatted CSV file is to be input into the LitteR package. A report will be produced for the period specified including the following components:

- Outlier analysis (by site)
- Descriptive statistics for each spatial code and group/type name:
    - Mean Count
    - Median count
    - Relative count
    - Coefficient of variation
    - Ratio of MAD (Median Absolute Deviation) and median
    - Number of surveys
    - Theil-Sen slope
    - p-value
    - Figures showing median count for each group per spatial code
- Trend analysis for each spatial code and group/type name:
    - Theil-Sen slope
    - p-value
    - Number of surveys
    - Figures showing the time series of the total count, fisheries, single use plastic and cigarette stubs
- Session information

(Walvoort, D. & van Loon, W. 2021)

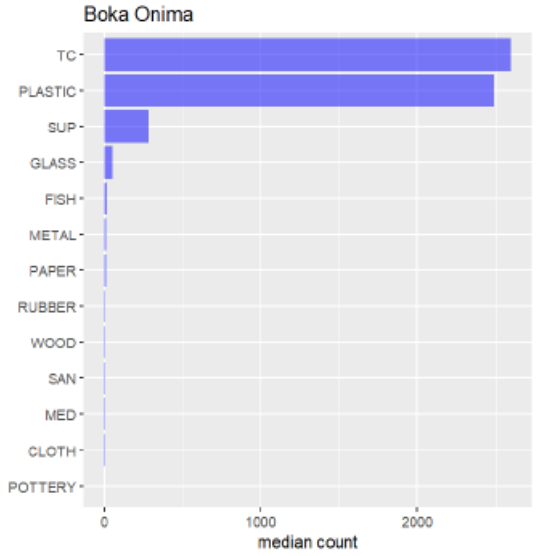


FIGURE 13 SAMPLE FIGURE FROM LITTER SHOWING MEDIAN COUNT PER GROUP

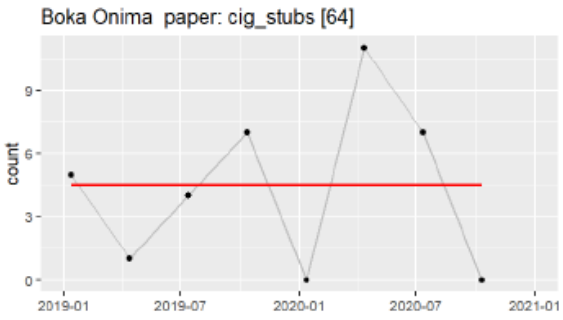
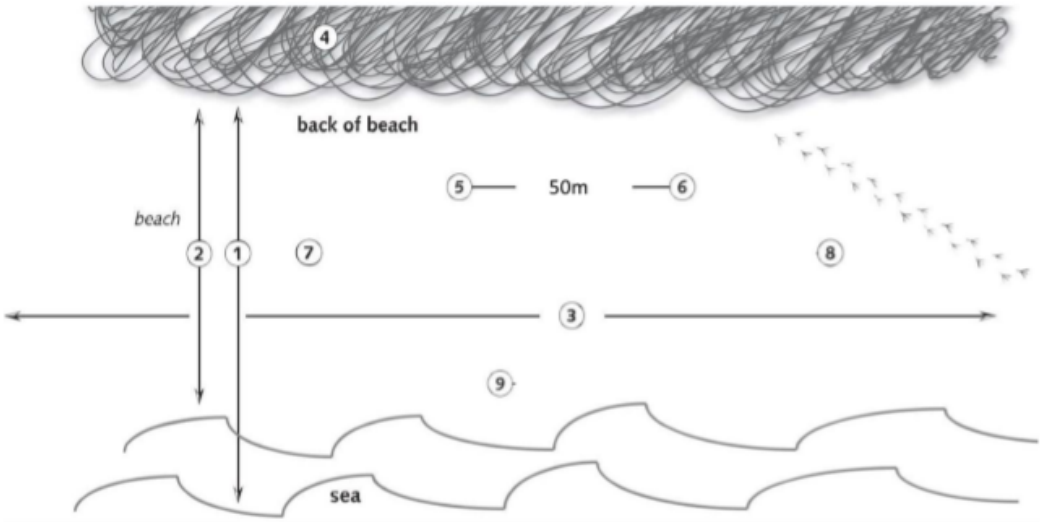


FIGURE 14 SAMPLE FIGURE FROM LITTER SHOWING TREND ANALYSIS

Attachment 6: Modified OSPAR Site Data Form

Modified OSPAR Site Data Form

Name of beach: .....
Beach ID: .....
Country: ..... to be filled in by national coordinators



1 Beach width at mean low spring tide: ..... (m) 2 Beach width at mean high spring tide: ..... (m)
3 Total length of beach: ..... (m) 4 Back of beach (example dunes): .....
5 GPS coordinates start 50 m: .....
6 GPS coordinates end 50 m: .....
Coordinate system used: ..... Date position measured: .../.../..... (d/m/y)
Prevailing currents off the beach*: ❑N ❑E ❑S ❑W Prevailing winds*: ❑N ❑E ❑S ❑W

When you look from the beach to the sea, what direction is the beach facing*: ❑N ❑E ❑S ❑W
Type of beach material (% coverage): .....(e.g. sand 60%, pebbles 40%)
Beach topography: .....(e.g. slope 20%)
Beach curvature: ❑concave ❑convex ❑sinusoidal ❑straight
Horizontal profile (horizontal shape of the beach): ❑linear ❑concave ❑convex ❑mixed
Are there any objects in the sea (e.g. a pier) that influence the currents: .....

Major beach usage (local people, swimming and sunbathing, fishing, surfing, sailing etc.):
1. .....seasonal or whole year round: .....
2. .....seasonal or whole year round: .....
3. .....seasonal or whole year round: .....

---

*you may tick one or two boxes

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Modified OSPAR Site Data Form

How often is the beach cleaned: .....

All year round: ..... X ❑Daily ❑Weekly ❑Monthly ❑Other .....

Seasonal, please specify in months: .....

..... X ❑Daily ❑Weekly ❑Monthly ❑Other X

What method is used: ❑Manual ❑Mechanical

Who is responsible for the cleaning: .....

Additional comments and observations about this beach: .....

.....

.....

.....

.....

.....

.....

.....

Please include:

1. A map of the beach
2. A map of the beach and the local surroundings.
   When relevant please mark on this map the following:
   ❑Nearest town ❑Food/drink outlets ❑Nearest shipping lane
   ❑Nearest harbor ❑Nearest river mouth ❑Discharge or discharges of waste water
3. A regional map

Is this an amendment to an existing questionnaire: ❑ Yes ❑ No

Date questionnaire is filled in: ...../...../..... (d/m/y)

Name: .....

Phone number: .....

E-mail: .....

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Attachment 7: Modified OSPAR Survey Data Form

Modified OSPAR Survey Data Form

To be filled in by Survey Coordinator

Coordinator: _____ **Date:** _____

Site: _____ **Number of Volunteers:** _____

Survey Start Time:_____ **Survey End Time:** _____

Total weight of all litter items collected: _____ **kg/lbs**

Sargassum: _____ Yes* _____No

** If yes, note depth & meters of coverage from shoreline to back of beach*

Width of beach (waterline to designated back of beach): _____ **meters/feet**

Was litter collected during this survey? _____

When was the beach last cleaned? _____

Did any of the following weather conditions effect the data of the survey?

- Wind _____
- Rain _____
- Exceptionally High Tide _____

Large/unmovable objects present on beach (describe): _____

Did you find stranded or dead animals? _____

- If so, how many? _____
- Please describe the animal or note the species name, if known: _____
- Alive or dead? _____
- Sex of animal (if known): _____
- Age of animal (if known): _____
- Is the animal entangled in litter? _____
- If so please describe nature of the entanglement and type of litter: _____

Were there any circumstances that influenced the survey, for example, tracks on the beach (cleaning or other), recent replenishment of the beach or other? Please specify: _____

Were there any events that lead to unusual types and/or amounts of litter on the beach, for example beach events or other. Please specify: _____

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Attachment 8: Modified OSPAR Beach Litter Data Form

Modified OSPAR Beach Litter Data Form

Date: _____

Surveyor: _____ **Site:** _____

OSPAR ID / J-List ID	Items	Total
	Plastic/Polystyrene	
2 / J3	Bags (e.g. shopping, carrier, grocery)	
3 / J4	Small plastic bags, e.g., freezer bags	
23 / J36	Fertiliser/animal feed / rubbish bags (heavy duty)	
24 / J238	Mesh vegetable bags	
112 / J5	Plastic bag ends	
4 / J7	Drinks (bottles & containers) ≤ 0.5 Liter	
4 / J8	Drinks (bottles, containers and drums) >0.5 Liters	
5 / J9	Cleaner (bottles, containers and drums)	
7 / J12	Cosmetics (bottles & containers e.g. shampoo, deodorant) NON-BEACH USE	
7 / J11	Cosmetics (bottles & containers e.g. sunscreen) BEACH USE	
12 / J13	Other bottles, containers and drums	
1 / J1	4/6-pack yokes	
15 / J23	Caps - UNKNOWN	
15 / J21	Caps - from drinks/food (inc. plastic corks)	
15 / J22	Caps - from non-drinks	
15 / J24	Rings from bottle caps	
610 / J225	Food containers incl. fast food containers (PLASTIC)	
620 / J224	Food containers incl. fast food containers (POLYSTYRENE/EPS)	
19 / J30	Crisp/chip packets & candy/sweets wrappers	
19 / J31	Lolly sticks/ice cream sticks	
211 /J227	Cups/lids (PLASTIC)	
212 / J226	Cups/lids (POLYSTYRENE/EPS)	
221 / J228	Cutlery	
221 / J229	Trays/plates	
222 / J231	Straws	
222 / J230	Stirrers	
8 / J14	Engine oil containers and drums <50 cm	
9 / J15	Engine oil containers and drums > 50 cm	
10 / J16	Jerry cans (square plastic containers with handle)	
11 / J17	Injection gun containers	
13 /J18	Crates / boxes /baskets	
14 / J19	Car parts; plastic vehicle parts (car, boat, bicycle)	
17 / J28	Pens	
18 / J29	Combs/hair brushes	
48 / J29	Sunglasses	
48 / J236	Other personal hygiene items (toothbrushes, razor, etc.)	
25 / J40	Gloves (typical washing up gloves)	
113 / J41	Gloves (industrial/professional gloves)	
38 / J65	Buckets	
39 / J66	Strapping bands	
40 / J67	Industrial packaging, plastic sheeting	
41 / J68	Fibre glass	
42 / J69	Hard hats	
48 / J166	Paint brushes	
48 / J72	Plastic traffic cones	
20 / J32	Toys & party poppers	
43 / J70	Shotgun cartridges	
48 / J243	Plastic firework remains	
44 / J136	Shoes/sandals/plastic footwear (non-flip-flops)	
44 / J102	Flip-flops	
48 / J93	Zip ties/tie wraps/cable ties	
48 / J87	Electrical/duct tape	
48 /	Labels	
48 / J241	Decorations (beads, rhinestones, plastic ribbons, etc.)	
48 / J241	Clothes pegs	

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Modified OSPAR Beach Litter Data Form

Plastic/Polystyrene		
31 / J49	Rope (diameter more than 1 cm)	
321 / J242	String & cord (diameter < 1 cm) - not from dolly ropes or unk	
322 / J232	String and cord (diameter less than 1 cm) - from **dolly ropes**	
35 / J59	Fishing line (angling)	
48 / J233	Other plastic string and filaments exclusively from fishery	
115 / J53	Nets and pieces of net < 50 cm	
116 / J54	Nets and pieces of net > 50 cm	
331 / J234	Tangled nets/rope & string (w/o or mixed with **dolly rope**)	
332 / J235	Tangled **dolly rope**	
341 / J57	Fish boxes - plastic	
342 / J58	Fish boxes - foamed polystyrene (EPS)	
36 / J60	Light sticks (tubes with fluid)	
37 / J62	Floats for fishing nets	
37 / J63	Floats/Buoys (other source than fishing/unknown)	
48 / J64	Plastic fenders	
12 / J92	Plastic bait containers/packaging	
48 / J85	Commercial salt packaging	
26 / J42	Crab/lobster traps (pots) and tops	
114 / J43	Lobster & fish tags; plastic tags (fishing, shipping, farming)	
44 / J27	Octopus pots	
48 / J61	Other plastic fisheries related items	
64 / J27	Cigarette butts	
16 / J26	Cigarette lighters	
48 / J25	Plastic cigarette or tobacco packaging	
48 / J84	CD/DVD & Holders/Cases	
48 / J88	Telephone	
48 / J86	Plastic fin trees (from fins for scuba diving)	
48 / J239	Synthetic sponge (i.e. mattress, bathing sponge)	
48 / J257	Foamed plastic packing material	
45 / J256	Foam sponge/ foamed plastic insulation / spray foam	
48 / J89	Plastic construction waste (not foamed insulation)	
1171	PLASTIC pieces 0 - 2,5 cm SMALL	
461/ J79	PLASTIC pieces 2,5 cm > < 50 cm MEDIUM	
471 / J80	PLASTIC pieces > 50 cm LARGE	
1172	Polystyrene (EPS) pieces 0 - 2,5 cm SMALL	
462 / J82	Polystyrene pieces (EPS) 2,5 cm > < 50 cm MEDIUM	
472 / J83	Polystyrene pieces (EPS) > 50 cm LARGE	
48 / J241	Other plastic items (please specify below)	
Other:		
48 / J240	Other foamed polystyrene items (please specify below)	
Other:		

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Modified OSPAR Beach Litter Data Form

Metal		
76 / J174	Aerosol/Spray cans	
77 / J178	Bottle caps, lids & pull tabs from cans	
78 / J175	Drink cans	
82 / J176	Food cans	
89 / J188	Other cans (non food/drink/paint)	
120 / J179	Disposable BBQ's	
79 / J180	Electric appliances	
89 / J181	Metal tableware (e.g. plates, cups & cutlery)	
80 / J182	Fishing weights / lures	
87 / J184	Lobster/crab pots and tops	
81 / J177	Foil wrappers	
83 / J186	Industrial scrap	
84 / J187	Drums & barrels	
90 / J193	Vehicle parts / batteries	
90 / J130	Wheels with metal hub	
90 / J194	Metal cables	
89 / J195	Metal household batteries	
86 / J190	Paint tins	
88 / J191	Wire, wire mesh, barbed wire	
89 / J198	Twist tie	
89 / J198	Other metal pieces < 50 cm (please specify below)	
Other:		
90 / J199	Other metal pieces > 50 cm (please specify below)	
Other:		
Paper • Cardboard		
60 / J147	Bags	
61 / J148	Cardboard boxes	
118 / J150	Cartons e.g. tetrapak (milk)	
62 / J151	Cartons e.g. tetrapak (other)	
63 / J152	Cigarette packets	
65 / J244	Cups	
66 / J154	Newspapers & magazines	
67 / J158	Paper towel/napkin	
67 / J155	Fireworks (disks, tubes, etc.)	
67 / J245	Takeaway food container	
67 / J247	Other paper containers	
67 / J156	Unidentifiable pieces of paper / Paper fragments	
67 / J158	Other paper items (please specify below)	
Other:		
Glass / Ceramic / Pottery		
91 / J200	Bottles	
931 / J201	Jars	
92 / J202	Light bulbs	
92 / J205	Light tubes	
93 / J203	Glass/ceramic tableware (plates, cups, glasses)	
93 / J208	Pieces of glass/ceramic (glass or ceramic fragments ≥ 2.5 cm)	
93 / J210	Pieces of glass/ceramic (glass or ceramic fragments < 2.5 cm)	
93 / J210	Other glass items (please specify below)	
Other:		
94/J204	Construction material e.g. bricks, tiles, cement	
95/J207	Octopus pots	
96/J219	Other ceramic/pottery items (please specify below)	
Other:		

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Modified OSPAR Beach Litter Data Form

Cloth			**Wood (machined)**		
54/J137	Clothing		68/J159	Corks (non-plastic)	
55/J141	Furnishing/ carpet		69/J160	Pallets	
56/J140	Sacking		70/J162	Crates/boxes/baskets	
57/J138	Shoes (leather and/or textile)		71/J163	Crab/lobster pots	
59/J143	Sails/Canvas		119/J164	Fish boxes	
59/J139	Cloth/textile backpacks, bags		72/J165	Ice lolly sticks / chip forks / toothpicks	
59/J145	*Other textiles (please specify below)*		73/J171	Paint brushes	
Other:			74/J171	Kebab skewer	
Medical waste			74/J167	Matchstick/firework stick	
103/J100	Containers / tubes / packaging		74/J171	*Other wood < 50 cm (please specify below)*	
104/J99	Plastic syringes		75/J172	*Other wood > 50 cm (please specify below)*	
105/J253	PPE Masks		Other:		
105/J252	Latex gloves		**Sanitary waste**		
105/J211	Plasters/bandaids/bandages		97/J133	Condom / packaging	
105/J211	*Other medical items (please specify below)*		981/J95	Cotton bud sticks (plastic)	
Other:			982/J246	Cotton bud sticks (cardboard)	
Rubber			99/J96	Sanitary towels/panty liners/backing strips	
49/J125	Balloons, including plastic valves, ribbons, strings etc.		100/J144	Tampons & applicators	
53/J126	Rubber balls		101/J97	Toilet fresheners	
50/J127	Boots		1021/J237	Wet wipes (plastic)	
52/J251	Rubber tyres		102/J98	Diapers	
52/J249	Rubber belts		102/J237	*Other sanitary items (please specify below)*	
53/J250	Inner tube		Other:		
53/J248	Rubber sheet		**Faeces**		
53/J134	Hair ties		121/J101	Bagged dog faeces	
53/J131	Rubber band				
53/J134	*Other rubber pieces (please specify below)*				
Other:					

Pellets (nurdles): ___ Yes ____ No

Presence of other pollutants

108/J217	Parrafin or wax pieces (0-1 cm)	
109/J217	Parrafin or wax pieces (1-10 cm)	
110/J217	Parrafin or wax pieces (> 10 cm)	
111/J216	Tar / Unidentified dark-colored chemicals	
111/J218	Unidentified chemicals	
111	Charcoal	
111/J215	Organic Food Waste (i.e. rib bones)	

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Gulf and Caribbean Fisheries Institute (GCFI) & UN Environment's Caribbean Environment Programme (UNEP-CEP)

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