

A revised methodology to analyse the effectiveness of existing and potential response options and activities on marine litter and microplastics at all levels to determine the contribution in solving the global problem (in delivery of UNEA resolution 4/6, subparagraph 7d).

Table of Contents

1. PURPOSE OF THE DOCUMENT	2
2. SUMMARY OF SUBMISSIONS ON METHODOLOGICAL APPROACHES RELATED TO EFFECTIVENESS.....	2
3. INTRODUCTION TO THE REVISED METHODOLOGY	2
4. THE BOWTIE ANALYSIS	3
5. APPLICATION OF THE BOWTIE ANALYSIS TO THE GOVERNANCE OF MARINE PLASTIC LITTER AND MICROPLASTICS	4
6. MAPPING THE STOCKTAKE SURVEY TO THE BOWTIE ANALYSIS	5
6.1. AN EXAMPLE OF A GOVERNANCE STRATEGY: MICROPLASTIC POLLUTION	7
6.2. AN EXAMPLE OF A GOVERNANCE STRATEGY: EPR SCHEME.....	7
7. ANALYSIS OF EFFECTIVENESS	8
7.1. TYPES OF INDICATORS	9
7.2. RESPONSE OPTIONS AND ACTIVITIES AS A STANDALONE CONTROL MEASURE.....	9
7.3. RESPONSE OPTIONS AND ACTIVITIES AS PART OF A GOVERNANCE STRATEGY	12

List of Tables

Table 1: Criteria for measuring effectiveness of response options and activities.....	9
---	---

List of Figures

Figure 1: Diagrammatic representation of the Bowtie analysis.....	3
Figure 2: Illustrating the application of the Bowtie analysis to the governance of plastic pollution.....	5
Figure 3: Mapping of stocktake survey fields to a governance strategy.....	6
Figure 4: The example of microplastics.....	7
Figure 5: The example of an EPR scheme for packaging.....	8

1. Purpose of the document

The third meeting of the ad hoc open-ended expert group on marine litter and microplastics (expert group) held in Bangkok, November 2019, reviewed the proposed methodology for the analysis of effectiveness of existing and potential response options and activities on marine litter and microplastics at all levels to determine the contribution in solving the global problem as outlined in document UNEP/AHEG/2019/3/5. The meeting provided comments and further requested the Secretariat to consult Member States intersessionally regarding a revised methodology. This revised methodology is taking into account comments provided during the third meeting of the expert group, data collected through the stocktaking survey as well as input provided through a submission process.

This background note is provided in preparation of an online intersessional consultation in which Member States and major groups and stakeholders are invited to participate in revising the methodology presented for consideration in document UNEP/AHEG/2019/3/5.

2. Summary of submissions on methodological approaches related to effectiveness

As per the guidance to the UNEP Secretariat on the preparations for the fourth meeting of the expert group,¹ the Scientific Advisory Committee convened by the Executive Director of UNEP to guide and provide input to the preparation of an Assessment on sources, pathways and hazards of litter including plastic litter and microplastics pollution was invited to provide advice on methodological approaches related to effectiveness. In addition, Member States and major groups and stakeholders were subsequently invited to submit further suggestions to improve the methodology for analysing effectiveness of response options and activities at all levels.

In total, 30 submissions were uploaded to the UNEP papersmart portal or emailed directly to the Secretariat. Of the portal submissions, 2 did not contain any data and 7 were duplicates, giving a total of 21 valid submissions. Of the 21 valid submissions, 6 provided information on their current or upcoming responses and activities, 3 provided a narrative highlighting the issue more broadly and 12 submissions provided suggestions relating directly to options for the methodology, including published approaches.

As requested during the third meeting of the expert group, the revised methodology takes into account the above submissions and comments provided during the third meeting of the expert group and the existing body of work on effectiveness analysis methodologies. In addition, the stocktake survey undertaken in delivery of subparagraph 7(a) of UNEA resolution 4/6 will feed into the effectiveness analysis.

3. Introduction to the revised methodology

The leakage of plastic waste into the environment presents a risk to the oceans in the form of marine plastic litter and microplastics. Management controls (preventive and mitigative) have

¹ Outcome document of the third meeting of the ad hoc open-ended expert group on marine litter and microplastics, paragraph 8.

been put in place to prevent such leakage into the environment and to mitigate the impacts thereof once leaked. An analysis of the effectiveness of management controls must identify and consider those risks which reduce the effect of preventive and mitigative measures. Stressors increase the likelihood of leakage, contributing to the pollution event and undermining the end goal of long-term elimination of discharge into the ocean.

The revised method² takes a two-pronged approach to analysing the effectiveness of response options and activities (management controls) to determine their contribution to the solving the global problem of marine plastic litter and microplastics. First, similar response options and activities are aggregated into an **archetype management control**, the components of which are informed by each individual response option or activity (see section 5.1). Secondly, the archetype management control is considered within a broader **management strategy**, based on the Bowtie analysis. This provides a more holistic analysis of the additional factors contributing to the effectiveness of the management control and the role of the management control within the broader management strategy (see section 5.2).

4. The Bowtie analysis

The IEC/ISO 31010 Bowtie analysis is a method that identifies 1) the **source** of the risk, 2) the associated **prevention** controls that reduce the likelihood of the pollution event taking place, and the 3) **mitigation**/recovery controls that reduce the effect once the pollution event has taken place.³ Together, the prevention and mitigation controls reduce the consequences to the overall objective. Outside of the governance strategy, external factors can both negatively affect (escalate) and positively affect (support)⁴ the outcome of management controls. Figure 1 provides a high-level diagrammatic overview of the Bowtie analysis.

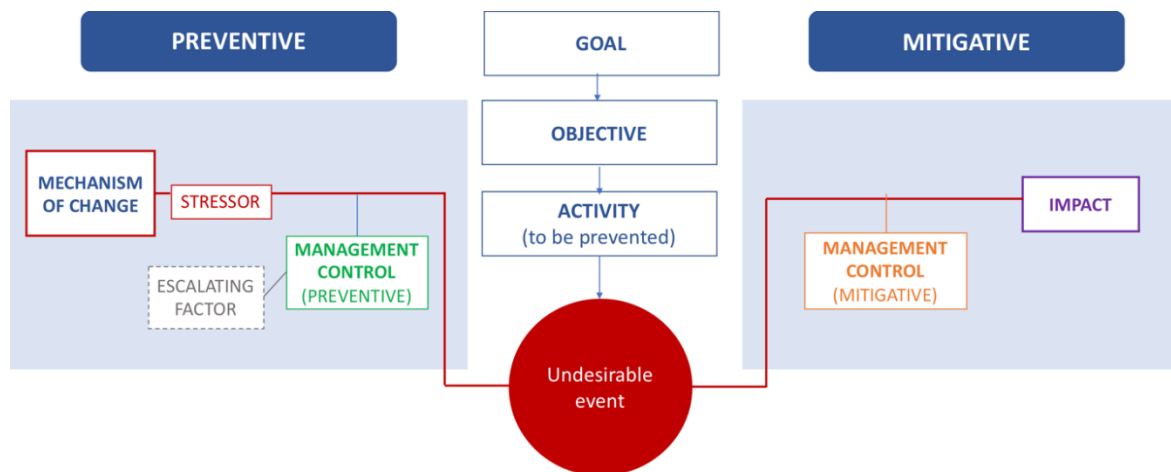


Figure 1: Diagrammatic representation of the Bowtie analysis

² A previous method is outlined in document UNEP/AHEG/2019/3/5.

³ See Cormier, R., Elliot, M., Kannen, A., 2018. *IEC/ISO Bowtie analysis of marine legislation: A case study of the Marine Strategy Framework Directive*. ICES Cooperative Research Report No. 342, 56.

<https://doi.org/10.17895/ices.pub.4504>; Astles, K.L., Cormier, R., 2018. *Implementing Sustainably Managed Fisheries Using Ecological Risk Assessment and Bowtie Analysis*. 10.103390/su10103659, Cormier, R., Elliot, M., Kannen, A., 2018. *IEC/ISO Bowtie analysis of marine legislation: A case study of the Marine Strategy Framework Directive*. ICES Cooperative Research Report No. 342, 56. <https://doi.org/10.17895/ices.pub.4504>.

⁴ “Supporting factors” are not included in the Bowtie analysis. This component has been added for the purposes of this study.

To assess the effectiveness of a governance strategy, the targets and outcomes must be evaluated against the management targets and objective to determine progress towards achieving the long-term goal (elimination of all plastic discharges into the ocean). This requires monitoring of operational controls to match actual outcomes to expected outcomes of the operational controls. Controls that have not achieved their expected outcomes should be reviewed and adapted accordingly.⁵

5. Application of the Bowtie analysis to the governance of marine plastic litter and microplastics

By effectively controlling the causes, the **event** (plastic products and waste entering the environment) can be prevented. Once the event has taken place, the consequences must be controlled through mitigation and recovery.⁶

The Bowtie analysis recognises that management controls do not operate in isolation. A number of response options may contribute to an outcome while external (escalating) factors, such as natural disasters, may influence the risks in achieving the objective. Applying the Bowtie analysis will therefore allow for a holistic view of the effectiveness of a governance strategy while providing analysis of each response option in achieving its own intended goal/objective.

The Bowtie analysis will assist in identifying 1) the mechanism of control, 2) the stressor(s), 3) prevention controls, 4) mitigative controls, and 5) the impacts and outcomes should the management controls not be effective. In addition, monitoring efforts (where available) and measurement of effectiveness (where available) for each response option will feed into the governance strategy. This will inform the evaluation of achieved results against operational and/or management targets (see figure 3 for illustration).

⁵ Astles, K.L., Cormier, R., 2018. *Implementing Sustainably Managed Fisheries Using Ecological Risk Assessment and Bowtie Analysis*. 10. 10.3390/su10103659.

⁶ Cormier, R., Elliot, M., Kannen, A., 2018. *IEC/ISO Bowtie analysis of marine legislation: A case study of the Marine Strategy Framework Directive*. ICES Cooperative Research Report No. 342, 56. <https://doi.org/10.17895/ices.pub.4504>

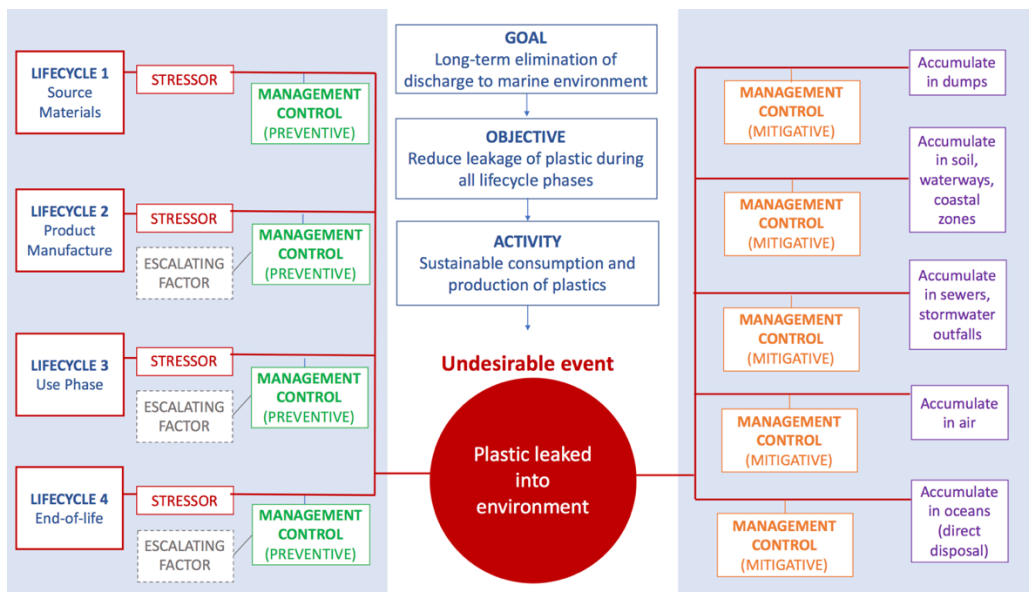


Figure 2: Illustrating the application of the Bowtie analysis to the governance of plastic pollution

Figure 2 provides an overview of the Bowtie analysis as applied to the issue of marine litter. On the left-hand side, the mechanisms of change are reflected in the four lifecycle phases. Each phase may have one or more stressors that increase the likelihood of plastic leaking into the environment. Multiple management controls may be applied to prevent such leakage from happening. Each lifecycle phase may result in one or more impacts on the right-hand side, which could lead to accumulation of plastic litter and microplastics in the oceans. In addition, accumulation in the oceans can result from direct disposal of plastic waste and fishing gear.

6. Mapping the stocktake survey to the Bowtie analysis

The stocktake survey undertaken in delivery of subparagraph 7(d) of UNEA resolution 4/6 will provide one source of response options and activities to identify the various components of the governance strategy. Figure 3 illustrates which fields within the survey will be mapped to the governance strategy. Those fields that will not be used are also listed.

RESPONSE OPTION/ACTION TITLE (7)

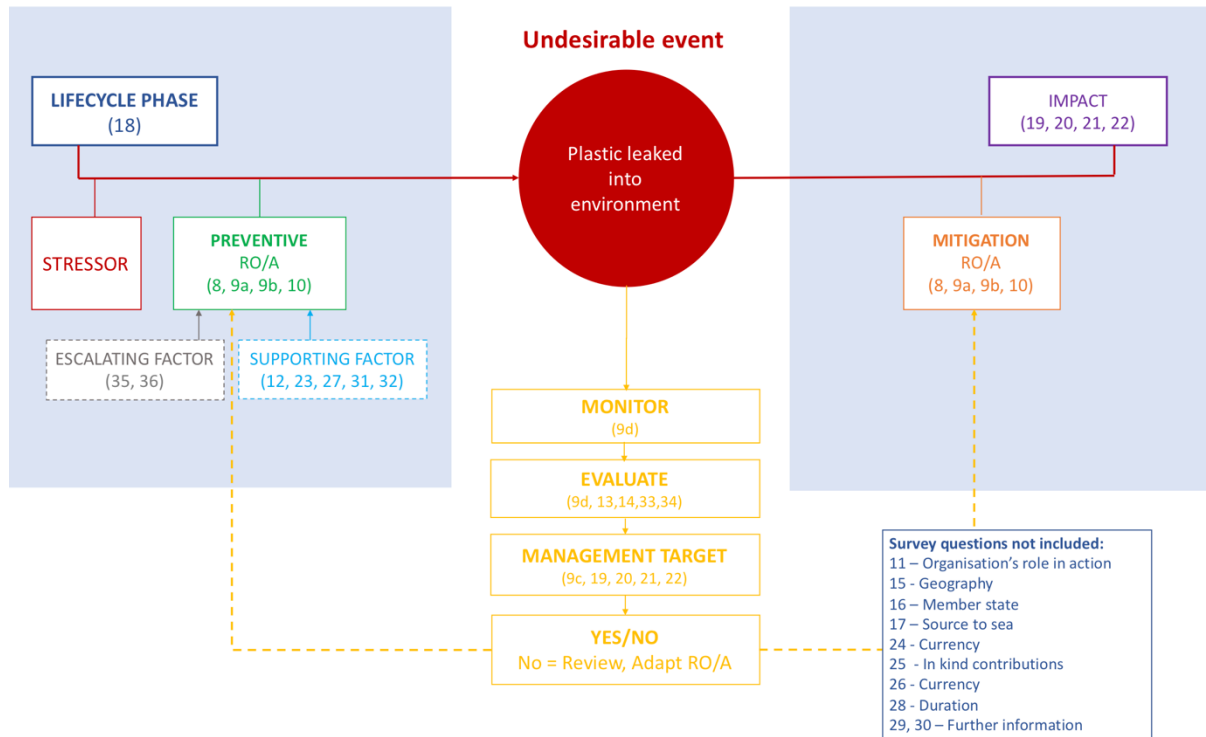


Figure 3: Mapping of stocktake survey fields to a governance strategy

Figure 3 legend:

SOURCE OF CHANGE - LIFECYCLE PHASE	
18	Raw materials
	Design, production/manufacture
	Use/Consumption
	Collection / sorting of plastics after use
	Management of collected plastics
	Clean-up of plastic from the environment
MANAGEMENT TARGET	
9c	Technology and processes (incl research)
19	Target of action
20	Impacts or harms action relates to
21	Types of items or contaminants targeted
22	Sectors targeted
EVALUATION	
9d	Monitoring and analysis activities
13	Reporting and evaluations
14	Actual outcomes, impacts evaluated
33	Timeframe for evidence of impact
34	Are outcomes evaluated

RESPONSE OPTION/ACTIVITY	
7	ACTION TITLE
8	TYPE OF ACTION
9a	Legislation, standards, rules
9b	Working with people
10	Type of Action
MONITORING	
9d	Monitoring and analysis activities
SUPPORTING FACTORS	
35	Drivers
36	Barriers
ESCALATING FACTORS	
12	Actors (cooperation)
23	Action is funded
27	Type of funding (see list)
31	Stakeholder engagement
32	Systems circularity

Additional sources for identifying response options and actions include the study on technical and financial resources or mechanisms (subparagraph 7(b) of UNEA resolution 4/6), the study on partnerships and increased cooperation (subparagraph 7(c) of UNEA resolution 4/6) and a literature review.

6.1. An example of a governance strategy: microplastic pollution

Figure 4 provides an example of a governance strategy to prevent pollution by microplastics. Here, the component of microfibres from clothing is illustrated.

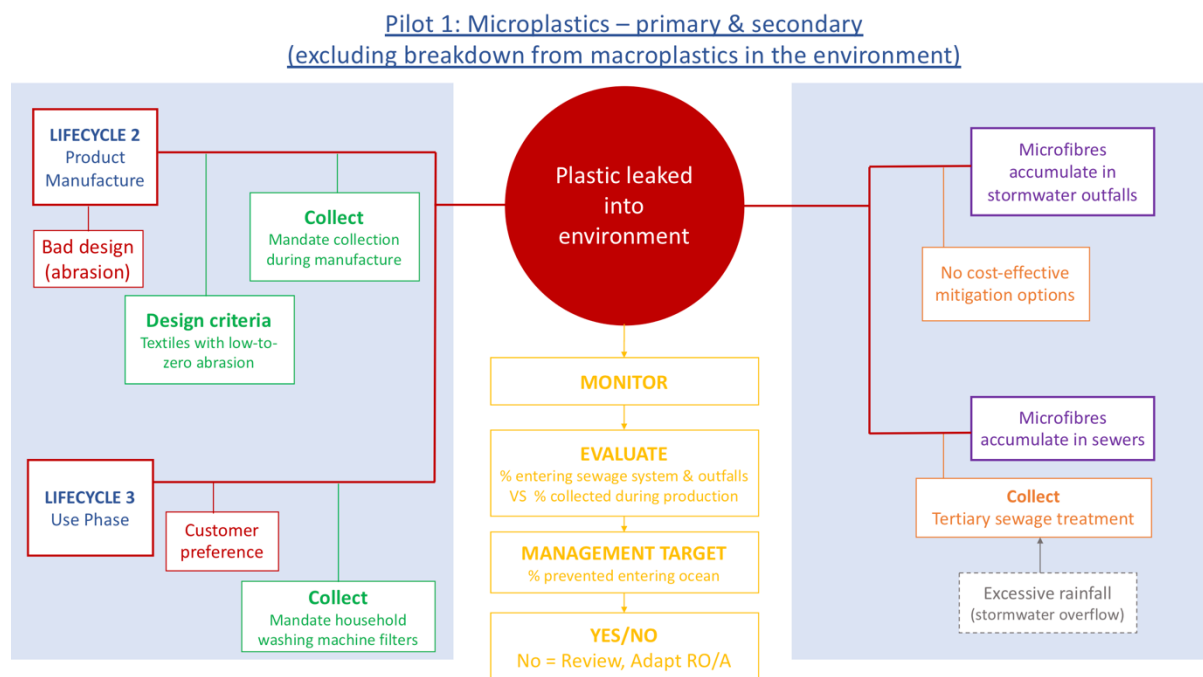


Figure 4: The example of microplastics

The full governance strategy for eliminating discharge of microplastics would include microbeads, other microplastics and additional lifecycle phases (including the use phase). The diagram is provided for illustrative purposes only will be further mapped out during the study.

6.2. An example of a governance strategy: EPR Scheme

Figure 5 provides an example of a governance strategy that uses an Extended Producer Responsibility (EPR) scheme to contribute to financing collection and recycling processes.

Pilot 2: EPR Scheme for Packaging

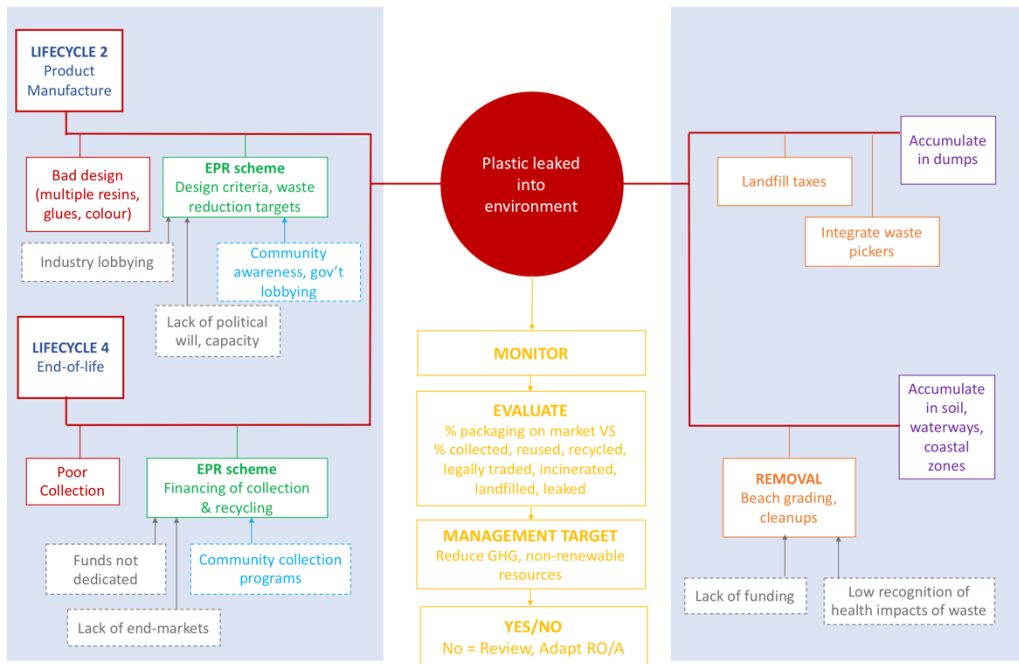


Figure 5: The example of an EPR scheme for packaging

As for figure 4, this diagram is provided for illustrative purposes only and will be further mapped out during the study.

7. Analysis of effectiveness

Submissions from Member States, the Scientific Advisory Committee and major groups and stakeholders have been taken into account in the revised method for the analysis of the effectiveness of existing and potential response options and activities on marine litter and microplastics at all levels to determine the contribution in solving the global problem.

The analysis will, amongst other submission suggestions, be qualitative, take into account the DPSIR (drivers, pressure, state, impact and response) model, acknowledge the multi-disciplinary and cross-sectoral nature of combating plastic pollution across its full life cycle.

It was suggested the analysis should not evaluate whether implementation is effective based on current domestic implementation, as that is case-specific given a country's capabilities but could identify barriers to and enabling conditions for fully effective implementation.

Where operational or management targets have not been set, some may be suggested to complete the governance strategy. These may be based on the Sustainable Development Goals as a default. Where monitoring is not in place or is limited to particular management controls only, this will be highlighted as a gap.

Barriers discussed in the first and second meeting of the expert group will be included in the discussion of each strategy. Where response options may reduce the effect of an identified barrier, this will be included in the assessment of effectiveness in contributing to solving the global issue.

7.1. Types of indicators

Input indicators are used to measure the amount of resources that are allocated to a policy. Thus, they are measures of effort.

Output indicators monitor how efficiently policies are executed. The information they provide can help to improve the implementation of policies. Output indicators measure quantities that are produced by a policy in order to achieve its objectives, but not progress towards the objectives itself. Outputs are means to achieve a policy objective, but no ends in themselves. They are produced because policy makers expect them to contribute to desirable outcomes.

Outcome/result indicators are used to monitor the effectiveness of policies in achieving their objectives. They help to understand whether policies are well-designed in view of their objectives. Outcomes are the underlying motivation behind policies, but in most cases, they can only be affected through the production of outputs.⁷

7.2. Response options and activities as a standalone control measure

Similar response options and activities will be grouped into a single management control, forming an archetype management control. Individual response options will be listed individually within each of the components of the management control, illustrating the range of control measures being taken and informing the qualitative assessment and discussion for the archetype management control.

Within the scope and goal/objective of the response option or activity, a successful response option will be qualitatively assessed on whether the components listed in Table 1 are included in activities, followed by a discussion (see below).

The introductory narrative to the archetype management control (response option or activity) will include the following:

1. Life Cycle Phase - upstream or downstream and which of the four phases the activity fits into.
2. Geographic Range – scope of the activity (e.g., source-to-sea, river basin management, coastal zone management).
3. Environmental Zone – where the activity is being implemented (e.g. land, freshwater and marine).
4. Regulatory/Non regulatory – if the activity is regulatory or non-regulatory.
5. Scope – if the activity is focused on the regional, national, sub-national, or local level.

Table 1: Criteria for measuring effectiveness of response options and activities

Type of response option or activity		
Preventive control, mitigative control, or monitoring and evaluation.	<i>Identifies the role of the response option or activity within the broader management strategy.</i>	

⁷ OECD, 2016. *Using Outcome Indicators to Improve Policies: Methods, Design Strategies and Implementation*. OECD Regional Development Working Papers 2016/02. <https://dx.doi.org/10.1787/5jm5cgr8j532-en>

Governance components		Yes, No, N/A
Management target/s are defined (What is to be achieved?)	<i>List targets defined in legislation, policy, strategy, action plan, declaration, commitment, programs, etc.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Operational target/s are defined (How is it to be achieved and measured?)	<i>List targets. Quantitative or qualitative, as appropriate. These could be output, outcome and/or impact targets.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Management components		Yes, No, N/A
Local capacity building and development	<i>List workshops, awareness raising, etc. targeting, for example, industry sectors, authorities, consumers.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Ongoing funding is secured	<i>Funding is allocated from domestic sources.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Monitoring is in place	<i>List relevant monitoring activities in place.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Reporting is in place	<i>List relevant reporting in place.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Review process is defined	<i>List the types of evaluation and review processes is in place.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Co-operation components		Yes, No, N/A
Domestic	<i>List stakeholders engaged, including relevant sectors and actors as appropriate to the response option or activity.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
International	<i>Funding for bilateral/multilateral programmes, capacity building activities.</i>	
	<ul style="list-style-type: none"> • Response option #1 	
	<ul style="list-style-type: none"> • Response option #2 ... 	
Co-benefits		Yes, No, N/A
Social, economic, environmental	<i>List benefits beyond prevention of leakage of plastic into the marine environment.</i>	
	<ul style="list-style-type: none"> • Response option #1 	

	• Response option #2 ...	
Overall effectiveness towards the global goal of elimination of discharge		
Should published data be available that allows for a quantitative or qualitative measure of the effectiveness of a response option or activity towards preventing discharge of plastic waste to the marine environment, such research will be highlighted. This will be context-specific and dependant on the capacity of each country or community and will therefore be reflected in the discussion of the archetype management control.		

As per the report of the third meeting of the ad hoc open-ended expert group on marine litter and microplastics (UNEP/AHEG/2019/3/6):

“The assessment of the effectiveness of possible response options should enable measurement of whether progress was being made towards the global goals that had been set, primarily target 14.1 of the Sustainable Development Goals and ultimately the elimination of all discharge of plastic litter into the ocean. Several representatives said that in order to achieve such measurement, more data and research were needed to provide a strong scientific and knowledge base.”

Discussion

A discussion will follow the assessment of the archetype management control. Although not a measure of effectiveness, the role of the response option or activity within the broader management strategy will be discussed (preventive control, mitigative/recovery control or contributing to the monitoring, reporting and evaluation of the management control).

In addition, the discussion of the archetype management control (response option or activity) will include the following:

- Maturity – how established a given response option or activity is (e.g. low = not yet established, medium = ready to be applied or has been piloted (established), high = well-established with many examples of use in countries).
- Scale – the level of effort of each activity (e.g. small, medium, or high).

Escalating factors

The barriers identified in the first and second meeting of the expert group will be reflected as escalating factors within the broader management strategy (section 5.2). The discussion of archetype management controls will highlight where response options may reduce the effect of a barrier, but this effect will not be included in the assessment of effectiveness in contributing to solving the global problem.

Supporting factors

Response options and activities submitted by major groups and stakeholders will be reflected as supporting factors. These are not necessarily within the control of government authorities but play an important role towards achieving the global goal and objective of long-term elimination of discharge to the oceans.

Tracking the global goal

The operational and management targets, the objective and any co-benefits will, where applicable, be mapped to the Sustainable Development Goals beyond 14.1. The discussion will therefore also consider whether the response option or activity contributes to tracking global progress of long-term elimination of discharge to the marine environment.

7.3. Response options and activities as part of a governance strategy

The development of governance strategies will illustrate the interplay between various response options, providing a view of the **cause–effect pathways** and the **drivers** that can influence the effectiveness of responses in achieving management targets across the lifecycle of plastics and towards the overall global objective of eliminating discharge to the marine environment.

By including escalating and supporting factors, a more **holistic view** of the cause-effect pathways for plastic waste entering the oceans is developed. This will provide policymakers with an opportunity to evaluate all contributing factors within their national context and the comprehensiveness of their own responses to the issue.

Each governance strategy will aim to provide a qualitative assessment of the effectiveness of response options and activities currently in use by different governments, institutions, industry, civil society and academia. This will be illustrated through the following:

1. The process of developing a complete governance strategy, within current knowledge, by incorporating different response options related to the issue will highlight components of **response options or activities that are not consistently included** in the modelled governance strategy.
2. Where quantitative data is available for a particular response option, this will be included in the analysis of that response option, forming a component of the qualitative assessment of the **contribution of that response option** to the governance strategy.
3. The governance strategy can **build knowledge on the gaps** in the governance strategy intended to address the issue or marine plastic litter and microplastics. For example, monitoring or reporting may not cover a particular aspect required to evaluate and review the effectiveness of management controls.

Bibliography:

Astles, K.L., Cormier, R., 2018. *Implementing Sustainably Managed Fisheries Using Ecological Risk Assessment and Bowtie Analysis*. 10. 10.3390/su10103659

Cormier, R., Elliot, M., Kannen, A., 2018. *IEC/ISO Bowtie analysis of marine legislation: A case study of the Marine Strategy Framework Directive*. ICES Cooperative Research Report No. 342, 56. <https://doi.org/10.17895/ices.pub.4504>

OECD, 2016. *Using Outcome Indicators to Improve Policies: Methods, Design Strategies and Implementation*. OECD Regional Development Working Papers 2016/02. <https://dx.doi.org/10.1787/5jm5cgr8j532-en>