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Agenda Item 3: Marine Litter CORMON

Updated Baseline Values (BV) and Threshold Values (TV) for IMAP Common Indicator 23 (Seafloor macro-litter, Floating microplastics)

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Note by the Secretariat

In 2016, the 19th Meeting of the Contracting Parties adopted the Baseline Values for the IMAP EO10 Marine Litter Common Indicators ([Decision IG.22/10](#)). These Baseline Values were established for IMAP Common Indicator 22 (i.e., beach macro-litter), Common Indicator 23 (i.e., seafloor macro-litter, and floating micro- and macro-litter), as well as for Candidate Indicator 24 (i.e., affected (%) sea turtles and ingested (gr) marine litter). The 2016 Baseline Values were complemented with marine litter environmental reduction targets providing for significant and measurable decrease of the different marine litter compartments.

With the view of preparing the 2023 Mediterranean Quality Status Report (MED QSR) there is a need to further update the marine litter assessment criteria and related baseline values; and taking into consideration the work undertaken in the field, MED POL was mandated in the Programmes of Work for the biennia 2020-2021 and 2022-2023 to develop updated Baseline Values (BV) and to recommend Threshold Values (TV) for IMAP Ecological Objective 10 (Marine Litter) and its Common Indicators 22 (CI22) and 23 (CI23).

Regarding CI 22, MED POL prepared during the biennium 2020-2021 updated Baselines Values (BV) and proposed Threshold Values. These were adopted by COP22 (Antalya, Türkiye, 7-10 December 2021). The updated Baseline and proposed Threshold Values are included in the annex to [Decision IG.25/9](#) “Amendments to the Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Land Based Sources Protocol.” This work led MED POL to elaborate a similar approach for updating the Baseline Values and proposing Threshold Values for IMAP CI23 during the biennium 2022-2023. The process was initiated in early 2021 in cooperation with the Contracting Parties to the Barcelona Convention and is planned to be concluded in December 2023. A total of 15 Contracting Parties have submitted data through the IMAP InfoSystem. This work was undertaken with a particular focus on seafloor macro-litter and floating microplastics. InfoRAC provided substantive support to the process by providing technical assistance to the respective countries; thus enabling the timely submission of validated and quality assured datasets.

The first version of the updated BVs and proposed TV for IMAP CI 23 were presented to the Meeting of the Ecosystem Approach Correspondence Group on Marine Litter Monitoring (CORMON Marine Litter) held in Athens, Greece, on 3 March 2023. Further to reflecting several comments received from the Meeting, the following revisions were made:

- a) Revision and validation of existing data, including the submission of new datasets for a number of countries; and
- b) Proposition of intermediate environmental targets towards achievement of GES.

The updated document describes the conceptual and methodological approaches utilized for defining and updating the Baseline Values (BV) and Threshold Values (TV) for IMAP Common Indicator 23 at the regional level, and, in particular, for seafloor macro-litter and floating microplastics. The adopted statistical/methodological approach follows the same approach used for IMAP CI22. The proposed values (BV-TV) are applied in parallel for the preparation of the marine litter chapter of the 2023 Mediterranean Quality Status Report (MED QSR) and the respective chapters have been revised accordingly.

The present document is submitted to the Integrated Meeting of the Ecosystem Approach Correspondence Groups for their review and endorsement, including the use of the respective values for the needs of the 2023 MED QSR (Marine Litter Chapter), with the aim to propose values (BV-TV) to the Ecosystem Approach (EcAp) Coordination Group Meeting to be convened in Istanbul, Türkiye on 11 September 2023, and the MAP Focal Points Meeting to be held in Istanbul, Türkiye from 12-15 September 2023.

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List of Abbreviations / Acronyms

BV	Base Line Value
CI	Common Indicator
COP	Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols
DD	Data Dictionaries
DS	Data Standards
EC	European Commission
EcAp	Ecosystem Approach
EO	Ecological Objective
EU	European Union
GES	Good Environmental Status
IMAP	Integrated Monitoring and Assessment Program of the Mediterranean Sea and Coast and Related Assessment Criteria
JRC	Joint Research Centre
MAP	Mediterranean Action Plan
MED POL	Mediterranean Pollution Assessment and Control Programme
MED QSR	Mediterranean Quality Status Report
ML	Marine Litter
MSFD	Marine Strategy Framework Directive
TGML	Technical Group on Marine Litter
TV	Threshold Values
UNEP	United Nations Environment Programme

1. Objective

1. The objective of the present document is to elaborate, formulate and update assessment criteria for IMAP EO10 Marine Litter at regional level, taking into account recent developments on the national and regional levels concerning marine litter monitoring and assessment, and most importantly the outcomes of implementation of the Integrated Monitoring and Assessment Program of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP).

2. The present document elaborates a proposal for updating the 2016 Baseline Values (BV) and proposing the establishment of Threshold Values (TV) for IMAP Common Indicator 23 (CI23), and specifically for seafloor macro-litter and floating microplastics.

2. Conceptual Approach, Definition and Estimation of Baseline and Threshold Values for Marine Litter

2.1 Baseline Values (BV)

3. After the adoption of the Regional Plan on Marine Litter Management in the Mediterranean in 2013 (Decision IG.21/7), UNEP/MAP adopted in 2016 the first Marine Litter Baseline Values (Decision IG.22/10 – Annex II), against which the implementation of the Regional Plan's programmes of measures could be assessed. Further to the 2017 Mediterranean Quality Status Report (MED QSR) and the progress in IMAP implementation, UNEP/MAP with the support of its MED POL Programme has progressed in updating a number of assessment criteria, including the BV and TV for IMAP CI23.

4. The Baseline Values (BV) would enable the basis for assessing the quantitative evolution (increasing/decreasing/stable) of marine litter in the marine and coastal environment, the effective of the applied reduction and prevention measures, the elaboration and establishment of updated environment reduction targets (in line with Decision IG.22/10), as well as supporting Good Environmental Status (GES) and non-GES scenarios.

5. Towards advancing the work for assessing GES in the Mediterranean, UNEP/MAP adopted during COP 22 (Antalya, Türkiye, 7-10 December 2021) updated Baselines Values (BV) and established Threshold Values for IMAP CI22¹ (beach macro-litter), and with the present document proposes relevant values also for IMAP CI23 (i.e., seafloor macro-litter, floating microplastics).

6. In line with the relevant elaboration the following definition has been used:

7. Definition of Baseline Values: According to definition provided by the UNEP/MAP Informal Online Group on Marine in 2015² and as used in UNEP/MED WG.514/7³, “A *baseline is a description of environmental state at a specific point against which subsequent values of state are compared. It may refer to a specified level of an impact or a pressure and act as a reference against which limit can be set or trends for the assessment of GES. Baselines can be derived from reference conditions, initial assessment values, the present state, or a potential/predicted issue.*”

8. The Joint Research Centre (JRC) of the European Commission (EC), introduced a similar definition: “A *baseline value for marine litter refers to the information related to marine litter abundance that can be used as reference point in time in order to test the achievement of quantitative litter reduction goals (Van Loon et al., 2020).*”

¹ Annexed to Decision IG.25/9 “Amendments to the Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Land Based Sources Protocol”.

² UNEP/MED WG.411/Inf.10: First Report of the Informal Online Group on Marine Litter. Meeting of the Integrated Monitoring and Assessment Group (Athens, Greece, 30 March – 1 April 2015).

³ UNEP/MED WG.514/7: Updated Baseline Values and Proposal for Threshold Values for IMAP Common Indicator 22. 8th Meeting of the Ecosystem Approach Coordination Group, Videoconference, 9 September 2021.

9. In the framework of the Ecosystem Approach (EcAp), UNEP/MAP adopted in 2016 a series of Baseline Values (BV) for the marine litter IMAP Indicators based on a thorough analysis and statistical elaboration conducted at that time based on existing marine litter data deriving from relevant publications and reports. This analysis was conducted by the UNEP/MAP Informal Online Working Group on Marine Litter (OWG-ML) in 2014-2015 and was considered and approved by the Meeting of the Integrated Monitoring Correspondence Group in 2015 (Athens, Greece, 30 March – 1 April 2015).

10. The updated Baseline Values (BV) for IMAP CI23 have been based on the data generated by the Contracting Parties in the framework of their IMAP-based national monitoring programmes, supported by various sources (e.g., projects and other initiatives) and officially reported and uploaded through [IMAP InfoSystem](#).

11. Baseline values will and can be used at different organizational levels for evaluating the compliance with reduction goals, and thus their setting is crucial in the entire process for reducing marine litter.

2.2 Threshold Values (TV)

12. The composition, quantity and spatial distribution of marine litter on the shoreline, in the surface layer of the water column and on the seabed should be at levels that do not cause damage the marine and coastal environment. For this purpose, threshold values (TV) are established taking into account regional or sub-regional specificities (Van Loon et al., 2020).

13. Definition of Threshold Values: The New GES Decision (2017/848) of the European Commission (EC) provides a definition for the Threshold Values for marine litter: “*Threshold value means a value or range of values that allows for an assessment of the quality level achieved for a particular criterion, thereby contributing to the assessment of the extent to which good environmental status is being achieved.*”

14. For the determination of Threshold Values (TV), pristine or next to pristine areas/ environments should be considered. Due to the ubiquity of plastic in the marine environment worldwide, it is very difficult to define/find a pristine area, which for some experts does not even exist (Matiddi M. et al., 2019; Hanke et al., 2019, Van Loon et al. 2020).

15. The European Union (EU) Marine Strategy Framework Directive (MSFD) Technical Group on Marine Litter (TGML) proposes threshold values for marine litter, not based on evidence of ecological harm, which cannot be assessed in practice. Rather, it considers that there is some degree of freedom to establish a threshold value and an assessment method which shows a good level of ambition, is feasible (e.g., by selecting a low percentile value; percentile 1 (Q1), 5(Q5), 10(Q10), 15(Q15)), practical, and robust to apply (e.g., using the low percentile threshold value and the median assessment value). In that respect, a lower threshold value results in a lower residual risk of ecological harm (Willem van Loon et al. 2019).

16. For the determination of the Baseline and Threshold Values in the Mediterranean, UNEP/MAP has embarked on IMAP implementation, through the establishment and implementation of IMAP-based national monitoring programmes for IMAP Ecological Objective 10 (EO10) Marine Litter and its Common Indicators 22 (CI22) and 23 (CI23) across the Mediterranean. Relevant data sets deriving from national monitoring programmes have been gradually available and have been progressively uploaded and stored to [IMAP InfoSystem](#).

17. The respective IMAP-based national monitoring programmes are supporting the process for achieving GES with quality controlled and quality assured data for all IMAP Common Indicators, including for those focusing on IMAP EO10 Marine Litter (i.e., Common Indicators 22 and 23).

3. Data Sets and Data Management

18. Overall, Baseline and Threshold Values are strongly linked and associated with data availability and data quality. This is also the case for IMAP EO10 Marine Litter. Data should be acquired through harmonized monitoring methodologies to provide comparable data. This still remains a challenge, though much progress has been made in the framework of UNEP/MAP IMAP, whereby data are generated through region-wide agreed protocols and methodologies, also streamlined through the development of relevant information standards (i.e., Data Standards (DS) and Data Dictionaries (DD)) for the pollution and marine litter IMAP cluster, as reflected in [IMAP InfoSystem](#).

19. To support this process UNEP/MAP and its MED POL programme prepared the region-wide Guidelines for Monitoring Floating Microplastics,⁴ as well as reporting templates (Data Standards and Data Dictionaries⁵) for IMAP CI23, and in particular seafloor macro-litter and floating microplastics.

20. Quantitative data necessary to assess abundance, trends and distribution of marine litter is required to put in place and implement targeted and effective prevention and reduction measures for marine litter in the Mediterranean. While monitoring marine litter has been ongoing for several years in the Mediterranean, yet difficulties do exist in getting a comprehensive overview and thus to analyze the abundance of marine litter; distribution; categories; and trends in different spatial scales from local areas throughout the Mediterranean Sea. In that regard, the central storage of the respective datasets to regional repository, like the [IMAP InfoSystem](#), is expected to significantly ease and harmonize this process. This process has not been particularly easy, but through targeted capacity building actions and on-the-ground experience is expected to become more familiar for all concerned parties, including for the UNEP/MAP Secretariat and its Contracting Parties.

21. The following information and data are required to establish marine litter baseline values:

- Ideally, data collected using the same, or a comparable, monitoring protocol;
- Data with sufficient spatial coverage;
- Data with sufficient temporal coverage;
- Data with sufficient “fit-for-purpose” quality;
- Agreement on a procedure for data clean-up; and
- Agreement on a baseline calculation method.,

22. Moreover, it is crucial to agree on several variables related to data management and treatment (JRC, 2019), which include the following:

- The time period from which data is used for the calculation of baselines;
- The temporal aggregation of data;
- The spatial aggregation of data; and
- The mathematical procedure used for baseline calculation.

4. Methodological Approach to Determine Baseline and Threshold Values for IMAP EO10 Marine Litter in the Mediterranean

23. For the elaboration and determination of Baseline and Threshold Values for IMAP CI23 (namely: seafloor macro-litter and floating microplastics), the data used correspond to data collected from the Contracting Parties to the Barcelona Convention between 2016 and 2020 in the framework of the respective IMAP-based national monitoring programmes, and officially submitted and validated

⁴ UNEP/MED WG.490/7: Monitoring Guidelines/Protocols for Floating Microplastics. Meeting of the Ecosystem Approach Correspondence Group on Marine Litter Monitoring (CORMON Marine Litter) (Videoconference, 30 March 2021).

⁵ UNEP/MED WG.473/8: Data Standards and Data Dictionaries for Common Indicators related to Pollution and Marine Litter. Meeting of MED POL Focal Points (Istanbul, Türkiye, 29-31 April 2019).

through the IMAP InfoSystem. The selection of the 2016-2020 period is due to the availability of full years data in a significant number of countries compared to previous years in which data availability was rather scarce or limited.

24. Considering all available datasets and information from a number of Contracting Parties, all steps have been undertaken in close collaboration between UNEP/MAP Barcelona Convention Secretariat and its Contracting Parties. The present work to set-up baseline and threshold values for marine litter in the Mediterranean has also taken into consideration the ongoing discussions on marine litter monitoring, establishment of baseline and threshold values within the EU MSFD TGML framework (i.e., Van Loon et al., 2020).

4.1 IMAP Common Indicator 23: Seafloor Macro-litter

25. During the present exercise for elaborating updated Baselines Values (BV) and proposing Threshold Values (TV) for seafloor macro-litter (IMAP CI23), eleven (11) countries have contributed with data. Under the present exercise, the data were provided by the respective Focal Points with an official submission through IMAP InfoSystem, and have undergone thorough quality checks, and thus do not contain erroneous data.

26. All data from for the total number of surveys have been collected for the current exercise into the IMAP InfoSystem, in accordance with the region-wide reporting templates (i.e., DS and DD) as proposed by UNEP/MAP and adopted by its institutional meeting (i.e., CORMON Marine Litter, MED POL Focal Points, and EcAp Coordination Group Meetings). As also applied for the case of elaboration of BV and TV for IMAP CI22, the extreme values that were observed (outliers) were retained in the datasets and were checked and verified case by case. The number of surveys conducted in each country and the year when it was undertaken for seafloor macro-litter (IMAP CI23) is presented in Table 1 hereunder.

Table 1: Number of surveys per respective Contracting Party used for the elaboration of updated BV and proposal of TV for seafloor macro-litter (IMAP CI23)

Country	Trawl Surveys (Number)	Years	Data Source
Croatia	27	2017, 2018, 2019, 2020	National Monitoring Programme
Cyprus	130	2016, 2017, 2018, 2019, 2020	MEDITS / National Monitoring Programme
France	332	2016, 2017, 2018, 2019, 2020, 2021	MEDITS
Israel	11	2020, 2021, 2022	National Monitoring Programme
Malta	48	2016, 2017	MEDITS
Montenegro	5	2019, 2020	National Monitoring Programme (EPA)
Morocco	15	2018, 2019, 2022	National Monitoring Programme
Slovenia	32	2017, 2018, 2019, 2020	MEDITS / National Monitoring Programme
Spain	639	2016, 2017, 2018, 2019, 2021, 2022	MEDITS / National Monitoring Programme
Tunisia	10	2018, 2020	National Monitoring Programme
Türkiye	55	2016, 2019	National Monitoring Programme (DEN-iZ)
TOTAL	1,304		

4.2 IMAP Common Indicator 23: Floating Microplastics

27. During the present exercise for elaborating updated Baselines Values (BV) and proposing Threshold Values (TV) for floating microplastics (IMAP CI23), eleven (11) Countries have contributed with data. Under the present exercise, the data were provided by the respective Focal Points through an official submission through IMAP InfoSystem, and have undergone thorough quality checks, and thus do not contain erroneous data.

28. All data from the total number of surveys have been collected for the current exercise into the IMAP InfoSystem, in accordance with the region-wide reporting templates (i.e., Data Standards and Data Dictionaries) as proposed by UNEP/MAP and adopted by its institutional meeting (i.e., CORMON Marine Litter, MED POL Focal Points, and EcAp Coordination Group Meetings). As also applied for the case of elaboration of BV and TV for IMAP CI22, the extreme values that were observed (outliers) were retained in the datasets and were checked and verified case by case. The number of surveys conducted in each country and the year when it was undertaken for floating microplastics (IMAP CI23) is presented in Table 2 hereunder.

Table 2: Number of surveys per respective Contracting Party used for the elaboration of updated BV and proposal of TV for floating microplastics (IMAP CI23)

Country	Number of Surveys	Years
Bosnia and Herzegovina	3	2019, 2021
Croatia	30	2017, 2018, 2019, 2020
France	52	2017, 2018, 2020, 2021
Greece	26	2017, 2019, 2020
Israel	21	2019, 2020, 2021
Italy	1,839	2016, 2017, 2018, 2019, 2020
Lebanon	14	2019
Slovenia	32	2019, 2020
Spain	426	2017, 2018, 2019, 2020, 2021, 2022
Tunisia	6	2017, 2019, 2020
Türkiye	25	2016, 2017, 2018, 2019, 2020
TOTAL	2,474	

5. Determination of Baseline and Threshold Values

5.1 Baseline Values (BV) and Threshold Values (TV) for Seafloor Macro-litter

29. For each country, the basic statistical values have been calculated together with the average and median values corresponding to the total amounts of seafloor macro-litter found in each survey per respective year, and then per country as illustrated in Table 3 hereunder. The seafloor macro-litter data distribution is provided under Figure 1 hereunder.

Table 3: Descriptive statistics parameters by country for seafloor macro-litter (item/km²)

Country	Average	Standard Deviation	Median
Croatia	322	274	217
Cyprus	31	36	14
France	229	208	161
Israel	9,673	16,395	2,373
Malta	78	51	72
Montenegro	61	69	26
Morocco	417,031	261,850	325,418
Slovenia	44	44	40
Spain	335	821	178
Tunisia	35	35	17
Türkiye	208	203	131
Total average	38,913	-	29,877

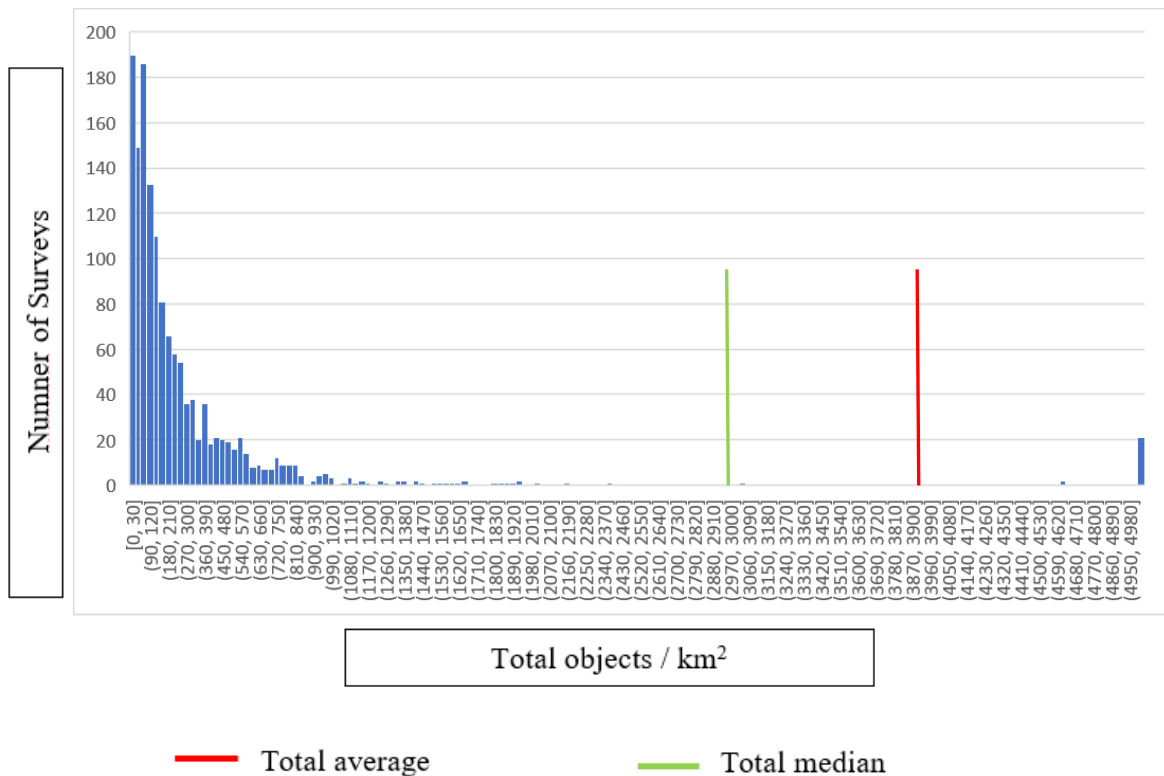


Figure 1: Frequency and distribution of the total values for seafloor macro-litter (IMAP CI23).

30. As can be figured out by Figure 1, non-symmetrical distributions are predominant in the seafloor macro-litter count (Table 3 and Figure 1). A thorough examination of the respective data, presented in Figure 1 and Table 3, indicates that the standard deviation is very high, even greater than the average for some countries. Thus, it gives a very wide range of average values (i.e., Cyprus: average 31 items/km²; standard deviation 36 items/ km², Table 3).

31. The graphic representation under Figure 1 shows that the data distribution for seafloor macro-litter is very irregular; and thus, **the median value is the most representative**. This is also confirmed by the higher frequencies, which are closer to the median value.

32. In fact, the median value is considered a better measurement of the central location of a value, than the average value in the case of a non-symmetric distribution (Baggelaar, Paul K. and Van der Meulen Eit C.J., 2014; Willem van Loon et al., 2019). This is due to the reason that, the median value is not sensitive to extreme values (Willem van Loon et al. 2019). Extreme values may sometimes occur, for example due to an extreme/intense storm event or an accidental loss of marine litter at sea. For all countries participating to the current exercise, the use of the median value will make the assessment insensitive to these occasional extreme values (Willem van Loon et al. 2019).

33. Baseline analyses can be performed at different spatial scales. The definition of boundaries for clustering at a specific scale is determined by political or geographical factors. For different purposes, baselines at different spatial scales are needed. The spatial resolution of the analysis will reflect the level at which common application of management measures will be necessary (Hanke et al., 2019). Theoretical spatial scenario options include:

- Global level
- Regional level (Mediterranean)
- Sub-regional level
- Member State level (national)
- Country region level (area)
- Local level (beach or set of beaches).

34. The selection of a spatial aggregation level is related to the spatial scope of the analysis, in terms of trends, setting thresholds, and other purposes. Monitoring should allow assessment of the need for action and validation of its success (Hanke et al., 2019). In the case of IMAP CI23 spatial aggregation is further influenced by the transboundary nature of marine litter, as it can also be transported over long distances. Regarding the geographical scale level, differences in sub-regions, could not be considered in this analysis, as the relevant data were not always available.

35. The data provided by the Contracting Parties represent 42% of the total Mediterranean. The analysis must take into account a weighting factor based on the maritime territory of each country to increase spatial representativeness.

36. The total percentage represented in the analysis (42%) is bigger than 30% of the total Mediterranean territorial sea it is considered adequate to increase the data representativeness.

37. Further to the above analysis, the baseline values for seafloor litter were calculated as depicted in Table 4:

Table 4: Mediterranean weighted median (median adjusted with the percentage of the country's maritime surface area)

Mediterranean	weighted median (item/km²)
	135

38. Hence, for **seafloor macro-litter (IMAP CI23), the proposed, updated Baseline Value for the Mediterranean is 135 item/km²** (Table 4). The BV for seafloor litter baseline that was adopted in 2016 by COP 19 (Athens, Greece, 9-12 February 2016) was 130-230 items/km². If we compare the BV value agreed in 2016 (130-230 items/km²) and the one proposed in 2023 (135 items/km²), we can assess that the proposed-2023 value is close to the lower BV (130 items/km²) established in 2016.

39. To calculate the threshold value, and also in line with the approach used for calculating the respective values for CI22 in 2021, it was proceeded with the estimation of the 15th percentile of the baseline results (Willem van Loon, David Fleet and Georg Hanke, 2019), against which to compare the state of seafloor litter in the Mediterranean, following the marine litter descriptor aim. The results from the different percentile calculations (Table 5, Q1, Q5, Q10, Q15) could be linked with more ambitious reduction targets, enhanced application of prevention and reduction measures, as well as on site removal of marine litter from the seafloor of the Mediterranean.

Table 5: Different scenarios for percentile calculation (Q) values (i.e., Q1 – 1%, Q5 – 5%, Q10 – 10%, Q15 – 15%).

Q1 (items/km ²)	Q5 (items/km ²)	Q10 (items/km ²)	Q15 (items/km ²)
0	8	20	38

40. The Threshold Values (TV) which is proposed for seafloor macro-litter (IMAP CI23) is the Q15 (38 items/km², Table 5), it could be the optimal value to be used at the level of the Mediterranean, a 72% reduction over the calculated BV would be required.

5.2 Baseline Value (BV) and Threshold Value (TV) for Floating Microplastics

41. For each country, the basic statistical values have been calculated together with the average and median values corresponding to the total amounts of floating microplastic found in each survey per respective year, and then per country as illustrated in Table 6 hereunder. The floating microplastic data distribution is provided under Figure 2 hereunder.

Table 6: Descriptive statistics parameters by country for floating microplastics (item/m²)

Country	Average	Standard Deviation	Median
Bosnia and Herzegovina	0.010833	0.001473	0,010833
Croatia	0.000048	0.000072	0,000029
France	0.096185	0.139756	0,036200
Greece	0.00022	0.000198	0,000135
Israel	3.649984	4.803688	1.785482
Italy	0.146805	0.436350	0.052891
Lebanon	0.000002	0.000002	0.000001
Slovenia	0.124508	0.102699	0.096684
Spain	0.213043	1.780767	0.031973
Tunisia	0.000433	0.000233	0,000406
Türkiye	0.850942	1.625261	0,357915
Total average	0.463000	-	0.215686

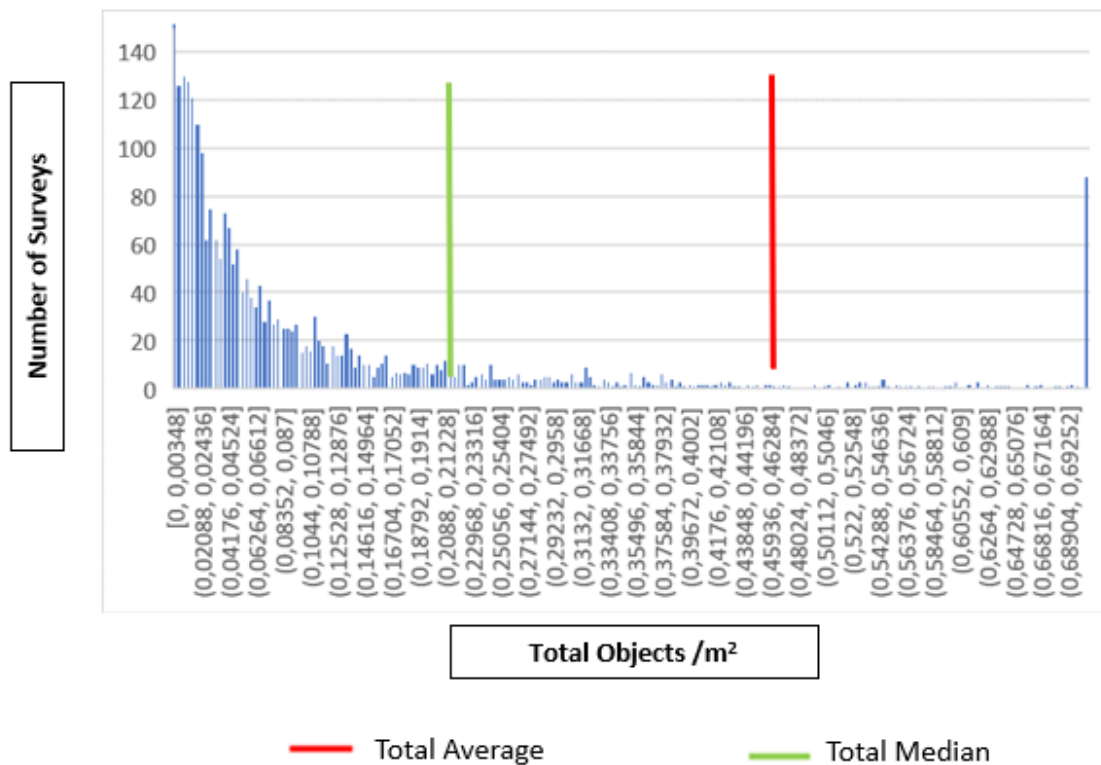


Figure 2: Frequency and distribution of total values for floating microplastics (IMAP CI23).

42. As can be shown from Figure 2, non-symmetrical distributions are predominant in the floating microplastic count (Table 6 and Figure 2). A thorough examination of the respective data, presented in Figure 2 and Table 6, indicates that the standard deviation is very high, even greater than the average for some countries. Thus, it gives a very wide range of average values (i.e., Italy, France. etc.; Table 6).

43. The graphic representation under Figure 2 shows that the data distribution for IMAP CI23 (floating microplastic) is very irregular; and thus, **the median value is the most representative**. This is also confirmed the higher frequencies, which are closer to median value. In fact, the median value is considered a better measure of the central location of a value than the average value in the case of a non-symmetric distribution (Baggelaar, Paul K. and Van der Meulen Eit C.J., 2014; Willem van Loon et al., 2019). This is due to the reason that, the median value is not sensitive to extreme values (Willem van Loon et al. 2019). Equally with seafloor macro-litter, extreme values may sometimes occur, for example due to severe/intense storm events or an accidental loss of marine litter at sea. For all countries participating to the current exercise, the use of the median value will make the assessment insensitive to these occasional extreme values (Willem van Loon et al. 2019).

44. The selection of a spatial aggregation level is related to the spatial scope of the analysis, in terms of trends, setting thresholds, and other purposes. Monitoring should allow assessment of the need for action and validation of its success (Hanke et al., 2019). In the case of CI23 spatial aggregation is further influenced by the transboundary nature of marine litter, as it can also be transported over long distances. Regarding the geographical scale level, differences in sub-regions, could not be considered in this analysis, as the relevant data were not always available.

45. The data provided by the Contracting Parties represent 77% of the total Mediterranean. The analysis must consider a weighting factor based on the maritime territory of each country to increase spatial representativeness.

46. This approach significantly increased the data representativeness. The total percentage represented in the analysis (77%) is more than the 30% that is considered adequate.

47. This methodology was applied to 100% of the data obtained to determine the baseline that will be compared to the values previously proposed (UNEP/MAP, 2016). Further to the above analysis, the baseline values for floating microlitter were calculated as depicted in Table 7:

Table 7: Mediterranean weighted median (median adjusted with the percentage of the country's maritime surface area)

	weighted median (item/m²)
Mediterranean	0.044338

48. Hence, for **floating microplastic (IMAP CI23), the proposed, updated Baseline Value for the Mediterranean is 0.044338 items/m²** (Table 7). The BV for floating microlitter proposed in 2016 by COP 19 (Athens, Greece, 9-12 February 2016) was between 200,000 and 500,000 items/km² (equivalent to 0.2 – 0.5 items/m²); thus, we can assess that the proposed-2023 BV is lower than the respective BV of 2016.

49. To calculate the threshold value, and also in line with the approach used for calculating the respective values for CI22 in 2021, it was proceeded with the estimation of the 15th percentile of the baseline results (Willem van Loon, David Fleet and Georg Hanke, 2019). Against which to compare the state of floating microlitter in the Mediterranean, following the marine litter descriptor aim.

50. As can be inferred from Table 8 (Q15), for **IMAP Common Indicator 23 (floating microlitter), the proposed Threshold Value is 0,000845 items/m²**.

Table 8: Different scenarios for calculation of Threshold Values based on different percentile (Q) values (i.e., Q1 - 1%, Q5 – 5%, Q10 – 10%, Q15 – 15%).

Q1 (items/m²)	Q5 (items/m²)	Q10 (items/m²)	Q15 (items/m²)
0	0,0000065	0,000378	0,000845

51. In order to reach achieve GES, a reduction percentage should be applied in order to give overall information about the reduction level that should be applied on the baseline value in order to comply with the proposed/calculated Threshold Value. The reduction percentage is calculated as per Van Loon et al. (2019) as follows:

$$\text{Reduction Percentage} = ((\text{median} - \text{TV}) / \text{median}) \times 100$$

52. Accordingly, it is found that the reduction percentage between the proposed Baseline Values (BV) and the proposed Threshold Value (TV) for the Mediterranean is approximately 98%.

6 Proposal for Updated Baseline Values (BV) and Establishment of Threshold Values (TV) for IMAP CI23 (seafloor macro-litter, floating microplastics)

53. Based on the datasets that were made available from the Contracting Parties to UNEP/MAP and its MED POL Programme, as well as the relevant analysis conducted and elaborated under the present document, a proposal for updated Baseline Values (BV) and establishing Threshold Values (TV) is put forward for seafloor macro-litter and floating microplastic within IMAP Common Indicator 23. Those proposals are summarized under Table 9 hereunder.

Table 9: 2016 (Agreed) and 2023 (Updated/Proposed) Baseline Values and Threshold Values for IMAP CI23 (seafloor macro-litter and floating microplastic).

IMAP Indicator s	Categories of Marine Litter	BV-2016	Updated BV-2023	Proposed TV-2023
CI23	Seafloor Macro-litter	130-230 items/km ²	135 items/km ²	38 items/km ² -
CI23	Floating Microplastics	0,2–0,5 items/m ²	0.044338 items/m ²	0,000845 items/m ²

54. The evolution of the baseline value proposed for seafloor macro-litter in 2023 is similar to BV established in 2016. In particular, a reduction around 25% is showcased when comparing the average value (180 items/km²) of 2016 against the median value of 2023. If this reduction trend is maintained also for the forthcoming years (decrease of 25% for a period of 5 years), it could be expected that within the next 5 years – by 2028 (i.e., similar to the period that is currently analysed) we may reach to values approximately to 100 items/km². In the scenario we consider Q15 as the optimal value to be achieved in the future, approximately 72% reduction would be required to reach GES. Subsequently, it can be assessed that a period of 14 years (i.e., by 2036) would be required to reach this value if a 25% decrease over a 5-year period is maintained.

55. For the case of floating microplastic, a reduction around 22% is assessed when comparing the lower BV of 2016 with the proposed-2023 BV. If this percentage decrease (22%) is maintained, it could be expected to reach approximately 0,034 items/m² in a period of 5 years – by 2027 (i.e., similar to the period that is currently analysed). If we take the 97% reduction needed to reach the TV, and under the assumption that the current decrease rate of 22% over a 5-year period is maintained, approximately 22 years (i.e., by 2045) would be required to reach values close to 0,001 items/m².

Annex I

List of References

Annex I: List of References

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Annex II

**Data flow for IMAP CI23 (seafloor macro-litter and floating microplastic)
for the determination of baseline and threshold values**

Annex II: Data flow for IMAP CI23 (seafloor macro-litter and floating microplastic) for the determination of baseline and threshold values

Step 1: Statistical analysis (seafloor macro-litter and floating microplastics)

The collected marine litter data and relevant excel sheets are subsequently developed in R-Language⁶ with which data files are read and analyzed. Accordingly, a final report is generated.

For the exercise elaborated under the present document, the 2016-2020 datasets were consolidated in R-Language in “.csv” format under schematic representation shown in Figure A:

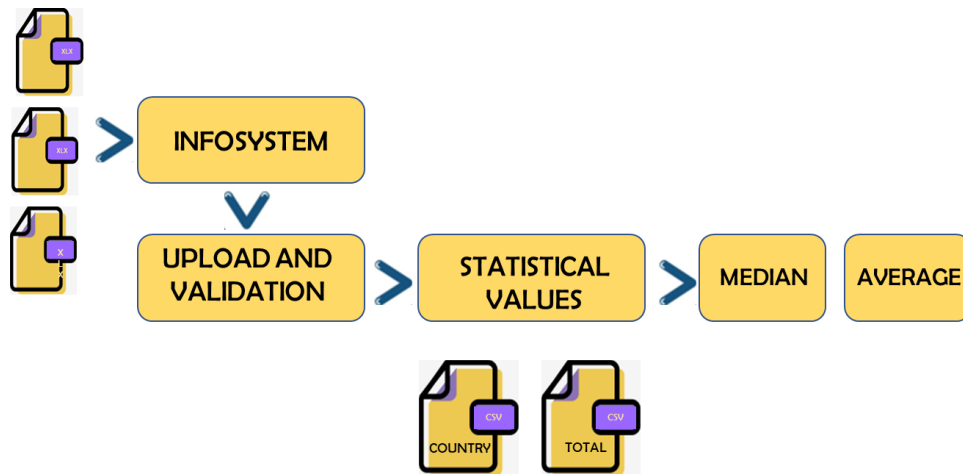


Figure A: Schematic representation of the methodological approach for the collection of the available datasets and the statistical treatment of the data.

Step 2: Calculation of Baseline and Threshold Values

Baseline Values: The schematic representation of the methodological approach for the calculation of baseline values based on median approach are depicted in Figure B.

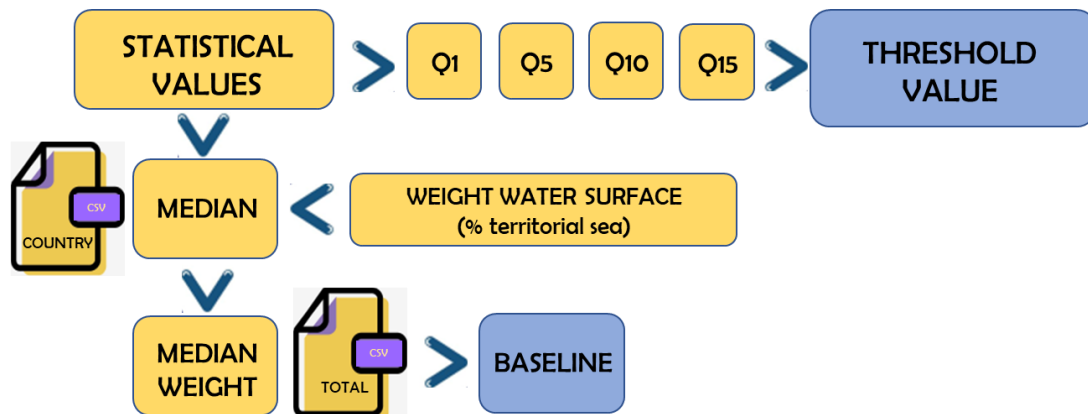


Figure B: Schematic representation of the methodological approach for the calculation of baseline and threshold values.

⁶ Statistical programme