UNITED NATIONS

EP

UNEP/MED WG.533/6

UNITED NATIONS
ENVIRONMENT PROGRAMME
MEDITERRANEAN ACTION PLAN

15 April 2022
Original: English

Meeting of the Ecosystem Approach Correspondence Group on Pollution Monitoring

Videoconference, 27 and 30 May 2022

Agenda Item 5: GES Assessment for IMAP Common Indicator 17 in the Areas with Limited Data Availability

The pilot example for Marine Environment Assessment in the Areas with Insufficient Data: The Results of GES Assessment for IMAP Common Indicator 17 in the Levantine Sea Basin

UNEP/MAP
Athens, 2022

Note by the Secretariat

In line with the Programme of Work 2020-2021 adopted by COP21 (Naples, Italy, December 2019), the MED POL Programme has prepared a Proposal of Integration and Aggregation Rules for Monitoring and Assessment of National Data for IMAP Pollution and Marine Litter Cluster, as presented to the Meeting of CorMon on Pollution Monitoring (Teleconference, 26-27 April 2021). The proposed integration and aggregation rules for monitoring and assessment set the basis for testing the application of the tools for GES assessment in the Mediterranean and its sub-regions/sub-divisions within the preparation of the 2023 MED QSR in line with the 2023 MED QSR Roadmap implementation (Decision IG.24/4 of COP21).

Considering the initial discussion on the Cross-Cutting Issues during the Regional Meeting on IMAP Implementation: Best Practices, Gaps and Common Challenges (Rome, Italy, 10-12 July 2018), in the context of applying different tools related to GES assessment, as well as the conclusions of the Meeting of CorMon on Pollution Monitoring (Teleconference, 26-27 April 2021) and the Meeting of MEDPOL Focal Points (Resumed Session 9 July 2021), this document elaborates application of the CHASE+ (Chemical Status Assessment Tool) methodology for IMAP Common Indicator 17 in the Levantine Sea Basin and its comparison with IMAP traffic light methodology applied within 2017 Mediterranean Quality Status Report. The CHASE+ was applied following experience in its application by the European Environmental Agency (EEA) to assess environmental status categories for the European Seas (Andersen et al. 2016, Anon 2019). Specifically, considering the rules for the integration and aggregation, the present application of CHASE+ methodology in the Levantine Basin was provided without spatial integration and aggregation of the areas of assessment and assessment results. Instead, calculation of a contaminantion ratio (CR) and aggregation of measured concentrations of the contaminants to calculate a contamination score (CS), when possible, was undertaken. In order to avoid a bias in the Mediterranean regional assessment, the present work includes inter-comparison of different approaches applied for setting GES and non-GES classes in the Adriatic Sea Sub-region and the Levantine Basin. It should be noted that the stricter boundary limit between GES and non-GES status was applied in the Levantine Basin in order to compensate for the lack of data, and hence a less confident assessment. In addition, this approach compensates for the lack of applying spatial integration and aggregation as required for nesting of the assessment areas and assessment results within IMAP implementation that is applied in the Adriatic Sea Sub-region by testing the NEAT methodology that requires a larger quantum of data than available in the Levantine Sea Basin.

The present proposal of CHASE+ application in the Levantine Sea Basin and related assessment findings are submitted for review and approval of the Meeting of the Ecosystem Approach Correspondence Group on Pollution Monitoring in terms of the results of GES assessment and further application of the CHASE+ methodology in the areas where it is impossible to undertake GES assessment methodologies based on IMAP nesting of the areas of assessment and related assessment findings.

Table of Contents

Annexes:

List of Abbreviations / Acronyms

ADR	Adriatic Sea sub-region
AEL	Aegean and Levantine Seas Sub-region
BC	Background Concentration
BAC	Background Assessment Concentrations
CHASE	Chemical Status Assessment Tool
CI	Common Indicator
CORMON	Correspondence Group on Monitoring
COP	Conference of the Parties
CR	Contamination Ratio
CS	Contamination Score
DW	Dry weight
EAC	Environmental Assessment Criteria
EC	European Union Regulations
EO	Ecological Objective
ERL	Effects Range Low
EEA	European Environmental Agency
EU	European Union
GES	Good Environmental Status
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria
MAP	Mediterranean Action Plan
MED	Mediterranean
MB	*Mullus barbatus*
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
NEAT	Nested Environmental Status Assessment Tool
NPA	Non Problem Area
OOAO	One Out All Out
OWG	Online Working Group
PA	Problem Area
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
QSR	Quality Status Report
SAU	Spatial Assessment Units
TM	Trace metals
UNEP	United Nations Environmental Program
WW	Wet weight

1. GES assessment of the Levantine Sea Basin – CI 17 (Contaminants), applying the Traffic light and the CHASE+ methodologies: Introduction

1. Updated BC and BAC values for IMAP Common Indicator 17 (CI 17) were calculated and proposed, as presented in documents UNEP/MAP WG.533/3 and UNEP/MAP WG.533/Inf.3. Their calculation was based on new national monitoring data received up to December 31st, 2021, that have not been previously used for the calculation of the assessment criteria in the 2017 and 2019 assessments. In addition, following the OWG on Contaminants recommendation, data since 2015 were used in the calculation as well, even if used in the previous assessment.

2. This document presents a pilot application of the above mentioned proposed updated assessment criteria for the Levantine Basin of the Eastern Mediterranean sub-division using two different methodologies: the traffic light system and CHASE+ (Chemical Status Assessment Tool) (See explanation below). A separate document presents the application of the proposed updated assessment criteria for the Adriatic sub-region using the NEAT methodology (UNEP/MED WG.533/5; UNEP/MED WG.533/Inf.4; UNEP/MED WG.533/Inf.5).

3. The areas for the pilot applications were chosen based on data availability to perform a more comprehensive assessment, in preparation for the 2023 Mediterranean Quality Status report (QSR). The most complete data set was for the Adriatic sub-region, even though there were still data and spatial gaps (UNEP/MED WG.533/Inf.3). Data availability was lower for the Levantine Sea Basin sub-division compared to the Adriatic, but higher compared to other sub-regions or sub-divisions.

2. Available data

4. The available data for the Levantine Sea Basin are presented in Table 1. Data were available for trace metals (TM – Cd, Hg and Pb) in sediments for Cyprus, Israel, Lebanon, Turkey; TM in the fish *M. barbatus* for Israel, Lebanon, Turkey; PAHs in sediments for Israel, Lebanon and Turkey and organochlorinated contaminants in sediments for Lebanon and Turkey.

5. The most data were available for TM in sediments. There were 150 stations in the database, with data on Cd and Pb in 149 stations and for Hg in 150 stations. TM in *M. barbatus* were as follows: 87 data points for Cd and Hg and 39 for Pb. Data for PAHs in sediments were available for 104 stations. However, concentrations for the individual PAHs were reported just for 52 stations. Total 16 PAHs (Σ_{16} PAHs) in sediments were reported for 71 stations while for 33 stations the data available were for Σ_4 PAHs and Σ_5 PAHs[1]. Few data were reported for PAHs in *M. barbatus,* and no criteria could be calculated for these elements (UNEP/MAP WG.533/3 and UNEP/MAP WG.533/Inf.3). Data for organochlorinated contaminants in sediments were available for 52 stations. However, concentrations for the individual PCBs were reported just for 33 stations. Total PCBs (Σ_7 PCBs) were available for all the stations. Data for Lindane and Dieldrin were available for only 33 stations. Data for Σ_7 PCBs in *M. barbatus* were available for 3 samples. No criteria could be calculated for this element.

6. Based on the available data, the assessment methodologies were applied to TM in sediments and *M. barbatus*, Σ_{16} PAHs in sediments and Σ_7 PCBs in sediment. When possible, a qualitative description was provided for the additional parameters or stations.

[1] Σ_4 PAHs is the sum of the concentrations of Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene while Σ_5 PAHs is the sum of Σ_4 PAHs and Benzo(ghi)perylene. No criteria are given for these parameters and therefore they were not used in the assessment.

Table 1. Data available for pilot application of proposed updated criteria for the environmental assessment of the Levantine Sea Basin.

Source	IMAP_File	Country	Year	Cd	Hg	Pb	Σ_{16} PAHs	Σ_4 PAHs	Σ_5 PAHs	Σ_7 PCBs	Lindane	Dieldrin
Sediment												
IMAP_IS	125	Cyprus	2013	2	2	2						
IMAP_IS	125	Cyprus	2014	4	4	4						
IMAP_IS	125	Cyprus	2015	3	3	3						
IMAP_IS	125	Cyprus	2016	2	2	2						
IMAP_IS	125	Cyprus	2017	7	7	7						
IMAP_IS	125	Cyprus	2018	4	4	4						
IMAP_IS	#	Israel	2020	14	14	14						
IMAP_IS	410	Israel	2019	16	16	16						
MEDPOL		Israel	2015	20	20	19						
MEDPOL		Israel	2017	14	14	14						
Lit1		Israel	2013				52*					
IMAP_IS	118	Lebanon	2019	17	17	17	19			19		
Lit2		Lebanon	2017	2	3	3						
IMAP_IS	445	Turkey	2018	33	33	33		33	33	33*	33	33
MEDPOL		Turkey	2015	11	11	11						
M. barbatus												
IMAP_IS	351	Israel	2015	28	28	0						
IMAP_IS	71	Israel	2018	13	13	0						
IMAP_IS	410	Israel	2019	7	7	0						
IMAP_IS	152	Lebanon	2019	14	14	14			6	3		
IMAP_IS	323	Turkey	2015	25	25	25	25^					

Data reported to MEDPOL, to be added to IMAP_IS, [1]Astrahan et al. 2017, [2]Ghosn et al, 2020, * Data for individual concentrations for all congeners are available, ^Data for 8 congeners available for 25 samples in 5 stations.

3. Location of sampling stations

7. The locations of the sampling stations are presented in Figure 1, sorted by matrix and group of contaminants. TM, PAH and Organochlorinated contaminants in sediments for Lebanon and Turkey were determined in samples collected from the same stations at the same date. PAHs in sediments from Israel were collected from stations different from the stations sampled for TM in sediments and at a different date. The sampling sites for the fish *M. barbatus* were located in the areas close to the sediment samples, but did not encompass one specific station, only a fishing area.

8. Further to IMAP[2] implementation, the monitoring stations were considered for grouping in the two main assessment zones i.e., the coastal and offshore zones. This spatial division and nesting of the spatial assessment units were applied in the NEAT assessment for the Adriatic sub-region (UNEP/MED

[2] In the EEA assessment using CHASE+ (Anon, 2019), the assessment areas were defined as a 20x20 km^2 grid for coastal areas and by 100x100 km^2 for offshore areas.

WG.533/5; UNEP/MED WG.533/Inf.4; UNEP/MED WG.533/Inf.5). Based on that approach setting the two main assessment zones i.e. the coastal and offshore zones, the sampling stations for TM in sediments for Israel can be considered all coastal, except 2 stations that can be considered offshore stations. In Lebanon, 5 out of 20 stations can be considered offshore stations. In Cyprus, 1 station can be considered offshore station. In Turkey, four stations can be considered offshore stations. The stations in Iskenderun Bay, Antalya Bay, the bay off Mersin and Erdemli and inlets can be considered coastal stations. No stations with data for PAHs in sediments in Israel can be considered coastal i.e. there were 52 stations that can be considered offshore stations. The grouping of stations for PAHs and organochlorinated contaminants in sediments for Lebanon and Turkey was the same as for TM. TM in *M. barbatus* were determined in samples collected from stations that can be considered offshore stations in Israel and Lebanon. In Turkey all stations can be considered coastal, with exception of one station that can be grouped as offshore station.

9. Due to the limited number of data points, more so if dividing into coastal and offshore stations, the spatial nesting of stations in spatial assessment units (SAUs) to the level considered meaningful for IMAP CI 17 was not possible in Levantine Sea Basin. Spatial nesting would decrease the reliability and the representativeness of each station for the assessment of the Levantine Sea Basin. Therefore, at this stage of IMAP implementation in the Levantine Sea Basin, the assessment was based on specific stations irrespective of their positions either in offshore or coastal zones.

4. Methodologies

10. Two methodologies were applied in this pilot environmental assessment of the Levantine Sea Basin: the IMAP “traffic light” system and the CHASE+ Chemical Status assessment tool. Both used the proposed updated criteria presented in document (UNEP/MED WG.533/3; UNEP/MED WG.533/Inf.3)

4.1 “Traffic Light” system

11. UNEP/MAP has adopted the threshold assessment methodology, based on the “traffic light” approach, by defining 2 values to classify 3 environmental categories: 1) good ~~BC)~~; 2) above background but with low risk for environment and biota population, or below dietary limits for fish and sea food concerning human health; and 3) unacceptable. The two thresholds used for this classification are i) the Background Assessment Concentration (BAC) and ii) the Environmental Assessment Criteria (EAC) for TM and organic contaminants in sediments and biota, or EC for TM and organic contaminants in biota. In the traffic light system, each contaminant is characterized as green (below BAC value), red (above EAC value) or yellow (between BAC and EAC values). All the green and yellow statuses of the contaminants are classified as in GES while all the red statuses of the contaminants are classified as non-GES.

4.2 CHASE+ (Chemical Status Assessment Tool)

12. The CHASE+ (Chemical Status Assessment Tool) methodology was used by the European Environmental Agency (EEA) to assess environmental status categories for the European Seas (Andersen et al. 2016, Anon 2019). This assessment methodology uses just one threshold, compared to the two used in the traffic light system.

13. The first step in this tool is to calculate the ratio $C_{measured}/C_{threshold}$ called the contamination ratio (CR) for each assessment element in a matrix. Then a contamination score (CS) is calculated as follows[3]:

$$CS=\frac{1}{\sqrt{n}}\sum_{i=1}^{n} CR_i$$

where n is the number of elements assessed for each matrix.

[3] The contamination sum minimizes the problem of ‘dilution’ of high values when several substances from an area are analyzed, and takes to some extent possible synergistic effects of contaminants into account by using square root of ‘n’ instead of ‘n’.

14. Based on the contamination ratio (CR) or on contamination score (CS), the elements are assessed. In line with the results of assessments, the stations/areas can be classified into non problem area (NPA) and problem area (PA), by applying 5 categories: NPAhigh (CR or CS=0.0-0.5), NPAgood (CR or CS =0.5-1.0), PAmoderate (CR or CS =1.0-5.0), PApoor (CR or CS =5.0-10.0) and PAbad (CR or CS > 10.0). NPA areas are considered in GES while PA areas are considered as non-GES. The boundary limit of 1 between GES and non-GES is based on the choice that only values that are equal or below the threshold are considered in GES.

15. Both methodologies need to define decision rules to determine the quality status. One decision rule used is the "One out all out approach" (OOAO) that says that if one element of the assessment is not in good status, the whole area is described as not in GES. This decision rule is very stringent. An additional approach is to set a limit, such as a proportion (%) of elements, that should each be in GES for the area to be classified as in GES. Here we recommend that if at least 75% of the elements are in GES, the station should be considered in GES. The same recommendation is given when assessing certain areas or the whole Levantine Sea Basin sub-division i.e., when 75% of the stations are in GES for a certain parameter, the whole sub-region is in GES. This more lenient approach for the GES-non GES decision rule compensates for stricter thresholds applied within the CHASE+ methodology (See section 4.3).

4.3 Choice of thresholds for the pilot application for the Levantine Sea Basin

16. The thresholds used for the traffic light system application were the BACs and MED_EACs as provided in the Meeting documents UNEP/MED WG.533/3; UNEP/MED WG.533/Inf.3. The BACs used were the proposed updated regional MED_BACs and for comparison, the proposed updated sub-regional AEL_BACs when available. The assessment presented in the Meeting documents UNEP/MED WG.533/5; UNEP/MED WG.533/Inf.4 was provided for the Adriatic Sea Sub-region, using the updated ADR_BACs as also provided in the Meeting documents UNEP/MED WG.533/3; UNEP/MED WG.533/Inf.3. The thresholds used for the CHASE+ tool were also the updated regional MED_BACs and for comparison, the same analysis was performed using the proposed updated sub-regional AEL_BACs when available. Table 2 summarizes the thresholds values. It is recognized that the choice of threshold will affect the assessment.

Table 2. Summary of the threshold values used in present pilot application for GES assessment of the Levantine Sea Basin.

	BAC_MED	**BAC_AEL**	**MedEAC**
Sediments, µg/kg dry wt			
Cd	161	118	1200
Hg	75	47.3	150
Pb	22500	23511	46700
Σ_{16} PAHs	32	41	4022*
Σ_7 PCBs	1.2#		68+
***M. barbatus*, µg/kg wet wt**			
Cd	7.8	7.2	50
Hg	81.2	67.4	1000
Pb	36.6	27	300

* ERL value derived for the sum of 16 PAHs by Long et al., 1995, do not appear in the Decisions of COP. # No BACs were proposed. . For this pilot application, 3 times the proposed recalculated MED_BC was used. UNEP/MED WG XXX/Inf.1 (UNEP/MED WG.492/Inf.11/Rev.2) + sum of the individual MedEACs values of the 7 PCB compounds as they appear in Decision IG.23/6

17. Comparison of the thresholds used in this piloting of GES assessment for CI-17 in the Levantine Sea Basin to the thresholds used for piloting the GES assessment for CI 17 in the Adriatic Sea Sub-region ((UNEP/MED WG.533/5; UNEP/MED WG.533/Inf.4) is presented in Annex I.

5. Results and Discussion

5.1 Traffic light system

18. In this methodology, each measured parameter at each station was classified as green (below BAC value), red (above EAC value) or yellow (between BAC and EAC values). Table 3 summarizes the results, while Annex II presents the tables with the colour coded results for each measured parameter at each station and matrix.

Table 3. Number of data points and their percentage from the total number of data points in each category based on the traffic light system, calculated using the proposed new MED_BACs and adopted MED_EAC. In parenthesis, the number of data points and their percentage classified using the proposed new AEL_BACs and adopted MED_EAC.

		Green (<BAC)		**Yellow (<EAC,>BAC)**		**Red (>EAC)**	
	Total number of data points	Number of data points	*Percentage from total data points*	Number of data points	*Percentage from total data points*	Number of data points	*Percentage from total data points*
Sediment							
Cd	149	88 (71)	*59 (48)*	42 (59)	*28 (40)*	19* (19*)[4]	*13* (13*)[4]*
Hg	150	101 (80)	*67 (53)*	18 (39)	*12 (26)*	31 (31)	*21 (21)*
Pb	149	117 (119)	*79 (80)*	27 (25)	*18 (17)*	5 (5)	*3 (3)*
Σ_{16} PAHs	71	55 (47)	*77 (66)*	16 (24)	*23 (34)*	0 (0)	*0 (0)*
Σ_7 PCBs	52	42	*81*	10	*19*	0	*0*
M. barbatus							
Cd	59	58 (58)	*98 (98)*	1 (1)	*2 (2)*	0 (0)	*0 (0)*
Hg	87	76 (69)	*87 (79)*	11 (18)	*13 (21)*	0 (0)	*0 (0)*
Pb	39	39 (36)	*100 (92)*	0 (3)	*0 (8)*	0 (0)	*0 (0)*

*All the points are from Cyprus were above EAC, probably due to specific local minerology. They were not taken into account while assessing GES of the Levantine Sea Basin (See footnote 4).

[4] All the points are from Cyprus. The concentrations of Cd in Cyprus were much higher than the MedBACs and even higher than the MedEAC agreed upon in Decision IG.23/6. Consultation with national representatives and experts of Cyprus provided the explanation that although anomalously high, the concentrations are natural, probably due to specific local minerology. Therefore, they were not considered while assessing the GES of the Levantine basin.

19. Analysis of TM in sediments showed that most of the area are in the “green” status followed by “yellow”, both indicating GES. The use of MED_BACs was more lenient and classified more areas as “green”. The only “red” stations (excluding Cd in Cyprus, as explained in Table 3) were 29 data points for Hg in Israel, 2 data points for Hg in Lebanon, and 5 data points for Pb in Cyprus, with concentrations above the respective MED_EAC. In the case of Hg in Israel, 27 “red” values were assigned to 9 stations located in Haifa Bay, at different sampling years. The area is known to be still contaminated by Hg, even though there was a vast improvement following pollution abatement measures (Herut et al, 1996, 2021). The additional 2 “red” sampling points were located at a sewage sludge marine disposal site in 2015 but not in the same sampling sites in 2017. Cessation of marine disposal caused a drastic improvement of the environmental quality in the area (Kress et al., 2016, 2020). Two “red” Hg points in Lebanon were located off Beirut, stations categorized as hot spots in the IMAP Information System and in Ghosn et al., (2020). In the case of Pb in Cyprus, 3 samples originated from Latsi (in different years) and one from Agkirovolio, both stations categorized as hot spots in the IMAP Information System. The additional point was at station Larnaca west. A check of the high Pb concentrations against Al or Fe in the samples, as normalizers, could confirm or refute the traffic light-based classification for these stations.

20. Analysis of Σ_{16} PAHs and Σ_7 PCBs in sediment showed no “red” classification, indicating that all the stations and data points were in GES. Most of the stations were in “green” classification. Qualitatively, all 33 data points for dieldrin were below detection limit and in green status, while all the 33 data points for lindane were lower than 0.14 μg/kg, lower than the proposed BC value of 1.0 μg/kg, and therefore in GES. Dieldrin and lindane were reported only by Turkey.

21. Analysis of TM in *M. barbatus* showed that most samples were classified in the “green” status (from 79% to 100% depending on the metal and threshold). The remaining samples were classified as “yellow”. Therefore, all the samples in all areas are in the GES.

5.2 CHASE+ methodology

22. In this methodology, for each measured parameter at each station a contamination ratio (CR) was calculated. For TM in sediments and in *M. barbatus*, a contamination score (CS) was further calculated (see section 4.2), aggregating all 3 metals. For PAHs and PCBs, only one element was available for each class of contaminant (i.e., Σ_{16} PAHs and Σ_7 PCBs, respectively), therefore only CRs were calculated.

23. The CRs and CSs for TMs in sediment and *M.barbatus* were classified in 5 GES-non GES categories as follows: Blue - NPAhigh (CR or CS=0.0-0.5); Green- NPAgood (CR or CS =0.5-1.5); Yellow- PAmoderate (CR or CS =1.5-5.0); Brown - PApoor (CR or CS =5.0-10.0) and Red - PAbad (CR or CS > 10.0). This is slightly different from the classification used by the EEA where NPAgood was defined as (CR or CS =0.5-1.0); and PAmoderate was defined as (CR or CS =1.0-5.0) (Anon, 2019). In the EEA classification, all elements with concentrations below the values used as threshold i.e. boundary limit of 1[5], were considered NPA i.e., in GES.

24. The recommendation to use 1.5 and not 1 as the boundary limit for TM in this pilot application was based on the decision to use the MED BACs and/or AEL BACs as thresholds. This is stricter approach given the one applied within the NEAT application for the Adriatic sub-region was based on use of the two thresholds i.e., the ADR BACs and MED EACs (see Annex I). In such manner, a balance is ensured regarding the use of different threshold values and classification categories for Cd, Hg and Pb, as well as a balance between GES classification categories set within the NEAT application in the Adriatic Sea Sub-region and CHASE+ methodology application in the Levantine Sea Basin (see Annex I). By

[5] If the measured concentration equals the threshold, i.e. measured concentration = 1 BAC, the contamination ratio CR is 1. In this case, if the boundary limit between GES and non-GES is set at value 1, then the threshold would be the maximal measured concentration allowed for the station still to be in GES.

setting the boundary limit at 1.5[6], the GES status is possible for some of the measured concentrations above the values of BACs used as thresholds.

25. A slightly different classification, where Green= NPAgood (CR or CS =0.5-2.0); and Yellow= PAmoderate (CR or CS =2.0-5.0) was recommended for PAHs and PCBs. This is a more lenient classification than with boundary limit of 1.5, that allows values twice the BAC threshold values, i.e. boundary limit of 2, to be considered NPA (or in GES)[7]. This more lenient classification is proposed due to the more limited data availability for PAHs and organochlorinated contaminants compared to TM in the Levantine Sea Basin. Moreover, this is proposed due to different interrelation of the BACs and EACs values for the organic contaminants compared to their interrelations for TM that were used to set GES classification categories for the application of the NEAT methodology in the Adriatic Sea Sub-region (see Annex I).

26. These two classifications schemes were performed twice, once using the proposed updated regional MED_BACs and for comparison, using the proposed updated sub-regional AEL_BACs when available (See section 4.3).

27. Further to the above-proposed boundary limits between the GES and non-GES status, it is important to recognize that the stricter approach in setting GES and non-GES classes for assessment of the Levantine Sea Basin was applied to compensate for the lack of data that prevented the use of NEAT. The NEAT methodology ensures optimal integration and aggregation of the assessment results in line with the nesting approach of IMAP. The present application of CHASE+ methodology in the Levantine Sea Basin was provided without spatial integration and aggregation of the areas of assessment and assessment results. Instead, aggregation of measured concentrations of the contaminants to calculate a contamination score (CS) was undertaken along with application of stricter boundary limits. However, aggregation to CS values was possible just for TM in sediments and *M. barbatus*.

28. In order to avoid a bias in the Mediterranean regional assessment, the comparison of the assessment findings between different sub-regions/areas should be further explored in order to provide additional inter-comparison of the results if needed. In that respect, it should be noted that the present work includes inter-comparison of different approaches applied for setting GES and non-GES classes in the Adriatic Sea Sub-region and the Levantine Sea Basin. The Secretariat undertakes further steps to analyze the inter-comparison of the assessment results in these two different areas, as a model for assessments that will be undertaken in other sub-regions/areas.

29. Table 4 summarizes the results of the CHASE+ application, while Annex II presents the tables with the colour coded results for each measured parameter at each station and matrix. Colour coded maps of selected results are presented in Annex III.

---

[6] If the measured concentration equals 1.5 x threshold, i.e. measured concentration = 1.5 BAC, the contamination ratio CR is 1.5. In this case, 1.5 BAC would be the maximal measured concentration allowed for the station still to be in GES. This is a more lenient approach than setting 1 as the boundary limit between GES and non-GES.
[7] For CR equals to 2, the measured concentration should be equal to twice the threshold, i.e. measured concentration = 2xBAC. Therefore, the boundary limit between GES and non-GES would be twice the threshold. That means that the 2x threshold (BAC) is the maximal measured concentration allowed for the station to be in GES.

Table 4. Number of data points and their percentage from the total number of data points in each category based on the CHASE+ tool, calculated using the proposed new MED_BACs (UNEP/MED WG.533/3; UNEP/MED WG.533/Inf.3). In parenthesis, there are number of data points and their percentage from the total number of data points, classified using the proposed new AEL_BACs.

CHASE+		**Blue** **High**	**Green** **Good**	**Yellow** **Moderate**	**Brown** **Poor**	**Red** **Bad**
		NPA or GES		**PA or non-GES**		
Sediment	Total number of data points					
		CS=0.0-0.5	**CS =0.5-1.5**	**CS =1.5-5**	**CS =5-10**	**CS >10**
*Cd, Hg, Pb	150	24 (19)	56 (43)	70 (86)	0 (2)	0 (0)
% from total number of data points		*16 (13)*	*37 (29)*	*47 (57)*	*0 (1)*	*0 (0)*
		CR=0.0-0.5	**CR=0.5-2.0**	**CR =2-5**	**CR =5-10**	**CR>10**
Σ_{16} PAHs	71	28 (14)	33 (45)	6 (7)	4 (1)	0 (4)
% from total number of data points		*39 (20)*	*47 (63)*	*8 (10)*	*6 (1)*	*0 (6)*
Σ_7 PCBs	52	39	6	4	1	2
% from total number of data points		*75*	*11*	*8*	*2*	*4*
M. barbatus						
		CS=0.0-0.5	**CS =0.5-1.5**	**CS =1.5-5**	**CS =5-10**	**CS >10**
+Cd, Hg, Pb	87	39 (32)	43 (50)	5 (5)	0 (0)	0 (0)
% from total number of data points		*45 (37)*	*49 (57)*	*6 (6)*	*0 (0)*	*0 (0)*

*Without anomalous Cd concentrations for Cyprus; +Without Cd for Israel, in 2015. All data were below detection limit of 17.5 µg/kg wet wt, a value that is much higher than the proposed MED_BAC and AEL_BAC (7.8 and 7.2 µg/kg wet wt, respectively)

30. Analysis of TM in sediments using CHASE+ with MED_BAC to calculate CR followed by CS calculation and using 1.5 as the boundary limit between NPA and Pa status (i.e., in GES and non-GES) showed that 47% of the stations were in the moderate (i.e., in yellow colour coded PA, non GES) status and 53% in GES. It should be mentioned that the yellow colour coded status is the least affected status

among the 3 PA (non-GES) classification. Examination of the CRs for the individual metals, using the results for MED_BACs as threshold, found that Hg (24% of the data non-GES), followed by Cd (21% of the data non-GES), were the main factors influencing the classification.

31. A detailed examination of the contamination scores (CS) found that the stations classified as yellow colour coded status in Cyprus were Agkirovolio HS, Amathounta, Vasilikos HS and Larnaca west all sampled in 2017 and the station Latsi, sampled at 4 different years. Pb concentration in sediments was the main element contributing to this classification. In Israel, the area classified as moderate (i.e., in yellow colour coded) status was Haifa Bay and the main element contributing to this classification was Hg. The area is known to be still contaminated by Hg, even though there was a vast improvement following pollution abatement measures (Herut et al, 2016, 2021). In Lebanon, the main area in yellow colour coded status was Beirut, in particular the Dora region, followed by North Lebanon, with Cd and Hg contributing equally for the moderate classification. The Beirut area is densely populated and industrialized (Ghosn et al., 2020). In Turkey, 4 stations in 2015 and 14 stations in 2018 were classified as moderate (i.e., in yellow colour coded) status. In 2015 Pb and Hg contributed to this classification while in 2018 Cd was the main element contributing to this classification. No specific areas, defining the moderate status, were identified in Turkey.

32. The same analysis using as threshold AEL_BAC to calculate CRs followed by CS calculation found 57% of the stations in the moderate status i.e., in yellow coded classification, and 1% in the poor (i.e., in brown colour coded) status, both classified as PA-non GES, while 42% of the stations were in GES. Examination of the CRs for the individual metals, found that Hg (33% of the data were non-GES), followed by Cd (31% of the data were non-GES), were the main factors influencing the classification. Further using the contamination score (CS) found 18 more non-GES stations compared to the assessment using MED_BACs.

33. Only 53 % of the stations (using MED_BACs) or 42% of the stations (using AEL_BACS) were in GES concerning TM in sediments. These percentages are less than the recommended 75% to assign the whole area as in GES. Therefore, the Levantine Sea Basin should be classified as non-GES for TM in sediments, but in the moderate (i.e., yellow color coded) classification. Nevertheless, it should be taken into account that specific hot spot areas were identified in the Levantine Sea Basin. Additional recent data would improve the assessment and add confidence to it, better delimiting the hot-spot areas and allowing for spatial assessment units to be defined, as in the Adriatic Sea.

34. Analysis of Σ_{16} PAHs in sediments using CHASE+ with MED_BAC to calculate CR and 2 as the boundary limit between NPA and PA (in GES and non-GES) showed that 86% of the stations were in the NPA (i.e., in GES) status and 14 % PA (i.e., in non-GES), with 6 stations classified as yellow colour coded status and 4 as brown colour coded status. No station was classified as red colour coded status.

35. The use of AEL_BAC slightly reduced the percentage of the NPA stations to 83% and increased the percentage of PA stations to 17%. In this case, 7 stations were classified as yellow, 1 as brown and 4 as red colour coded status. It should be noted that use of the sub-regional threshold values (AEL_BAC in this case) should be considered more accurate. There was no large specific area with non-GES status. Only two small, geographically limited areas with non_GES status were detected. One such area was in Israel, at stations close to the locations of drilled wells for gas exploration (Astrahan et al., 2017) and one-off in Beirut, in Lebanon. Data on Σ_{16} PAHs in sediments were available only for these two countries. In this case, more than 75% of the stations were in GES, therefore the sea areas of Israel and Lebanon could be assessed as in GES for Σ_{16} PAH in sediments. Given the limited data availability no conclusion could be provided on GES status at the level of the Levantine Sea Basin.

36. Analysis of Σ_7 PCBs in sediments using CHASE+ was performed with threshold equal to 3 times the calculated BC value for the Mediterranean Sea (Table 2). Using it to calculate CR and 2 as the boundary limit between NPA and PA (in GES and non-GES) status showed that 86% of the stations were in the NPA status and 14% PA status, with 4 stations classified as moderate (i.e., in yellow colour coded),

one poor (i.e. in brown colour coded) and 2 bad (i.e., in red colour coded) statuses. No specific area with non-GES status was detected, only localized hot spot off Beirut.

37. In this case, more than 75% of the stations were in GES, therefore Turkey and Lebanon could be assessed as in GES for Σ_7 PCBs in sediments. Given the limited data availability no conclusion could be provided on GES status at the level of the Levantine Sea Basin.

38. Analysis of TM in *M. barbatus* using CHASE+ with MED_BAC to calculate CR and 1.5 as the boundary limit between NPA and PA (in GES and non-GES) statuses showed that 94% of the samples were in the NPA (i.e., in GES) status and 6% PA (i.e., in non-GES, 5 samples) statuses, all of the latter on the moderate (i.e. in yellow colour coded) classification. The main factor influencing this classification was Hg. No samples were classified as brown or red colour coded statuses. Use of AEL_BAC did not change the percentage of the NPA samples, just changed the division between the blue and green classes, both in GES. The five samples in the yellow classification were from one station in Turkey (Anamur/Mersin) collected in 2015 and may not represent the status in 2022.

39. As more than 75% of the stations were in GES concerning TM in *M. barbatus*, and they encompassed a large area of the Levantine Sea Basin, it can be tentatively concluded that the whole basin is in GES. However, Hg concentrations should be further monitored. Moreover, recent data form Turkey, as well as data from additional countries from Levantine Sea Basin are needed to improve this assessment.

6. Key findings

40. Comparison between the results of the traffic light and CHASE+ methodologies showed that the latter was stricter and lead to the identification of possible hot spot areas for certain contaminants.

41. The traffic light methodology applied to TM in sediments assigned a GES status to the majority of stations, excluding 3 stations in Cyprus (affected by Pb), Haifa Bay in Israel (affected by Hg), and 2 stations in Beirut, Lebanon (affected by Hg). In the assessment using CHASE+, the Levantine Sea Basin was classified as non-GES, in the yellow moderate (yellow color coded) classification status.

42. The traffic light methodology applied to Σ_{16} PAHs and Σ_7 PCBs in sediments assigned a GES status to all stations sampled. In the assessment using CHASE+ most of the stations (83-86%, depending on the parameter and the BAC used) were in GES. Given the limited data availability no conclusion could be provided for the whole Levantine Sea Basin. It was possible to determine that Israel and Lebanon are in GES concerning to Σ_{16} PAHs and Lebanon and Turkey are in GES concerning Σ_7 PCBs in sediments.

43. The traffic light methodology applied to TM in *M. barbatus* assigned a GES status to all samples. The CHASE+ methodology found that 94% of the samples were in GES, and therefore it was tentatively concluded that the whole basin is in GES for TM in *M. barbatus*. However, Hg concentrations should be further monitored. Moreover, recent data form Turkey, as well as data from other countries from the Levantine Sea Basin are needed to improve this assessment for *M. barbatus.*

Annex I

Comparison between the thresholds used in the CHASE+ application in the Levantine Basin and the thresholds used in the NEAT application in the Adriatic sub-region

The two pilot GES assessments were performed applying the new proposed updated criteria: one in the Levantine Sea Basin as provided in the present document and one in the Adriatic Sea as provided in UNEP/MED WG.533/5; UNEP/MED WG.533/Inf.4; UNEP/MED WG.533/Inf. 5. CHASE+ was applied in the Levantine Sea Basin and the NEAT in the Adriatic Sea Sub-region.

The thresholds used for the NEAT application in the Adriatic Sea Sub-region and CHASE+ in the Levantine Sea Basin are presented in Table AI.1. In the NEAT application, the boundary limit between GES and non-GES was the MedEAC. A further division of the non-GES classification category was achieved by applying 3xMedEAC, that delimits between moderate and poor and bad GES assessment categories. The rational for this classification is provided in the documents UNEP/MED WG.533/5; UNEP/MED WG.533/Inf.4. In the application of CHASE+, the boundary limit delimiting between GES and non-GES was the 1.5 x MED_BAC[8] for TM in sediments and *M. barbatus*, and 2 x MED_BAC[9] for Σ_{16} PAHs and Σ_7 PCBs in sediments. A further division of the non-GES category was 5xMED_BAC and 10xMED_BAC, that delimits between moderate and poor, and between poor and bad GES assessment categories, respectively.

To compare with the NEAT boundary limits, the values used in CHASE+ were calculated as a fraction of MedEACs (Table AI.2). It can be seen that only for Hg and Pb in sediments, the boundary limits of the two assessment methodologies were similar. All the other boundary limits were much lower i.e., stricter in the CHASE+ pilot application in the Levantine Sea Basin.

The reason to apply the stricter boundary limits for the Levantine Sea Basin was to compensate for the lack of data, and hence a less confident assessment. In addition, this approach compensates for the lack of applying spatial integration and aggregation as required for nesting of the assessment areas and assessment results within IMAP implementation that is applied in the Adriatic Sea Sub-region by testing the NEAT methodology that requires a larger quantum of data than available in the Levantine Sea Basin. A stricter environmental classification boundary limits allowed for possible problem areas or hot spots to be pinpointed and marked for future additional assessment when more data will be available. If the higher MedEACs were used instead of BACs, such potential problem areas would be masked and not detected.

Table AI.1. Comparison among the GESclassification categories and boundary limits used in the pilot GES assessments of the Adriatic Sea (using NEAT) and the Levantine Sea Basin (using CHASE+).

	GES		non-GEs		
IMAP – traffic light approach (Adriatic and Levantine)	Good	Moderate	Bad		
NEAT`s use for IMAP (Adriatic)	High	Good	Moderate	Poor	Bad
	0< meas. conc. ≤ BAC	BAC<meas. conc. ≤MedEAC	MedEAC<meas. conc. ≤ 3xMedEAC	3xMedEAC<meas. conc. ≤ max. conc.	
Boundary limits **0**					**Max. conc.**

[8] Or AEL_BAC. The assessment was performed twice, using both thresholds: MED_BACs and AEL_BACs. For Σ_7 PCBs only one threshold was available (Table AI.2).

Thresholds	BAC	MedEAC	3xMedEAC		
CHASE+ use for the Levantine Sea Basin	High	Good	Moderate	Poor	Bad
	CRorCS=0.0-0.5	**CRorCS =0.5-1.5**	**CRorCS =1.5-5**	**CRorCS =5-10**	**CRorCS >10**
TM in sediments and *M. barbatus*	Meas.conc<0.5 BAC	1.5 BAC<meas. Conc<0.5BAC	5xBAC<meas. Conc<1.5 BAC	10x BAC<meas. Conc< 5x BAC	Meas.conc>10x BAC
	CR=0.0-0.5	**CR =0.5-2.0**	**CR =2-5**	**CR =5-10**	**CR >10**
Σ_{16} PAHs and Σ_7 PCBs in sediment	Meas.conc<0.5 BAC	2BAC<meas. Conc<0.5BAC	5xBAC<meas. Conc<2BAC	10x BAC<meas. Conc< 5x BAC	Meas.conc>10x BAC

*Meas.conc – measured concentration

Table AI.2. Threshold concentrations and boundary limits used in the CHASE+ assessment of the Levantine Sea Basin. In red, the ratio between the boundary limit used in the Levantine Sea Basin and MedEAC.

	BAC_MED	BAC_AEL	MedEAC	1.5xBAC		5xBAC		10xBAC	
Sediments, µg/kg dry wt				**MED**	**AEL**	**MED**	**AEL**	**MED**	**AEL**
Cd	161	118	1200	242	177	805	590	1610	1180
				0.2	0.15	0.7	0.5	1.3	1.0
Hg	75	47.3	150	113	71	375	236.5	750	473
				0.8	0.5	2.5	1.6	5.0	3.2
Pb	22500	23511	46700	33750	35267	112500	117555	225000	235110
				0.7	0.8	2.4	2.5	4.8	5.0
				2xBAC		**5xBAC**		**10xBAC**	
				MED	**AEL**	**MED**	**AEL**	**MED**	**AEL**
Σ_{16} PAHs	32	41	4022	64	82	160	205	320	410
				0.02	0.02	0.04	0.1	0.1	0.01
Σ_7 PCBs	1.2		68	2.4		6		12	
				0.04		0.1		0.2	
***M. barbatus*, µg/kg wet wt**									
				1.5xBAC		**5xBAC**		**10xBAC**	
				MED	**AEL**	**MED**	**AEL**	**MED**	**AEL**

Cd	7.8	7.2	50	12	11	39	36	78	72
				0.2	0.2	0.8	0.7	1.6	1.4
Hg	81.2	67.4	1000	122	101	406	337	812	674
				0.1	0.1	0.4	0.3	0.8	0.7
Pb	36.6	27	300	55	41	183	135	366	270
				0.2	0.1	0.6	0.5	1.2	0.9

Annex II

The results of application of the IMAP Traffic Light and the CHASE+ methodologies

Table A2.1. Results of the "traffic light" approach to assess the environmental status of TM in sediments in the Levantine Sea Basin. In green, values below BACs; in yellow, values between BAC and MED_EAC; in red values above the MED_EAC. Green and yellow stations are considered in GES, and red stations as non-GES. Cd concentrations in Cyprus were not classified (see table 3).

Source	IMAP _File	Country	Area	Station	Year	Cd MEDBAC	Hg MEDBAC	Pb MEDBAC		Cd AELBAC	Hg AELBAC	Pb AELBAC
IMAP	125	Cyprus	Agkirovolio HS	CY_12-C2_O1/B4	2017		15	53400			15	53400
IMAP	125	Cyprus	Agkirovolio HS	CY_12-C2_O1/B4	2018		15	38000			15	38000
IMAP	125	Cyprus	Amathounta	CY_12-C2_O4/B4	2017		15	43500			15	43500
IMAP	125	Cyprus	Amathounta	CY_12-C2_O4/B4	2018		15	37000			15	37000
IMAP	125	Cyprus	Cavo Greco	CY_22-C3_S1/B4	2014		15	4600			15	4600
IMAP	125	Cyprus	Cavo Greco	CY_22-C3_S1/B4	2017		15	11000			15	11000
IMAP	125	Cyprus	Cavo Greco	CY_22-C3_S1/B4	2018		15	5000			15	5000
IMAP	125	Cyprus	Larnaca East	CY_18-C2_S1/B4	2016		15	37100			15	37100
IMAP	125	Cyprus	Larnaca East	CY_18-C2_S1/B4	2017		15	42200			15	42200
IMAP	125	Cyprus	Larnaca East	CY_18-C2_S1/B4	2018		15	32000			15	32000
IMAP	125	Cyprus	Larnaca West	CY_16-C2_S1/B4	2016		15	37900			15	37900
IMAP	125	Cyprus	Larnaca West	CY_16-C2_S1/B4	2017		30	47600			30	47600
IMAP	125	Cyprus	Latsi	CY_3-C2_S1/LT4	2013		15	45400			15	45400
IMAP	125	Cyprus	Latsi	CY_3-C2_S1/LT4	2013		15	47200			15	47200
IMAP	125	Cyprus	Latsi	CY_3-C2_S1/LT4	2015		15	47200			15	47200
IMAP	125	Cyprus	Latsi	CY_3-C2_S1/LT4	2017		15	53900			15	53900
IMAP	125	Cyprus	Polis Limni HS	CY_03-C2-PS	2015		15	24500			15	24500
IMAP	125	Cyprus	Vasilikos HS	CY_14-C2_S1/B4	2014		15	4700			15	4700
IMAP	125	Cyprus	Vasilikos HS	CY_14-C2_S1/B4	2015		15	4700			15	4700
IMAP	125	Cyprus	Vasilikos HS	CY_14-C2_S1/B4	2017		15	44200			15	44200
IMAP	125	Cyprus	Vasilikos-EAC HS	CY_14-C2_S1/PS	2014		15	31000			15	31000
IMAP	125	Cyprus	Vasilikos-EAC HS	CY_14-C2_S1/PS	2014		15	1400			15	1400
MEDPOL		Israel		ISRMH0	2015	303.0	216.7	10561		303.0	216.7	10561
MEDPOL		Israel		ISRMH0	2017	140.4	53.7	5874		140.4	53.7	5874
MEDPOL		Israel	Haifa Bay	ISRTMH1	2015	50.0	283.3	5460		50.0	283.3	5460
MEDPOL		Israel	Haifa Bay	ISRTMH1	2017	39.7	256.9	6543		39.7	256.9	6543
IMAP	410	Israel	Haifa Bay	ISRTMH1	2019	209.8	291.3	5295		209.8	291.3	5295
IMAP		Israel	Haifa Bay	ISRTMH1	2020	29.9	283.6	5576		29.9	283.6	5576
MEDPOL		Israel	Haifa Bay	ISRTMH2	2015	50.0	279.6			50.0	279.6	
IMAP	410	Israel	Haifa Bay	ISRTMH2	2019	55.8	316.3	4411		55.8	316.3	4411
IMAP		Israel	Haifa Bay	ISRTMH2	2020	29.8	277.3	6243		29.8	277.3	6243
MEDPOL		Israel		ISRMH3	2015	426.4	171.0	12993		426.4	171.0	12993
MEDPOL		Israel		ISRMH3	2017	122.5	50.4	6635		122.5	50.4	6635
MEDPOL		Israel	Haifa Bay	ISRTMH8	2015	50.0	229.2	5752		50.0	229.2	5752
MEDPOL		Israel	Haifa Bay	ISRTMH8	2017	69.0	222.0	5653		69.0	222.0	5653
IMAP	410	Israel	Haifa Bay	ISRTMH8	2019	52.9	226.5	5426		52.9	226.5	5426
IMAP		Israel	Haifa Bay	ISRTMH8	2020	13.9	183.2	5883		13.9	183.2	5883
MEDPOL		Israel	Haifa Bay	ISRTMH9	2015	50.0	257.0	5607		50.0	257.0	5607
MEDPOL		Israel	Haifa Bay	ISRTMH9	2017	34.5	240.5	5939		34.5	240.5	5939
IMAP	410	Israel	Haifa Bay	ISRTMH9	2019	52.1	242.1	4974		52.1	242.1	4974
IMAP		Israel	Haifa Bay	ISRTMH9	2020	23.7	280.0	6101		23.7	280.0	6101
MEDPOL		Israel	Haifa Bay	ISRTMH10	2015	50.0	230.7	6240		50.0	230.7	6240
IMAP	410	Israel	Haifa Bay	ISRTMH10	2019	58.9	204.1	4365		58.9	204.1	4365
IMAP		Israel	Haifa Bay	ISRTMH10	2020	31.8	257.0	5747		31.8	257.0	5747
MEDPOL		Israel	Haifa Bay	ISRTMH11	2015	86.0	206.5	6972		86.0	206.5	6972
MEDPOL		Israel	Haifa Bay	ISRTMH11	2017	46.4	212.5	5799		46.4	212.5	5799
IMAP	410	Israel	Haifa Bay	ISRTMH11	2019	71.1	187.0	4371		71.1	187.0	4371
IMAP_IS		Israel	Haifa Bay	ISRTMH11	2020	34.4	208.0	6380		34.4	208.0	6380
MEDPOL		Israel	Haifa Bay	ISRTMH12	2015	50.0	252.6	5515		50.0	252.6	5515
IMAP	410	Israel	Haifa Bay	ISRTMH12	2019	50.7	199.7	4175		50.7	199.7	4175
IMAP		Israel	Haifa Bay	ISRTMH12	2020	28.9	213.9	5734		28.9	213.9	5734
MEDPOL		Israel	Haifa Bay	ISRTMC14	2015	50.0	155.8	4897		50.0	155.8	4897

MEDPOL		Israel	Haifa Bay	ISRTMC14	2017	44.8	127.2	5011		44.8	127.2	5011
IMAP	410	Israel	Haifa Bay	ISRTMC14	2019	48.0	161.3	3995		48.0	161.3	3995
IMAP		Israel	Haifa Bay	ISRTMC14	2020	32.7	132.3	5777		32.7	132.3	5777
MEDPOL		Israel	Haifa Bay	ISRTMC18	2015	50.0	79.3	4802		50.0	79.3	4802
MEDPOL		Israel	Haifa Bay	ISRTMC18	2017	24.6	29.6	4038		24.6	29.6	4038
IMAP	410	Israel	Haifa Bay	ISRTMC18	2019	46.9	43.6	3744		46.9	43.6	3744
IMAP		Israel	Haifa Bay	ISRTMC18	2020	37.9	34.9	5192		37.9	34.9	5192
MEDPOL		Israel	Haifa Bay	ISRTMC22	2015	50.0	19.4	3849		50.0	19.4	3849
MEDPOL		Israel	Haifa Bay	ISRTMC22	2017	60.4	17.1	6725		60.4	17.1	6725
MEDPOL		Israel	Haifa Bay	ISRTMC23	2015	50.0	25.6	4451		50.0	25.6	4451
MEDPOL		Israel	Haifa Bay	ISRTMC23	2017	37.5	21.2	5123		37.5	21.2	5123
IMAP	410	Israel	Haifa Bay	ISRTMC23	2019	54.9	26.2	4192		54.9	26.2	4192
IMAP		Israel	Haifa Bay	ISRTMC23	2020	31.3	6.8	4740		31.3	6.8	4740
MEDPOL		Israel	Haifa Bay	ISRTMC26	2015	81.3	29.8	5417		81.3	29.8	5417
MEDPOL		Israel	Haifa Bay	ISRTMC26	2015	50.0	30.3	5109		50.0	30.3	5109
MEDPOL		Israel	Haifa Bay	ISRTMH27	2015	59.1	56.0	9831		59.1	56.0	9831
MEDPOL		Israel	Haifa Bay	ISRTMH27	2017	146.2	86.0	9000.3		146.2	86.0	9000.3
IMAP	410	Israel	Haifa Bay	ISRTMH27	2019	225.5	61.4	10177		225.5	61.4	10177
IMAP	410	Israel	Haifa Bay	ISRTMH27	2019	230.8	55.0	10857		230.8	55.0	10857
IMAP	410	Israel	Haifa Bay	ISRTMH27	2019	220.6	56.1	10802		220.6	56.1	10802
IMAP		Israel	Haifa Bay	ISRTMH27	2020	323.7	61.3	16750		323.7	61.3	16749.63
MEDPOL		Israel		ISRTMC39	2015	50.0	3.78	4015		50.0	3.78	4015
MEDPOL		Israel		ISRTMC39	2017	17.3	2.46	9041.8		17.3	2.46	9041.8
IMAP	410	Israel		ISRTMC39	2019	23.2	2.43	3101		23.2	2.43	3101
IMAP		Israel		ISRTMC39	2020	10.4	2.03	4081		10.4	2.03	4081
MEDPOL		Israel		ISRTMC43	2015	50.0	5.53	3568		50.0	5.53	3568
MEDPOL		Israel		ISRTMC43	2017	25.3	3.73	4150		25.3	3.73	4150
IMAP	410	Israel		ISRTMC43	2019	17.6	1.85	2391		17.6	1.85	2391
IMAP		Israel		ISRTMC43	2020	13.3	2.76	3595		13.3	2.76	3595
MEDPOL		Israel		ISRTMC49	2015	50.0	8.52	4003		50.0	8.52	4003
MEDPOL		Israel		ISRTMC49	2017	17.6	7.61	5005		17.6	7.61	5005
IMAP	410	Israel		ISRTMC49	2019	21.7	4.27	5839		21.7	4.27	5839
IMAP		Israel		ISRTMC49	2020	19.5	4.17	4901		19.5	4.17	4901
MEDPOL		Israel		ISRTMC55a	2015	50.0	3.20	2935		50.0	3.20	2935
IMAP	118	Israel	Beirut	DORA-100	2019	599	234	35387		599	234	35387
IMAP	118	Israel	Beirut	DORA-10	2019	510	150	27000		510	150	27000
IMAP	118	Israel	Beirut	DORA-30	2019	530	210	26792		530	210	26792
IMAP	118	Israel	Beirut	RAMLET-40	2019	320	100	21000		320	100	21000
IMAP	118	Israel	Tripoli-North Lebanon	TRI-60	2019	130	100	17418		130	100	17418
IMAP	118	Israel	Akkar-North Lebanon	AKK-60	2019	223	25	12129		223	25	12129
IMAP	118	Israel	Beirut	COSTA-60	2019	120	100	11200		120	100	11200
IMAP	118	Israel	Beirut	RAMLET-100	2019	280	100	11000		280	100	11000
IMAP	118	Israel	Akkar-North Lebanon	AKK-10	2019	349	100	8888		349	100	8888
IMAP	118	Israel	Saida area	SDA-60	2019	143	21	7971		143	21	7971
IMAP	118	Israel	Damour	DAM-60	2019	169	23	7862		169	23	7862
IMAP	118	Israel	Tripoli-North Lebanon	TRI-10	2019	116	100	6674		116	100	6674
IMAP	118	Israel	Beirut	COSTA-30	2019	134	100	6072		134	100	6072
IMAP	118	Israel	Saida area	SDA-10	2019	124	11	4309		124	11	4309
IMAP	118	Israel	Damour	DAM-10	2019	301	100	3884		301	100	3884
IMAP	118	Israel	Beirut	RAMLET-10	2019	266	100	3853		266	100	3853
IMAP	118	Israel	Byblos area	Nhr Ib	2019	270	100	3800		270	100	3800
Ghosn et al, 2020		Israel		(Tripoli)	2017	320	120	17300		320	120	17300
Ghosn et al, 2020		Israel		(Beirut)	2017		70	7250			70	7250
Ghosn et al, 2020		Israel		(Saida)	2017	130	70	3350		130	70	3350
MEDPOL		Turkey	MERSİN KÖRFEZİ	EUTMR6-3	2015	109	117	22302		109	117	22302
MEDPOL		Turkey	SKENDERUN KÖRFEZ	ISKSW2-3	2015	87	54	11923		87	54	11923
MEDPOL		Turkey	SKENDERUN KÖRFEZ	ISKSW3-3	2015	50	50	10838		50	50	10838
MEDPOL		Turkey	KARATAŞ	KARSW1-3	2015	101	64	18977		101	64	18977
MEDPOL		Turkey	MARMARİS	MARSW1-3	2015	44	66	27106		44	66	27106
MEDPOL		Turkey	SEYHAN AĞZI	SEYSW3-3	2015	99	56	32142		99	56	32142
MEDPOL		Turkey	YUMURTALIK	YUMSW1-3	2015	72	56	9886		72	56	9886
MEDPOL		Turkey	ANTALYA KÖRFEZİ	ANBSW1	2015	88	69	17943		88	69	17943
MEDPOL		Turkey	GÖKSU NEHRİ AĞZI	GRESW1	2015	88	54	7882		88	54	7882
MEDPOL		Turkey	SEYHAN AĞZI	SEYSW1	2015	102	68	30254		102	68	30254
MEDPOL		Turkey	TIRTAR	TIRSW1	2015	78	76	27355		78	76	27355
IMAP	445	Turkey	Akkuyu	AKKUYU	2018	383	39	14834		383	39	14834

IMAP	445	Turkey	Akıncı Burnu	AKNSW1	2018	201	27	14237		201	27	14237
IMAP	445	Turkey	Alanya	ALBSW1	2018	72	6	10131		72	6	10131
IMAP	445	Turkey	Anamur	ANASW1	2018	323	28	18193		323	28	18193
IMAP	445	Turkey	Anamur	ANASWR	2018	396	39	25048		396	39	25048
IMAP	445	Turkey	Antalya Bay	ANBSW1	2018	163	35	19697		163	35	19697
IMAP	445	Turkey	Antalya Bay	ANBSWR	2018	149	34	16410		149	34	16410
IMAP	445	Turkey	Botaş	BTCSW1	2018	250	56	26509		250	56	26509
IMAP	445	Turkey	Ceyhan River mouth	CEYSWR	2018	133	20	12174		133	20	12174
IMAP	445	Turkey	Dalaman River mouth	DALSW1	2018	104	62	7532		104	62	7532
IMAP	445	Turkey	Dalaman River mouth	DALSW2	2018	105	31	6138		105	31	6138
IMAP	445	Turkey	Dildare Burnu	DILSWR	2018	79	31	15204		79	31	15204
IMAP	445	Turkey		ECSW1	2018	134	39	11037		134	39	11037
IMAP	445	Turkey	Erdemli	ERDSWR	2018	186	31	19625		186	31	19625
IMAP	445	Turkey	Finike Bay	FIBSW1	2018	91	25	16703		91	25	16703
IMAP	445	Turkey	Göksu	GRESW1	2018	214	21	8016		214	21	8016
IMAP	445	Turkey	Göksu River mouth	GRESW2	2018	551	25	12603		551	25	12603
IMAP	445	Turkey	İskenderun Bay	ISKSW2	2018	134	65	9779		134	65	9779
IMAP	445	Turkey	İskenderun Bay	ISKSW3	2018	119	31	13526		119	31	13526
IMAP	445	Turkey	İskenderun Bay	ISKSWR	2018	211	32	23146		211	32	23146
IMAP	445	Turkey	Karataş	KARSW1	2018	127	18	14388		127	18	14388
IMAP	445	Turkey	Mersin Bay	MERSİN-DOGU-REF	2018	211	29	23536		211	29	23536
IMAP	445	Turkey	Mersin Bay	MERSWR	2018	250	36	21425		250	36	21425
IMAP	445	Turkey	Manavgat River mouth	MRESW1	2018	154	7	6407		154	7	6407
IMAP	445	Turkey	Mersin Bay	MRSYB6	2018	227	32	27886		227	32	27886
IMAP	445	Turkey	Samandağ	SAMSWR	2018	291	27	8445		291	27	8445
IMAP	445	Turkey	Seyhan River mouth	SEYSW1	2018	231	39	23561		231	39	23561
IMAP	445	Turkey	Seyhan River mouth	SEYSW2	2018	245	27	25471		245	27	25471
IMAP	445	Turkey	Seyhan River mouth	SEYSW3	2018	263	33	26303		263	33	26303
IMAP	445	Turkey	Taşucu	TASSW1	2018	478	25	14155		478	25	14155
IMAP	445	Turkey	Tırtar	TIRSW1	2018	263	45	22947		263	45	22947
IMAP	445	Turkey	İskenderun Bay	YUM-REF	2018	189	35	16510		189	35	16510
IMAP	445	Turkey	Yumurtalık	YUMSW1	2018	130	15	11547		130	15	11547

Table A2.2. Results of the CHASE+ approach to assess the environmental status of TM in sediments in the Levantine Sea Basin. Blue - NPAhigh (CS=0.0-0.5); Green- NPAgood (CS =0.5-1.5); Yellow- PAmoderate (CS =1.5-5.0); Brown - PApoor (CS =5.0-10.0) and Red - PAbad (CS > 10.0). Blue and green stations are considered in GES, yellow, brown and red stations are considered non-GES. Cd concentrations in Cyprus were not classified (see table 3).

Sourc	IMAP	Country	Area	Station	Year	Cd_CR=C measure	Hg_CR=C measure	Pb_CR=C measure	CS with MED_BA		_Cd_CR=C measure	Hg_CR=C measure	Pb_CR=C measure	CS with AEL_BA
IMAP	125	Cyprus	Agkirovolio HS	CY_12-	2017		0.20	2.37	1.82			0.32	2.27	1.83
IMAP	125	Cyprus	Agkirovolio HS	CY_12-	2018		0.20	1.69	1.34			0.32	1.62	1.37
IMAP	125	Cyprus	Amathounta	CY_12-	2017		0.20	1.93	1.51			0.32	1.85	1.53
IMAP	125	Cyprus	Amathounta	CY_12-	2018		0.20	1.64	1.30			0.32	1.57	1.34
IMAP	125	Cyprus	Cavo Greco	CY_22-	2014		0.20	0.20	0.29			0.32	0.20	0.36
IMAP	125	Cyprus	Cavo Greco	CY_22-	2017		0.20	0.49	0.49			0.32	0.47	0.56
IMAP	125	Cyprus	Cavo Greco	CY_22-	2018		0.20	0.22	0.30			0.32	0.21	0.37
IMAP	125	Cyprus	Larnaca East	CY_18-	2016		0.20	1.65	1.31			0.32	1.58	1.34
IMAP	125	Cyprus	Larnaca East	CY_18-	2017		0.20	1.88	1.47			0.32	1.79	1.49
IMAP	125	Cyprus	Larnaca East	CY_18-	2018		0.20	1.42	1.15			0.32	1.36	1.19
IMAP	125	Cyprus	Larnaca West	CY_16-	2016		0.20	1.68	1.33			0.32	1.61	1.36
IMAP	125	Cyprus	Larnaca West	CY_16-	2017		0.40	2.12	1.78			0.63	2.02	1.88
IMAP	125	Cyprus	Latsi	CY_3-	2013		0.20	2.02	1.57			0.32	1.93	1.59
IMAP	125	Cyprus	Latsi	CY_3-	2013		0.20	2.10	1.62			0.32	2.01	1.64
IMAP	125	Cyprus	Latsi	CY_3-	2015		0.20	2.10	1.62			0.32	2.01	1.64
IMAP	125	Cyprus	Latsi	CY_3-	2017		0.20	2.40	1.84			0.32	2.29	1.85
IMAP	125	Cyprus	Polis Limni HS	CY_03-C2-PS	2015		0.20	1.09	0.91			0.32	1.04	0.96
IMAP	125	Cyprus	Vasilikos HS	CY_14-	2014		0.20	0.21	0.29			0.32	0.20	0.37
IMAP	125	Cyprus	Vasilikos HS	CY_14-	2015		0.20	0.21	0.29			0.32	0.20	0.37
IMAP	125	Cyprus	Vasilikos HS	CY_14-	2017		0.20	1.96	1.53			0.32	1.88	1.55

IMAP	125	Cyprus	Vasilikos-EAC	CY_14-	2014		0.20	1.38	1.12			0.32	1.32	1.16
IMAP	125	Cyprus	Vasilikos-EAC	CY_14-	2014		0.20	0.06	0.19			0.32	0.06	0.27
MEDPOL		Israel		ISRMH0	2015	1.9	2.89	0.47	3.03		2.6	4.59	0.45	4.38
MEDPOL		Israel		ISRMH0	2017	0.9	0.72	0.26	1.07		1.2	1.14	0.25	1.48
MEDPOL		Israel	Haifa Bay	ISRTMH1	2015	0.3	3.78	0.24	2.50		0.4	6.00	0.23	3.84
MEDPOL		Israel	Haifa Bay	ISRTMH1	2017	0.2	3.43	0.29	2.29		0.3	5.44	0.28	3.49
IMAP	410	Israel	Haifa Bay	ISRTMH1	2019	1.3	3.88	0.24	3.13		1.8	6.17	0.23	4.71
IMAP		Israel	Haifa Bay	ISRTMH1	2020	0.2	3.78	0.25	2.43		0.3	6.00	0.24	3.75
MEDPOL		Israel	Haifa Bay	ISRTMH2	2015	0.3	3.73		2.86		0.4	5.92		4.48
IMAP	410	Israel	Haifa Bay	ISRTMH2	2019	0.3	4.22	0.20	2.75		0.5	6.69	0.19	4.25
IMAP		Israel	Haifa Bay	ISRTMH2	2020	0.2	3.70	0.28	2.40		0.3	5.87	0.27	3.69
MEDPOL		Israel		ISRMH3	2015	2.7	2.28	0.58	3.18		3.6	3.62	0.55	4.49
MEDPOL		Israel		ISRMH3	2017	0.8	0.67	0.29	1.00		1.0	1.07	0.28	1.38
MEDPOL		Israel	Haifa Bay	ISRTMH8	2015	0.3	3.06	0.26	2.09		0.4	4.85	0.24	3.19
MEDPOL		Israel	Haifa Bay	ISRTMH8	2017	0.4	2.96	0.25	2.10		0.6	4.70	0.24	3.19
IMAP	410	Israel	Haifa Bay	ISRTMH8	2019	0.3	3.02	0.24	2.07		0.4	4.79	0.23	3.16
IMAP		Israel	Haifa Bay	ISRTMH8	2020	0.1	2.44	0.26	1.61		0.1	3.88	0.25	2.45
MEDPOL		Israel	Haifa Bay	ISRTMH9	2015	0.3	3.43	0.25	2.30		0.4	5.44	0.24	3.52
MEDPOL		Israel	Haifa Bay	ISRTMH9	2017	0.2	3.21	0.26	2.13		0.3	5.09	0.25	3.25
IMAP	410	Israel	Haifa Bay	ISRTMH9	2019	0.3	3.23	0.22	2.18		0.4	5.12	0.21	3.33
IMAP		Israel	Haifa Bay	ISRTMH9	2020	0.1	3.73	0.27	2.40		0.2	5.93	0.26	3.69
MEDPOL		Israel	Haifa Bay	ISRTMH10	2015	0.3	3.08	0.28	2.12		0.4	4.88	0.27	3.22
IMAP	410	Israel	Haifa Bay	ISRTMH10	2019	0.4	2.72	0.19	1.89		0.5	4.32	0.19	2.89
IMAP		Israel	Haifa Bay	ISRTMH10	2020	0.2	3.43	0.26	2.24		0.3	5.44	0.24	3.44
MEDPOL		Israel	Haifa Bay	ISRTMH11	2015	0.5	2.75	0.31	2.08		0.7	4.37	0.30	3.11
MEDPOL		Israel	Haifa Bay	ISRTMH11	2017	0.3	2.83	0.26	1.95		0.4	4.50	0.25	2.96
IMAP	410	Israel	Haifa Bay	ISRTMH11	2019	0.4	2.49	0.19	1.81		0.6	3.96	0.19	2.74
IMAP IS		Israel	Haifa Bay	ISRTMH11	2020	0.2	2.77	0.28	1.89		0.3	4.40	0.27	2.87
MEDPOL		Israel	Haifa Bay	ISRTMH12	2015	0.3	3.37	0.25	2.27		0.4	5.35	0.23	3.47
IMAP	410	Israel	Haifa Bay	ISRTMH12	2019	0.3	2.66	0.19	1.83		0.4	4.23	0.18	2.79
IMAP		Israel	Haifa Bay	ISRTMH12	2020	0.2	2.85	0.25	1.90		0.2	4.53	0.24	2.90
MEDPOL		Israel	Haifa Bay	ISRTMC14	2015	0.3	2.08	0.22	1.51		0.4	3.30	0.21	2.27
MEDPOL		Israel	Haifa Bay	ISRTMC14	2017	0.3	1.70	0.22	1.27		0.4	2.69	0.21	1.90
IMAP	410	Israel	Haifa Bay	ISRTMC14	2019	0.3	2.15	0.18	1.52		0.4	3.41	0.17	2.30
IMAP		Israel	Haifa Bay	ISRTMC14	2020	0.2	1.76	0.26	1.28		0.3	2.80	0.25	1.92
MEDPOL		Israel	Haifa Bay	ISRTMC18	2015	0.3	1.06	0.21	0.91		0.4	1.68	0.20	1.33
MEDPOL		Israel	Haifa Bay	ISRTMC18	2017	0.2	0.39	0.18	0.42		0.2	0.63	0.17	0.58
IMAP	410	Israel	Haifa Bay	ISRTMC18	2019	0.3	0.58	0.17	0.60		0.4	0.92	0.16	0.85
IMAP		Israel	Haifa Bay	ISRTMC18	2020	0.2	0.47	0.23	0.54		0.3	0.74	0.22	0.74
MEDPOL		Israel	Haifa Bay	ISRTMC22	2015	0.3	0.26	0.17	0.43		0.4	0.41	0.16	0.58
MEDPOL		Israel	Haifa Bay	ISRTMC22	2017	0.4	0.23	0.30	0.52		0.5	0.36	0.29	0.67
MEDPOL		Israel	Haifa Bay	ISRTMC23	2015	0.3	0.34	0.20	0.49		0.4	0.54	0.19	0.67
MEDPOL		Israel	Haifa Bay	ISRTMC23	2017	0.2	0.28	0.23	0.43		0.3	0.45	0.22	0.57
IMAP	410	Israel	Haifa Bay	ISRTMC23	2019	0.3	0.35	0.19	0.51		0.5	0.55	0.18	0.69
IMAP		Israel	Haifa Bay	ISRTMC23	2020	0.2	0.09	0.21	0.29		0.3	0.14	0.20	0.35
MEDPOL		Israel	Haifa Bay	ISRTMC26	2015	0.5	0.40	0.24	0.66		0.7	0.63	0.23	0.89
MEDPOL		Israel	Haifa Bay	ISRTMC26	2015	0.3	0.40	0.23	0.54		0.4	0.64	0.22	0.74
MEDPOL		Israel	Haifa Bay	ISRTMH27	2015	0.4	0.75	0.44	0.90		0.5	1.19	0.42	1.21
MEDPOL		Israel	Haifa Bay	ISRTMH27	2017	0.9	1.15	0.40	1.42		1.2	1.82	0.38	1.98
IMAP	410	Israel	Haifa Bay	ISRTMH27	2019	1.4	0.82	0.45	1.54		1.9	1.30	0.43	2.10
IMAP	410	Israel	Haifa Bay	ISRTMH27	2019	1.4	0.73	0.48	1.53		2.0	1.16	0.46	2.06
IMAP	410	Israel	Haifa Bay	ISRTMH27	2019	1.4	0.75	0.48	1.50		1.9	1.19	0.46	2.03
IMAP		Israel	Haifa Bay	ISRTMH27	2020	2.0	0.82	0.74	2.07		2.7	1.30	0.71	2.74
MEDPOL		Israel		ISRTMC39	2015	0.3	0.05	0.18	0.31		0.4	0.08	0.17	0.39
MEDPOL		Israel		ISRTMC39	2017	0.1	0.03	0.40	0.31		0.1	0.05	0.38	0.34
IMAP	410	Israel		ISRTMC39	2019	0.1	0.03	0.14	0.18		0.2	0.05	0.13	0.22
IMAP		Israel		ISRTMC39	2020	0.1	0.03	0.18	0.16		0.1	0.04	0.17	0.18
MEDPOL		Israel		ISRTMC43	2015	0.3	0.07	0.16	0.31		0.4	0.12	0.15	0.40
MEDPOL		Israel		ISRTMC43	2017	0.2	0.05	0.18	0.23		0.2	0.08	0.18	0.27
IMAP	410	Israel		ISRTMC43	2019	0.1	0.02	0.11	0.14		0.1	0.04	0.10	0.17
IMAP		Israel		ISRTMC43	2020	0.1	0.04	0.16	0.16		0.1	0.06	0.15	0.19
MEDPOL		Israel		ISRTMC49	2015	0.3	0.11	0.18	0.35		0.4	0.18	0.17	0.45
MEDPOL		Israel		ISRTMC49	2017	0.1	0.10	0.22	0.25		0.1	0.16	0.21	0.30
IMAP	410	Israel		ISRTMC49	2019	0.1	0.06	0.26	0.26		0.2	0.09	0.25	0.30
IMAP		Israel		ISRTMC49	2020	0.1	0.06	0.22	0.23		0.2	0.09	0.21	0.27
MEDPOL		Israel		ISRTMC55a	2015	0.3	0.04	0.13	0.28		0.4	0.07	0.12	0.36
IMAP	118	Israel	Beirut	DORA-100	2019	3.7	3.12	1.57	4.86		5.1	4.95	1.51	6.65
IMAP	118	Israel	Beirut	DORA-10	2019	3.2	2.00	1.20	3.68		4.3	3.17	1.15	4.98
IMAP	118	Israel	Beirut	DORA-30	2019	3.3	2.80	1.19	4.21		4.5	4.44	1.14	5.81
IMAP	118	Israel	Beirut	RAMLET-40	2019	2.0	1.33	0.93	2.46		2.7	2.12	0.89	3.30
IMAP	118	Israel	Tripoli-North	TRI-60	2019	0.8	1.33	0.77	1.68		1.1	2.12	0.74	2.29
IMAP	118	Israel	Akkar-North	AKK-60	2019	1.4	0.33	0.54	1.31		1.9	0.53	0.52	1.69
IMAP	118	Israel	Beirut	COSTA-60	2019	0.7	1.33	0.50	1.49		1.0	2.12	0.48	2.08
IMAP	118	Israel	Beirut	RAMLET-100	2019	1.7	1.33	0.49	2.06		2.4	2.12	0.47	2.86
IMAP	118	Israel	Akkar-North	AKK-10	2019	2.2	1.33	0.40	2.25		3.0	2.12	0.38	3.15
IMAP	118	Israel	Saida area	SDA-60	2019	0.9	0.28	0.35	0.88		1.2	0.44	0.34	1.15
IMAP	118	Israel	Damour	DAM-60	2019	1.1	0.31	0.35	0.99		1.4	0.49	0.33	1.30
IMAP	118	Israel	Tripoli-North	TRI-10	2019	0.7	1.33	0.30	1.36		1.0	2.12	0.28	1.96
IMAP	118	Israel	Beirut	COSTA-30	2019	0.8	1.33	0.27	1.41		1.1	2.12	0.26	2.03

IMAP	118	Israel	Saida area	SDA-10	2019	0.8	0.15	0.19	0.64		1.0	0.23	0.18	0.85
IMAP	118	Israel	Damour	DAM-10	2019	1.9	1.33	0.17	1.95		2.5	2.12	0.17	2.79
IMAP	118	Israel	Beirut	RAMLET-10	2019	1.7	1.33	0.17	1.82		2.2	2.12	0.16	2.62
IMAP	118	Israel	Byblos area	Nhr Ib	2019	1.7	1.33	0.17	1.84		2.3	2.12	0.16	2.63
Lit_Ghosn		Israel		(Tripoli)	2017	2.0	1.60	0.77	2.52		2.7	2.54	0.74	3.45
Lit_Ghosn		Israel		(Beirut)	2017		0.93	0.32	0.89			1.48	0.31	1.27
Lit_Ghosn		Israel		(Saida)	2017	0.8	0.93	0.15	1.09		1.1	1.48	0.14	1.57
MEDPOL		Turkey	MERSİN	EUTMR6-3	2015	0.7	1.56	0.99	1.87		0.9	2.48	0.95	2.51
MEDPOL		Turkey	SKENDERUN	ISKSW2-3	2015	0.5	0.72	0.53	1.04		0.7	1.15	0.51	1.38
MEDPOL		Turkey	SKENDERUN	ISKSW3-3	2015	0.3	0.67	0.48	0.84		0.4	1.07	0.46	1.12
MEDPOL		Turkey	KARATAŞ	KARSW1-3	2015	0.6	0.86	0.84	1.35		0.9	1.36	0.81	1.74
MEDPOL		Turkey	MARMARİS	MARSW1-3	2015	0.3	0.88	1.20	1.36		0.4	1.40	1.15	1.69
MEDPOL		Turkey	SEYHAN AĞZI	SEYSW3-3	2015	0.6	0.75	1.43	1.61		0.8	1.19	1.37	1.96
MEDPOL		Turkey	YUMURTALIK	YUMSW1-3	2015	0.4	0.75	0.44	0.95		0.6	1.20	0.42	1.28
MEDPOL		Turkey	ANTALYA	ANBSW1	2015	0.6	0.92	0.80	1.31		0.7	1.45	0.76	1.71
MEDPOL		Turkey	GÖKSU NEHRİ	GRESW1	2015	0.5	0.72	0.35	0.93		0.7	1.14	0.34	1.28
MEDPOL		Turkey	SEYHAN AĞZI	SEYSW1	2015	0.6	0.91	1.34	1.67		0.9	1.45	1.29	2.07
MEDPOL		Turkey	TIRTAR	TIRSW1	2015	0.5	1.01	1.22	1.57		0.7	1.60	1.16	1.98
IMAP	445	Turkey	Akkuyu	AKKUYU	2018	2.4	0.52	0.66	2.06		3.2	0.83	0.63	2.71
IMAP	445	Turkey	Akıncı Burnu	AKNSW1	2018	1.2	0.36	0.63	1.30		1.7	0.57	0.61	1.66
IMAP	445	Turkey	Alanya	ALBSW1	2018	0.5	0.08	0.45	0.57		0.6	0.12	0.43	0.67
IMAP	445	Turkey	Anamur	ANASW1	2018	2.0	0.38	0.81	1.85		2.7	0.60	0.77	2.37
IMAP	445	Turkey	Anamur	ANASWR	2018	2.5	0.53	1.11	2.37		3.3	0.83	1.07	3.03
IMAP	445	Turkey	Antalya Bay	ANBSW1	2018	1.0	0.46	0.88	1.36		1.4	0.74	0.84	1.70
IMAP	445	Turkey	Antalya Bay	ANBSWR	2018	0.9	0.45	0.73	1.22		1.3	0.72	0.70	1.54
IMAP	445	Turkey	Botaş	BTCSW1	2018	1.6	0.74	1.18	2.01		2.1	1.17	1.13	2.55
IMAP	445	Turkey	Ceyhan River	CEYSWR	2018	0.8	0.26	0.54	0.94		1.1	0.42	0.52	1.19
IMAP	445	Turkey	Dalaman River	DALSW1	2018	0.6	0.83	0.33	1.05		0.9	1.32	0.32	1.45
IMAP	445	Turkey	Dalaman River	DALSW2	2018	0.7	0.41	0.27	0.78		0.9	0.66	0.26	1.04
IMAP	445	Turkey	Dildare Burnu	DILSWR	2018	0.5	0.41	0.68	0.91		0.7	0.65	0.65	1.14
IMAP	445	Turkey		ECSW1	2018	0.8	0.52	0.49	1.07		1.1	0.83	0.47	1.41
IMAP	445	Turkey	Erdemli	ERDSWR	2018	1.2	0.42	0.87	1.41		1.6	0.66	0.83	1.77
IMAP	445	Turkey	Finike Bay	FIBSW1	2018	0.6	0.34	0.74	0.95		0.8	0.54	0.71	1.17
IMAP	445	Turkey	Göksu	GRESW1	2018	1.3	0.28	0.36	1.14		1.8	0.45	0.34	1.50
IMAP	445	Turkey	Göksu River	GRESW2	2018	3.4	0.34	0.56	2.50		4.7	0.53	0.54	3.31
IMAP	445	Turkey	İskenderun Bay	ISKSW2	2018	0.8	0.87	0.43	1.23		1.1	1.38	0.42	1.69
IMAP	445	Turkey	İskenderun Bay	ISKSW3	2018	0.7	0.41	0.60	1.01		1.0	0.65	0.58	1.29
IMAP	445	Turkey	İskenderun Bay	ISKSWR	2018	1.3	0.43	1.03	1.60		1.8	0.68	0.98	1.99
IMAP	445	Turkey	Karataş	KARSW1	2018	0.8	0.24	0.64	0.97		1.1	0.39	0.61	1.20
IMAP	445	Turkey	Mersin Bay	MERSİN-DOGU-	2018	1.3	0.39	1.05	1.59		1.8	0.61	1.00	1.96
IMAP	445	Turkey	Mersin Bay	MERSWR	2018	1.6	0.48	0.95	1.73		2.1	0.76	0.91	2.19
IMAP	445	Turkey	Manavgat River	MRESW1	2018	1.0	0.10	0.28	0.78		1.3	0.16	0.27	1.00
IMAP	445	Turkey	Mersin Bay	MRSYB6	2018	1.4	0.42	1.24	1.77		1.9	0.67	1.19	2.18
IMAP	445	Turkey	Samandağ	SAMSWR	2018	1.8	0.37	0.38	1.47		2.5	0.58	0.36	1.96
IMAP	445	Turkey	Seyhan River	SEYSW1	2018	1.4	0.52	1.05	1.74		2.0	0.83	1.00	2.18
IMAP	445	Turkey	Seyhan River	SEYSW2	2018	1.5	0.36	1.13	1.74		2.1	0.57	1.08	2.15
IMAP	445	Turkey	Seyhan River	SEYSW3	2018	1.6	0.43	1.17	1.87		2.2	0.69	1.12	2.33
IMAP	445	Turkey	Taşucu	TASSW1	2018	3.0	0.33	0.63	2.27		4.0	0.52	0.60	2.98
IMAP	445	Turkey	Tırtar	TIRSW1	2018	1.6	0.61	1.02	1.88		2.2	0.96	0.98	2.40
IMAP	445	Turkey	İskenderun Bay	YUM-REF	2018	1.2	0.47	0.73	1.37		1.6	0.74	0.70	1.75
IMAP	445	Turkey	Yumurtalık	YUMSW1	2018	0.8	0.20	0.51	0.88		1.1	0.32	0.49	1.10

Table A2.3. Results of the "traffic light" and the CHASE+ approaches to assess the environmental status of Σ16 PAHs in sediments in the Levantine Sea Basin. Traffic light approach: In green, values below BACs; in yellow, values between BAC and MED_EAC; in red values above the MED_EAC. Green and yellow stations are considered in GES, and red stations as non-GES. CHASE+ approach: Blue - NPAhigh (CS=0.0-0.5); Green- NPAgood (CS =0.5-2); Yellow- PAmoderate (CS =2-5.0); Brown - PApoor (CS =5.0-10.0) and Red - PAbad (CS > 10.0). Blue and green stations are considered in GES, yellow, brown and red stations are considered non-GES.

Source	IMAP file	Country	Station	Station	Year	TrafficLight	TrafficLigh_t		CR=Cmeas	CR=Cmeas /AELBAC
IMAP_IS	152	Lebano	Akkar-N.	AKK-10	2019	7.9	7.9		0.19	0.25
IMAP_IS	152	Lebano	Akkar-N.	AKK-60	2019	17.4	17.4		0.42	0.54
IMAP_IS	152	Lebano	Beirut	COSTA-10	2019	0.1	0.1		0.00	0.00
IMAP_IS	152	Lebano	Beirut	COSTA-30	2019	17.2	17.2		0.42	0.54
IMAP_IS	152	Lebano	Beirut	COSTA-60	2019	12.1	12.1		0.30	0.38
IMAP_IS	152	Lebano	Damour	DAM-10	2019	0.4	0.4		0.01	0.01

IMAP_IS	152	Lebano	Damour	DAM-60	2019	17.6	17.6		0.43	0.55
IMAP_IS	152	Lebano	Beirut	DORA-10	2019	115.9	115.9		2.83	3.62
IMAP_IS	152	Lebano	Beirut	DORA-100	2019	343.3	343.3		8.37	10.73
IMAP_IS	152	Lebano	Beirut	DORA-30	2019	155.2	155.2		3.79	4.85
IMAP_IS	152	Lebano	Byblos area	Nhr Ib	2019	1.2	1.2		0.03	0.04
IMAP_IS	152	Lebano	Beirut	RAMLET-	2019	1.6	1.6		0.04	0.05
IMAP_IS	152	Lebano	Beirut	RAMLET-	2019	347.6	347.6		8.48	10.86
IMAP_IS	152	Lebano	Beirut	RAMLET-	2019	395.9	395.9		9.66	12.37
IMAP_IS	152	Lebano	Saida area	SDA-10	2019	335.4	335.4		8.18	10.48
IMAP_IS	152	Lebano	Saida area	SDA-60	2019	10.0	10.0		0.25	0.31
IMAP_IS	152	Lebano	Tripoli-N.	TRI-10	2019	78.0	78.0		1.90	2.44
IMAP_IS	152	Lebano	Tripoli-N.	TRI-40	2019	12.6	12.6		0.31	0.39
IMAP_IS	152	Lebano	Tripoli-N.	TRI-60	2019	45.4	45.4		1.11	1.42
Lit-Astrahan et al.		Israel		S11	2013	22.5	22.5		0.55	0.70
Lit-Astrahan et al.		Israel		S12	2013	45.5	45.5		1.11	1.42
Lit-Astrahan et al.		Israel		S13	2013	38.9	38.9		0.95	1.22
Lit-Astrahan et al.		Israel		S14	2013	27.4	27.4		0.67	0.86
Lit-Astrahan et al.		Israel		G1	2013	28.3	28.3		0.69	0.88
Lit-Astrahan et al.		Israel		G2	2013	33	33		0.80	1.03
Lit-Astrahan et al.		Israel		G3	2013	12	12		0.29	0.38
Lit-Astrahan et al.		Israel		G4	2013	24.1	24.1		0.59	0.75
Lit-Astrahan et al.		Israel		G5	2013	18.1	18.1		0.44	0.57
Lit-Astrahan et al.		Israel		G6	2013	25.6	25.6		0.62	0.80
Lit-Astrahan et al.		Israel		G7	2013	25.1	25.1		0.61	0.78
Lit-Astrahan et al.		Israel		G8	2013	11	11		0.27	0.34
Lit-Astrahan et al.		Israel		G9	2013	32.2	32.2		0.79	1.01
Lit-Astrahan et al.		Israel		G10	2013	19.6	19.6		0.48	0.61
Lit-Astrahan et al.		Israel		G11	2013	19.2	19.2		0.47	0.60
Lit-Astrahan et al.		Israel		S21	2013	27.3	27.3		0.67	0.85
Lit-Astrahan et al.		Israel		S22	2013	21.8	21.8		0.53	0.68
Lit-Astrahan et al.		Israel		S23	2013	21.6	21.6		0.53	0.68
Lit-Astrahan et al.		Israel		S24	2013	27.1	27.1		0.66	0.85
Lit-Astrahan et al.		Israel		S25	2013	22.6	22.6		0.55	0.71
Lit-Astrahan et al.		Israel		G12	2013	37.7	37.7		0.92	1.18
Lit-Astrahan et al.		Israel		G13	2013	22.2	22.2		0.54	0.69
Lit-Astrahan et al.		Israel		G14	2013	11.3	11.3		0.28	0.35
Lit-Astrahan et al.		Israel		G15	2013	35.2	35.2		0.86	1.10
Lit-Astrahan et al.		Israel		G16	2013	15.6	15.6		0.38	0.49
Lit-Astrahan et al.		Israel		G17	2013	16.6	16.6		0.40	0.52
Lit-Astrahan et al.		Israel		G31	2013	20.7	20.7		0.50	0.65
Lit-Astrahan et al.		Israel		G18	2013	26.1	26.1		0.64	0.82
Lit-Astrahan et al.		Israel		G18a	2013	25.9	25.9		0.63	0.81
Lit-Astrahan et al.		Israel		G19	2013	19.2	19.2		0.47	0.60
Lit-Astrahan et al.		Israel		G20	2013	17.2	17.2		0.42	0.54
Lit-Astrahan et al.		Israel		G21	2013	13.4	13.4		0.33	0.42
Lit-Astrahan et al.		Israel		G22	2013	16.8	16.8		0.41	0.53
Lit-Astrahan et al.		Israel		S31	2013	23.8	23.8		0.58	0.74
Lit-Astrahan et al.		Israel		S32	2013	33.5	33.5		0.82	1.05
Lit-Astrahan et al.		Israel		S33	2013	33.6	33.6		0.82	1.05
Lit-Astrahan et al.		Israel		S34	2013	43.7	43.7		1.07	1.37
Lit-Astrahan et al.		Israel		S35	2013	41	41		1.00	1.28
Lit-Astrahan et al.		Israel		G23	2013	31.5	31.5		0.77	0.98
Lit-Astrahan et al.		Israel		G24	2013	38.1	38.1		0.93	1.19
Lit-Astrahan et al.		Israel		G25	2013	17.6	17.6		0.43	0.55
Lit-Astrahan et al.		Israel		G26	2013	19.7	19.7		0.48	0.62
Lit-Astrahan et al.		Israel		G32	2013	17	17		0.41	0.53
Lit-Astrahan et al.		Israel		S41	2013	28.2	28.2		0.69	0.88
Lit-Astrahan et al.		Israel		S42	2013	147	147		3.59	4.59
Lit-Astrahan et al.		Israel		S43	2013	188.1	188.1		4.59	5.88
Lit-Astrahan et al.		Israel		S44	2013	68.6	68.6		1.67	2.14
Lit-Astrahan et al.		Israel		S45	2013	96	96		2.34	3.00
Lit-Astrahan et al.		Israel		G27	2013	84.5	84.5		2.06	2.64
Lit-Astrahan et al.		Israel		G28	2013	21.1	21.1		0.51	0.66
Lit-Astrahan et al.		Israel		G29	2013	19.8	19.8		0.48	0.62
Lit-Astrahan et al.		Israel		G30	2013	15.2	15.2		0.37	0.48

Table A2.4. Results of the "traffic light" and the CHASE+ approaches to assess the environmental status of Σ7 PCBs in sediments in the Levantine Sea Basin. Traffic light approach: In green, values below BACs; in yellow, values between BAC and MED_EAC; in red values above the MED_EAC. Green and yellow stations are considered in GES, and red stations as non-GES. CHASE+ approach: Blue - NPAhigh (CS=0.0-0.5); Green- NPAgood (CS =0.5-2); Yellow- PAmoderate (CS =2-5.0); Brown - PApoor (CS =5.0-10.0) and Red - PAbad (CS > 10.0). Blue and green stations are considered in GES, yellow, brown and red stations are considered non-GES.

Source	File ID	Country	Area	Cruise	Year	Traffic light_ 3xMEDBC		CR=Cmeas/3xMED BC
IMAP	152	Lebanon	Akkar-North Lebanon	AKK-10	2019	0		0.0
IMAP	152	Lebanon	Akkar-North Lebanon	AKK-60	2019	2.8		2.3
IMAP	152	Lebanon	Beirut	COSTA-10	2019	0		0.0
IMAP	152	Lebanon	Beirut	COSTA-30	2019	0		0.0
IMAP	152	Lebanon	Beirut	COSTA-60	2019	0		0.0
IMAP	152	Lebanon	Damour	DAM-10	2019	0		0.0
IMAP	152	Lebanon	Damour	DAM-60	2019	0		0.0
IMAP	152	Lebanon	Beirut	DORA-10	2019	6.7		5.6
IMAP	152	Lebanon	Beirut	DORA-100	2019	13.9		11.6
IMAP	152	Lebanon	Beirut	DORA-30	2019	19.0		15.8
IMAP	152	Lebanon	Byblos area	Nhr Ib	2019	0.139		0.1
IMAP	152	Lebanon	Beirut	RAMLET-10	2019	0		0.0
IMAP	152	Lebanon	Beirut	RAMLET-100	2019	0		0.0
IMAP	152	Lebanon	Beirut	RAMLET-40	2019	4.1		3.4
IMAP	152	Lebanon	Saida area	SDA-10	2019	5.8		4.8
IMAP	152	Lebanon	Saida area	SDA-60	2019	0		0.0
IMAP	152	Lebanon	Tripoli-North Lebanon	TRI-10	2019	1.9		1.6
IMAP	152	Lebanon	Tripoli-North Lebanon	TRI-40	2019	3.0		2.5
IMAP	152	Lebanon	Tripoli-North Lebanon	TRI-60	2019	1.3		1.1
IMAP	445	Turkey	Akkuyu	AKKUYU	2018	0.22		0.2
IMAP	445	Turkey	Akıncı Burnu	AKNSW1	2018	0.15		0.1
IMAP	445	Turkey	Alanya	ALBSW1	2018	0.16		0.1
IMAP	445	Turkey	Anamur	ANASW1	2018	0.27		0.2
IMAP	445	Turkey	Anamur	ANASWR	2018	0.75		0.6
IMAP	445	Turkey	Antalya Bay	ANBSW1	2018	0.21		0.2
IMAP	445	Turkey	Antalya Bay	ANBSWR	2018	0.24		0.2
IMAP	445	Turkey	Botaş	BTCSW1	2018	0.78		0.7
IMAP	445	Turkey	Ceyhan River mouth	CEYSWR	2018	0.32		0.3
IMAP	445	Turkey	Dalaman River mouth	DALSW1	2018	0.11		0.1
IMAP	445	Turkey	Dalaman River mouth	DALSW2	2018	0.26		0.2
IMAP	445	Turkey	Dildare Burnu	DILSWR	2018	0.36		0.3
IMAP	445	Turkey		ECSW1	2018	0.27		0.2
IMAP	445	Turkey	Erdemli	ERDSWR	2018	0.19		0.2
IMAP	445	Turkey	Finike Bay	FIBSW1	2018	0.21		0.2
IMAP	445	Turkey	Göksu	GRESW1	2018	0.69		0.6
IMAP	445	Turkey	Göksu River mouth	GRESW2	2018	0.22		0.2
IMAP	445	Turkey	İskenderun Bay	ISKSW2	2018	0.23		0.2
IMAP	445	Turkey	İskenderun Bay	ISKSW3	2018	0.20		0.2
IMAP	445	Turkey	İskenderun Bay	ISKSWR	2018	0.19		0.2
IMAP	445	Turkey	Karataş	KARSW1	2018	0.30		0.3
IMAP	445	Turkey	Mersin Bay	MERSİN-DOGU-REF	2018	0.28		0.2
IMAP	445	Turkey	Mersin Bay	MERSWR	2018	1.27		1.1
IMAP	445	Turkey	Manavgat River mouth	MRESW1	2018	0.17		0.1
IMAP	445	Turkey	Mersin Bay	MRSYB6	2018	0.21		0.2
IMAP	445	Turkey	Samandağ	SAMSWR	2018	0.12		0.1
IMAP	445	Turkey	Seyhan River mouth	SEYSW1	2018	0.33		0.3
IMAP	445	Turkey	Seyhan River mouth	SEYSW2	2018	0.22		0.2
IMAP	445	Turkey	Seyhan River mouth	SEYSW3	2018	0.31		0.3
IMAP	445	Turkey	Taşucu	TASSW1	2018	0.17		0.1
IMAP	445	Turkey	Tırtar	TIRSW1	2018	0.23		0.2
IMAP	445	Turkey	İskenderun Bay	YUM-REF	2018	0.39		0.3
IMAP	445	Turkey	Yumurtalık	YUMSW1	2018	0.14		0.1

Table A2.5. Results of the "traffic light" approach to assess the environmental status of TM in *M. barbatus* in the Levantine Sea Basin. In green, values below BACs; in yellow, values between BAC and MED_EAC; in red values above the MED_EAC. Green and yellow stations are considered in GES, and red stations as non-GES.

Source	IMAP file	Country	Station	Year	Cd MEDBAC	Hg MEDBAC	Pb MEDBAC		Cd AELBAC	Hg AELBAC	Pb AELBAC
IMAP_IS	152	Lebanon	MB2 BEY	2019	0.081	2.305	4.850		0.081	2.305	4.850
IMAP_IS	152	Lebanon	MB4 BEY	2019	0.151	4.122	7.134		0.151	4.122	7.134
IMAP_IS	152	Lebanon	MB5 BEY	2019	0.198	2.900	3.363		0.198	2.900	3.363
IMAP_IS	152	Lebanon	MB7 BEY	2019	0.220	2.078	2.071		0.220	2.078	2.071
IMAP_IS	152	Lebanon	MB8 BEY	2019	0.162	4.397	13.475		0.162	4.397	13.475
IMAP_IS	152	Lebanon	MB9 BEY	2019	0.087	2.753	15.233		0.087	2.753	15.233
IMAP_IS	152	Lebanon	MB10 BEY	2019	0.133	4.138	2.744		0.133	4.138	2.744
IMAP_IS	152	Lebanon	MB5 TRIP	2019	0.482	12.309	15.686		0.482	12.309	15.686
IMAP_IS	152	Lebanon	MB1 TYRE	2019	0.067	9.222	0.441		0.067	9.222	0.441
IMAP_IS	152	Lebanon	MB4 TYRE	2019	0.597	15.719	2.817		0.597	15.719	2.817
IMAP_IS	152	Lebanon	MB6 TYRE	2019	0.788	86.967	9.431		0.788	86.967	9.431
IMAP_IS	152	Lebanon	MB7 TYRE	2019	0.190	6.879	0.571		0.190	6.879	0.571
IMAP_IS	152	Lebanon	MS1 TYRE	2019	0.544	13.266	5.299		0.544	13.266	5.299
IMAP_IS	152	Lebanon	MS2 TYRE	2019	0.483	33.645	7.311		0.483	33.645	7.311
IMAP_IS	410	Israel	TRAWL C	2019	1.82	121			1.82	121	
IMAP_IS	410	Israel	TRAWL C	2019	1.50	65.8			1.50	65.8	
IMAP_IS	410	Israel	TRAWL C	2019	2.48	67.8			2.48	67.8	
IMAP_IS	410	Israel	TRAWL C	2019	2.23	62.3			2.23	62.3	
IMAP_IS	410	Israel	TRAWL C	2019	2.50	79.3			2.50	79.3	
IMAP_IS	410	Israel	TRAWL C	2019	2.07	58.5			2.07	58.5	
IMAP_IS	410	Israel	TRAWL C	2019	2.93	72.1			2.93	72.1	
IMAP_IS	351	Israel	TRAWL C	2015		22.0				22.0	
IMAP_IS	351	Israel	TRAWL C	2015		13.2				13.2	
IMAP_IS	351	Israel	TRAWL C	2015		12.9				12.9	
IMAP_IS	351	Israel	TRAWL C	2015		19.5				19.5	
IMAP_IS	351	Israel	TRAWL C	2015		11.0				11.0	
IMAP_IS	351	Israel	TRAWL C	2015		12.8				12.8	
IMAP_IS	351	Israel	TRAWL C	2015		17.9				17.9	
IMAP_IS	351	Israel	TRAWL C	2015		20.1				20.1	
IMAP_IS	351	Israel	TRAWL C	2015		19.4				19.4	
IMAP_IS	351	Israel	TRAWL C	2015		13.7				13.7	
IMAP_IS	351	Israel	TRAWL C	2015		19.8				19.8	
IMAP_IS	351	Israel	TRAWL N	2015		36.9				36.9	
IMAP_IS	351	Israel	TRAWL N	2015		45.9				45.9	
IMAP_IS	351	Israel	TRAWL N	2015		31.2				31.2	
IMAP_IS	351	Israel	TRAWL N	2015		16.5				16.5	
IMAP_IS	351	Israel	TRAWL N	2015		57.6				57.6	
IMAP_IS	351	Israel	TRAWL N	2015		34.2				34.2	
IMAP_IS	351	Israel	TRAWL N	2015		74.9				74.9	
IMAP_IS	351	Israel	TRAWL N	2015		67.0				67.0	
IMAP_IS	351	Israel	TRAWL N	2015		33.7				33.7	
IMAP_IS	351	Israel	TRAWL N	2015		46.5				46.5	
IMAP_IS	351	Israel	TRAWL S	2015		26.8				26.8	
IMAP_IS	351	Israel	TRAWL S	2015		45.3				45.3	
IMAP_IS	351	Israel	TRAWL S	2015		27.7				27.7	
IMAP_IS	351	Israel	TRAWL S	2015		15.1				15.1	
IMAP_IS	351	Israel	TRAWL S	2015		23.3				23.3	
IMAP_IS	351	Israel	TRAWL S	2015		40.7				40.7	
IMAP_IS	351	Israel	TRAWL S	2015		42.6				42.6	
IMAP_IS	71	Israel	TRAWL S	2018	0.77	97.8			0.77	97.8	
IMAP_IS	71	Israel	TRAWL S	2018	0.86	48.0			0.86	48.0	
IMAP_IS	71	Israel	TRAWL S	2018	0.89	40.7			0.89	40.7	
IMAP_IS	71	Israel	TRAWL S	2018	1.89	50.0			1.89	50.0	

IMAP_IS	71	Israel	TRAWLS	2018	2.05	59.7			2.05	59.7	
IMAP_IS	71	Israel	TRAWLS	2018	1.38	72.9			1.38	72.9	
IMAP_IS	71	Israel	TRAWLS	2018	1.48	45.3			1.48	45.3	
IMAP_IS	71	Israel	TRAWLS	2018	0.99	53.2			0.99	53.2	
IMAP_IS	71	Israel	TRAWLS	2018	1.47	49.3			1.47	49.3	
IMAP_IS	71	Israel	TRAWLS	2018	0.84	40.9			0.84	40.9	
IMAP_IS	71	Israel	TRAWLS	2018	1.24	45.9			1.24	45.9	
IMAP_IS	71	Israel	TRAWLS	2018	1.51	55.3			1.51	55.3	
IMAP_IS	71	Israel	TRAWLS	2018	1.17	40.6			1.17	40.6	
IMAP_IS	323	Turkey	Tırtar / Mersin 1	2015	3.92	29.18	8.38		3.92	29.18	8.38
IMAP_IS	323	Turkey	Tırtar / Mersin 2	2015	3.11	32.02	10.07		3.11	32.02	10.07
IMAP_IS	323	Turkey	Tırtar / Mersin 3	2015	1.75	29.17	5.75		1.75	29.17	5.75
IMAP_IS	323	Turkey	Tırtar / Mersin 4	2015	1.43	26.10	6.24		1.43	26.10	6.24
IMAP_IS	323	Turkey	Tırtar / Mersin 5	2015	6.00	32.97	7.86		6.00	32.97	7.86
IMAP_IS	323	Turkey	Seyhan/ Adana 1	2015	5.27	35.57	15.30		5.27	35.57	15.30
IMAP_IS	323	Turkey	Seyhan / Adana 2	2015	4.30	30.54	12.23		4.30	30.54	12.23
IMAP_IS	323	Turkey	Seyhan / Adana 3	2015	4.68	36.56	21.56		4.68	36.56	21.56
IMAP_IS	323	Turkey	Seyhan / Adana 4	2015	3.99	32.87	14.48		3.99	32.87	14.48
IMAP_IS	323	Turkey	Seyhan / Adana 5	2015	5.61	30.81	13.20		5.61	30.81	13.20
IMAP_IS	323	Turkey	Anamur / Mersin 1	2015	8.61	192.36	27.99		8.61	192.36	27.99
IMAP_IS	323	Turkey	Anamur / Mersin 2	2015	4.60	172.48	27.90		4.60	172.48	27.90
IMAP_IS	323	Turkey	Anamur / Mersin 3	2015	6.49	155.33	26.13		6.49	155.33	26.13
IMAP_IS	323	Turkey	Anamur / Mersin 4	2015	4.99	126.86	24.63		4.99	126.86	24.63
IMAP_IS	323	Turkey	Anamur / Mersin 5	2015	6.22	151.00	19.87		6.22	151.00	19.87
IMAP_IS	323	Turkey	Göksu / Mersin 1	2015	2.52	87.06	15.30		2.52	87.06	15.30
IMAP_IS	323	Turkey	Göksu / Mersin 2	2015	1.49	73.97	11.69		1.49	73.97	11.69
IMAP_IS	323	Turkey	Göksu / Mersin 3	2015	1.61	89.09	18.92		1.61	89.09	18.92
IMAP_IS	323	Turkey	Göksu / Mersin 4	2015	3.48	77.79	17.67		3.48	77.79	17.67
IMAP_IS	323	Turkey	Göksu / Mersin 5	2015	3.96	86.94	14.68		3.96	86.94	14.68
IMAP_IS	323	Turkey	Karataş / Adana 1	2015	3.59	32.36	19.44		3.59	32.36	19.44
IMAP_IS	323	Turkey	Karataş / Adana 2	2015	2.41	34.97	16.43		2.41	34.97	16.43
IMAP_IS	323	Turkey	Karataş / Adana 3	2015	3.09	34.03	22.17		3.09	34.03	22.17
IMAP_IS	323	Turkey	Karataş / Adana 4	2015	5.88	31.96	23.10		5.88	31.96	23.10
IMAP_IS	323	Turkey	Karataş / Adana 5	2015	4.15	38.96	27.47		4.15	38.96	27.47

Table A2.6. Results of the CHASE+ approach to assess the environmental status of TM in *M. barbatus* in the Levantine Sea Basin. Blue - NPAhigh (CS=0.0-0.5); Green- NPAgood (CS =0.5-1.5); Yellow- PAmoderate (CS =1.5-5.0); Brown - PApoor (CS =5.0-10.0) and Red - PAbad (CS > 10.0). Blue and green stations are considered in GES, yellow, brown and red stations are considered non-GES.

Source	IMAP file	Country	Station	Year	Cd_CR=C measured /MedBAC	Hg_CR=C measured /MedBAC	Pb_CR=C measured /MedBAC	CS with MED_BACs		_Cd_CR=C measured /AEL_BAC	Hg_CR=C measured /AEL_BAC	Pb_CR=C measured /AEL_BAC	CS with AEL_BACs
IMAP_IS	152	Lebanon	MB2 BEY	2019	0.010	0.028	0.13	0.10		0.011	0.034	0.18	0.13
IMAP_IS	152	Lebanon	MB4 BEY	2019	0.019	0.051	0.19	0.15		0.021	0.061	0.26	0.20
IMAP_IS	152	Lebanon	MB5 BEY	2019	0.025	0.036	0.09	0.09		0.027	0.043	0.12	0.11
IMAP_IS	152	Lebanon	MB7 BEY	2019	0.028	0.026	0.06	0.06		0.031	0.031	0.08	0.08
IMAP_IS	152	Lebanon	MB8 BEY	2019	0.021	0.054	0.37	0.26		0.022	0.065	0.50	0.34
IMAP_IS	152	Lebanon	MB9 BEY	2019	0.011	0.034	0.42	0.27		0.012	0.041	0.56	0.36
IMAP_IS	152	Lebanon	MB10 BEY	2019	0.017	0.051	0.07	0.08		0.019	0.061	0.10	0.10
IMAP_IS	152	Lebanon	MB5 TRIP	2019	0.062	0.152	0.43	0.37		0.067	0.183	0.58	0.48
IMAP_IS	152	Lebanon	MB1 TYRE	2019	0.009	0.114	0.01	0.08		0.009	0.137	0.02	0.09
IMAP_IS	152	Lebanon	MB4 TYRE	2019	0.076	0.194	0.08	0.20		0.083	0.233	0.10	0.24
IMAP_IS	152	Lebanon	MB6 TYRE	2019	0.101	1.071	0.26	0.83		0.109	1.290	0.35	1.01
IMAP_IS	152	Lebanon	MB7 TYRE	2019	0.024	0.085	0.02	0.07		0.026	0.102	0.02	0.09
IMAP_IS	152	Lebanon	MS1 TYRE	2019	0.070	0.163	0.14	0.22		0.076	0.197	0.20	0.27
IMAP_IS	152	Lebanon	MS2 TYRE	2019	0.062	0.414	0.20	0.39		0.067	0.499	0.27	0.48
IMAP_IS	410	Israel	TRAWL C	2019	0.234	1.487		1.22		0.253	1.791		1.45
IMAP_IS	410	Israel	TRAWL C	2019	0.193	0.810		0.71		0.209	0.976		0.84

IMAP_IS	410	Israel	TRAWL C	2019	0.318	0.835		0.82		0.345	1.006		0.95
IMAP_IS	410	Israel	TRAWL C	2019	0.286	0.767		0.74		0.310	0.924		0.87
IMAP_IS	410	Israel	TRAWL C	2019	0.320	0.977		0.92		0.347	1.177		1.08
IMAP_IS	410	Israel	TRAWL C	2019	0.265	0.720		0.70		0.287	0.868		0.82
IMAP_IS	410	Israel	TRAWL C	2019	0.376	0.888		0.89		0.407	1.070		1.04
IMAP_IS	351	Israel	TRAWL C	2015		0.270		0.270			0.326		0.326
IMAP_IS	351	Israel	TRAWL C	2015		0.162		0.162			0.195		0.195
IMAP_IS	351	Israel	TRAWL C	2015		0.159		0.159			0.192		0.192
IMAP_IS	351	Israel	TRAWL C	2015		0.240		0.240			0.289		0.289
IMAP_IS	351	Israel	TRAWL C	2015		0.136		0.136			0.164		0.164
IMAP_IS	351	Israel	TRAWL C	2015		0.157		0.157			0.189		0.189
IMAP_IS	351	Israel	TRAWL C	2015		0.221		0.221			0.266		0.266
IMAP_IS	351	Israel	TRAWL C	2015		0.247		0.247			0.298		0.298
IMAP_IS	351	Israel	TRAWL C	2015		0.239		0.239			0.288		0.288
IMAP_IS	351	Israel	TRAWL C	2015		0.169		0.169			0.203		0.203
IMAP_IS	351	Israel	TRAWL C	2015		0.244		0.244			0.294		0.294
IMAP_IS	351	Israel	TRAWL N	2015		0.454		0.454			0.547		0.547
IMAP_IS	351	Israel	TRAWL N	2015		0.565		0.565			0.681		0.681
IMAP_IS	351	Israel	TRAWL N	2015		0.384		0.384			0.463		0.463
IMAP_IS	351	Israel	TRAWL N	2015		0.203		0.203			0.245		0.245
IMAP_IS	351	Israel	TRAWL N	2015		0.710		0.710			0.855		0.855
IMAP_IS	351	Israel	TRAWL N	2015		0.421		0.421			0.507		0.507
IMAP_IS	351	Israel	TRAWL N	2015		0.922		0.922			1.111		1.111
IMAP_IS	351	Israel	TRAWL N	2015		0.825		0.825			0.995		0.995
IMAP_IS	351	Israel	TRAWL N	2015		0.415		0.415			0.500		0.500
IMAP_IS	351	Israel	TRAWL N	2015		0.572		0.572			0.690		0.690
IMAP_IS	351	Israel	TRAWL S	2015		0.330		0.330			0.398		0.398
IMAP_IS	351	Israel	TRAWL S	2015		0.558		0.558			0.672		0.672
IMAP_IS	351	Israel	TRAWL S	2015		0.341		0.341			0.411		0.411
IMAP_IS	351	Israel	TRAWL S	2015		0.186		0.186			0.224		0.224
IMAP_IS	351	Israel	TRAWL S	2015		0.288		0.288			0.346		0.346
IMAP_IS	351	Israel	TRAWL S	2015		0.500		0.501			0.603		0.603
IMAP_IS	351	Israel	TRAWL S	2015		0.525		0.525			0.632		0.632
IMAP_IS	71	Israel	TRAWL S	2018	0.099	1.204		0.92		0.107	1.451		1.10
IMAP_IS	71	Israel	TRAWL S	2018	0.110	0.591		0.50		0.119	0.713		0.59
IMAP_IS	71	Israel	TRAWL S	2018	0.114	0.501		0.43		0.124	0.604		0.51
IMAP_IS	71	Israel	TRAWL S	2018	0.243	0.616		0.61		0.263	0.742		0.71
IMAP_IS	71	Israel	TRAWL S	2018	0.263	0.735		0.71		0.285	0.885		0.83
IMAP_IS	71	Israel	TRAWL S	2018	0.177	0.898		0.76		0.192	1.082		0.90
IMAP_IS	71	Israel	TRAWL S	2018	0.190	0.558		0.53		0.206	0.672		0.62
IMAP_IS	71	Israel	TRAWL S	2018	0.127	0.655		0.55		0.138	0.789		0.66
IMAP_IS	71	Israel	TRAWL S	2018	0.189	0.608		0.56		0.205	0.732		0.66
IMAP_IS	71	Israel	TRAWL S	2018	0.107	0.504		0.43		0.116	0.607		0.51
IMAP_IS	71	Israel	TRAWL S	2018	0.159	0.565		0.51		0.172	0.681		0.60
IMAP_IS	71	Israel	TRAWL S	2018	0.194	0.681		0.62		0.210	0.820		0.73
IMAP_IS	71	Israel	TRAWL S	2018	0.151	0.500		0.46		0.163	0.602		0.54
IMAP_IS	323	Turkey	Tırtar / Mersin 1	2015	0.503	0.359	0.23	0.63		0.545	0.433	0.31	0.74
IMAP_IS	323	Turkey	Tırtar / Mersin 2	2015	0.399	0.394	0.28	0.62		0.432	0.475	0.37	0.74
IMAP_IS	323	Turkey	Tırtar / Mersin 3	2015	0.224	0.359	0.16	0.43		0.242	0.433	0.21	0.51
IMAP_IS	323	Turkey	Tırtar / Mersin 4	2015	0.183	0.321	0.17	0.39		0.198	0.387	0.23	0.47
IMAP_IS	323	Turkey	Tırtar / Mersin 5	2015	0.770	0.406	0.21	0.80		0.834	0.489	0.29	0.93
IMAP_IS	323	Turkey	Seyhan/ Adana 1	2015	0.675	0.438	0.42	0.88		0.732	0.528	0.57	1.05
IMAP_IS	323	Turkey	Seyhan / Adana 2	2015	0.552	0.376	0.33	0.73		0.598	0.453	0.45	0.87
IMAP_IS	323	Turkey	Seyhan / Adana 3	2015	0.600	0.450	0.59	0.95		0.650	0.542	0.80	1.15
IMAP_IS	323	Turkey	Seyhan / Adana 4	2015	0.511	0.405	0.40	0.76		0.554	0.488	0.54	0.91
IMAP_IS	323	Turkey	Seyhan / Adana 5	2015	0.719	0.379	0.36	0.84		0.779	0.457	0.49	1.00
IMAP_IS	323	Turkey	Anamur / Mersin 1	2015	1.104	2.369	0.76	2.45		1.195	2.854	1.04	2.94
IMAP_IS	323	Turkey	Anamur / Mersin 2	2015	0.590	2.124	0.76	2.01		0.639	2.559	1.03	2.44
IMAP_IS	323	Turkey	Anamur / Mersin 3	2015	0.832	1.913	0.71	2.00		0.901	2.305	0.97	2.41
IMAP_IS	323	Turkey	Anamur / Mersin 4	2015	0.640	1.562	0.67	1.66		0.694	1.882	0.91	2.01
IMAP_IS	323	Turkey	Anamur / Mersin 5	2015	0.797	1.860	0.54	1.85		0.864	2.240	0.74	2.22
IMAP_IS	323	Turkey	Göksu / Mersin 1	2015	0.323	1.072	0.42	1.05		0.350	1.292	0.57	1.28
IMAP_IS	323	Turkey	Göksu / Mersin 2	2015	0.191	0.911	0.32	0.82		0.207	1.097	0.43	1.003
IMAP_IS	323	Turkey	Göksu / Mersin 3	2015	0.207	1.097	0.52	1.05		0.224	1.322	0.70	1.30
IMAP_IS	323	Turkey	Göksu / Mersin 4	2015	0.447	0.958	0.48	1.09		0.484	1.154	0.65	1.32
IMAP_IS	323	Turkey	Göksu / Mersin 5	2015	0.508	1.071	0.40	1.14		0.550	1.290	0.54	1.38

IMAP_IS	323	Turkey	Karataş / Adana 1	2015	0.461	0.398	0.53	0.80		0.499	0.480	0.72	0.98
IMAP_IS	323	Turkey	Karataş / Adana 2	2015	0.309	0.431	0.45	0.69		0.335	0.519	0.61	0.84
IMAP_IS	323	Turkey	Karataş / Adana 3	2015	0.396	0.419	0.61	0.82		0.429	0.505	0.82	1.01
IMAP_IS	323	Turkey	Karataş / Adana 4	2015	0.754	0.394	0.63	1.03		0.816	0.474	0.86	1.24
IMAP_IS	323	Turkey	Karataş / Adana 5	2015	0.532	0.480	0.75	1.02		0.577	0.578	1.02	1.25

Annex III

Maps of selected Traffic light and CHASE+ assessment results for IMAP CI-17 in the Levantine Sea Basin

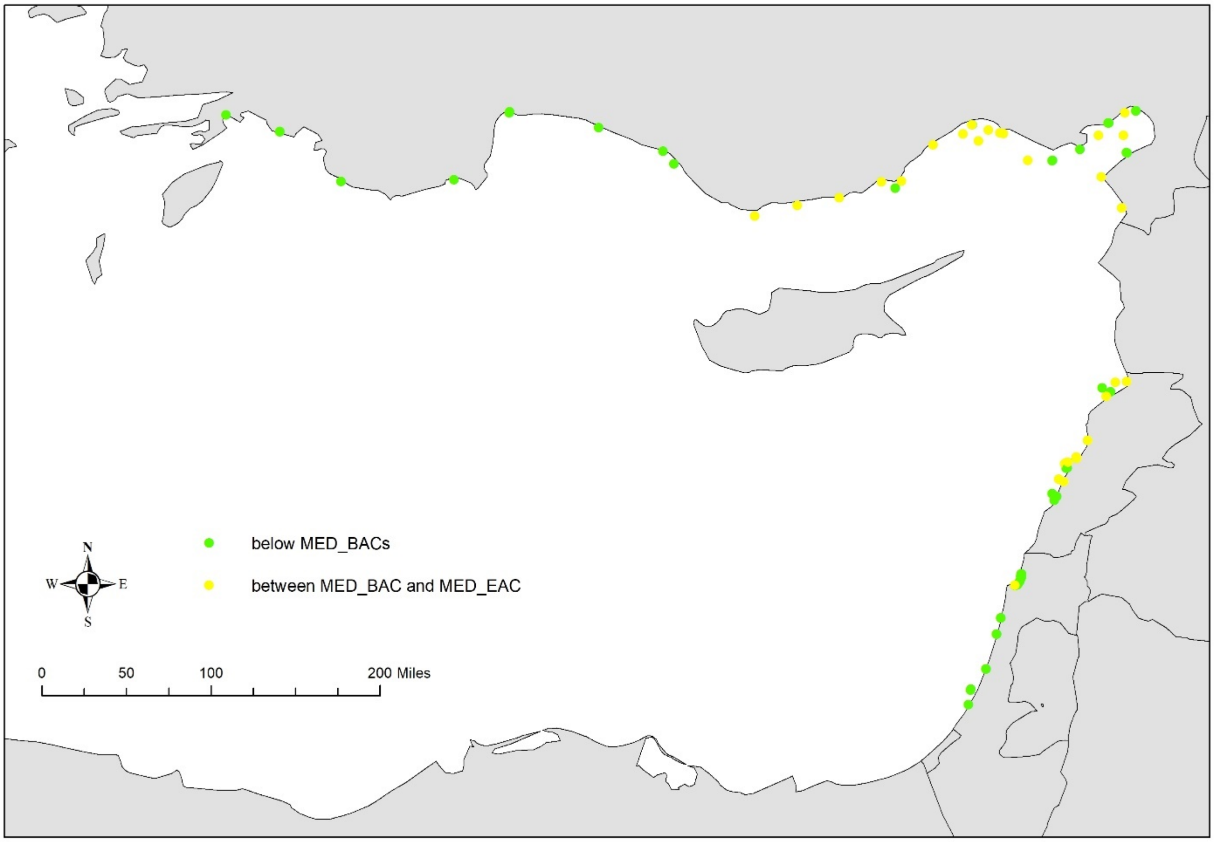

Figure 1. Results of the “traffic light” approach to assess the environmental status of Cd in sediments in the Levantine Sea Basin; stations marked in green: values below MED_BACs; stations marked in yellow: values between MED_BAC and MED_EAC; stations marked in red: values above the MED_EAC; stations marked in green and yellow are considered in GES, and stations in red are considered in non-GES.

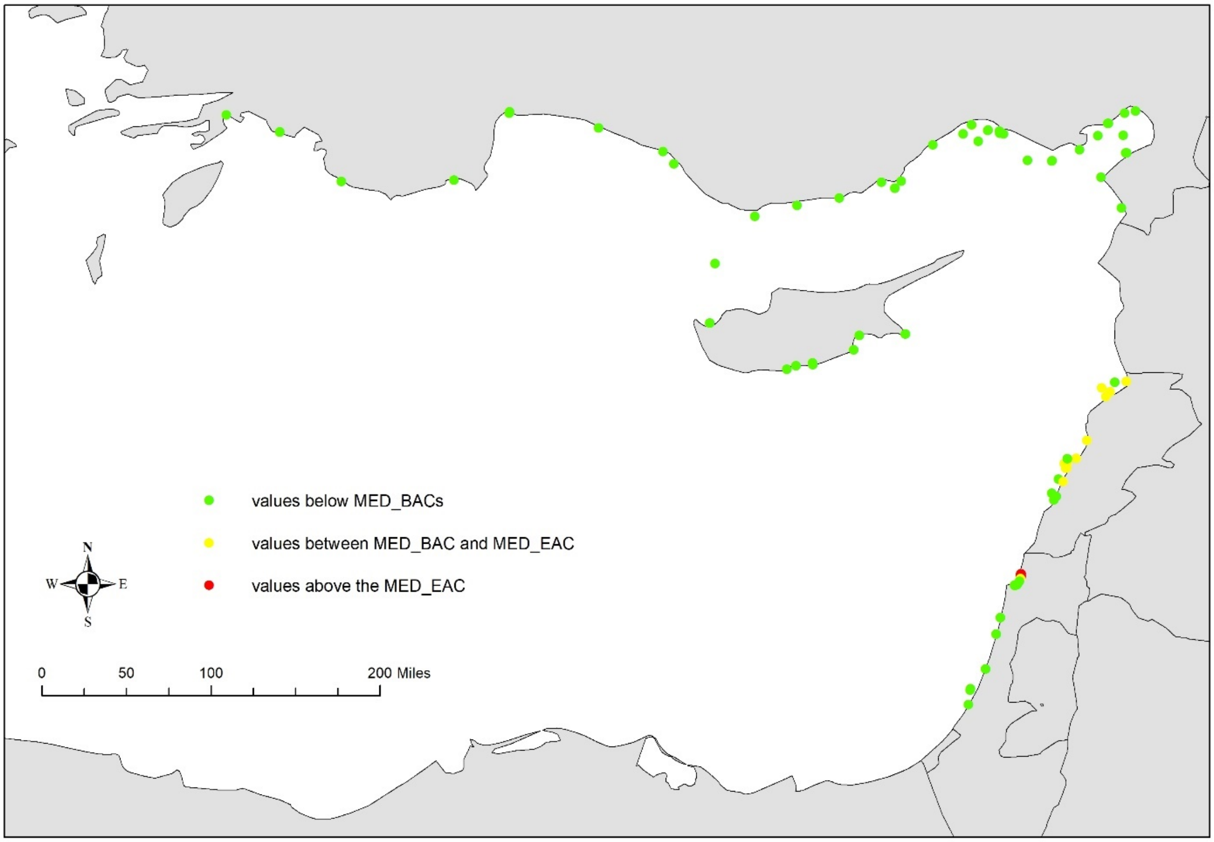

Figure 2. Results of the "traffic light" approach to assess the environmental status of Hg in sediments in the Levantine Sea Basin; stations marked in green indicate the values below MED_BACs; stations marked in yellow indicate the values between MED_BAC and MED_EAC; stations marked in red indicate the values above the MED_EAC; stations marked in green and yellow are considered in GES, and stations in red are considered in non-GES.

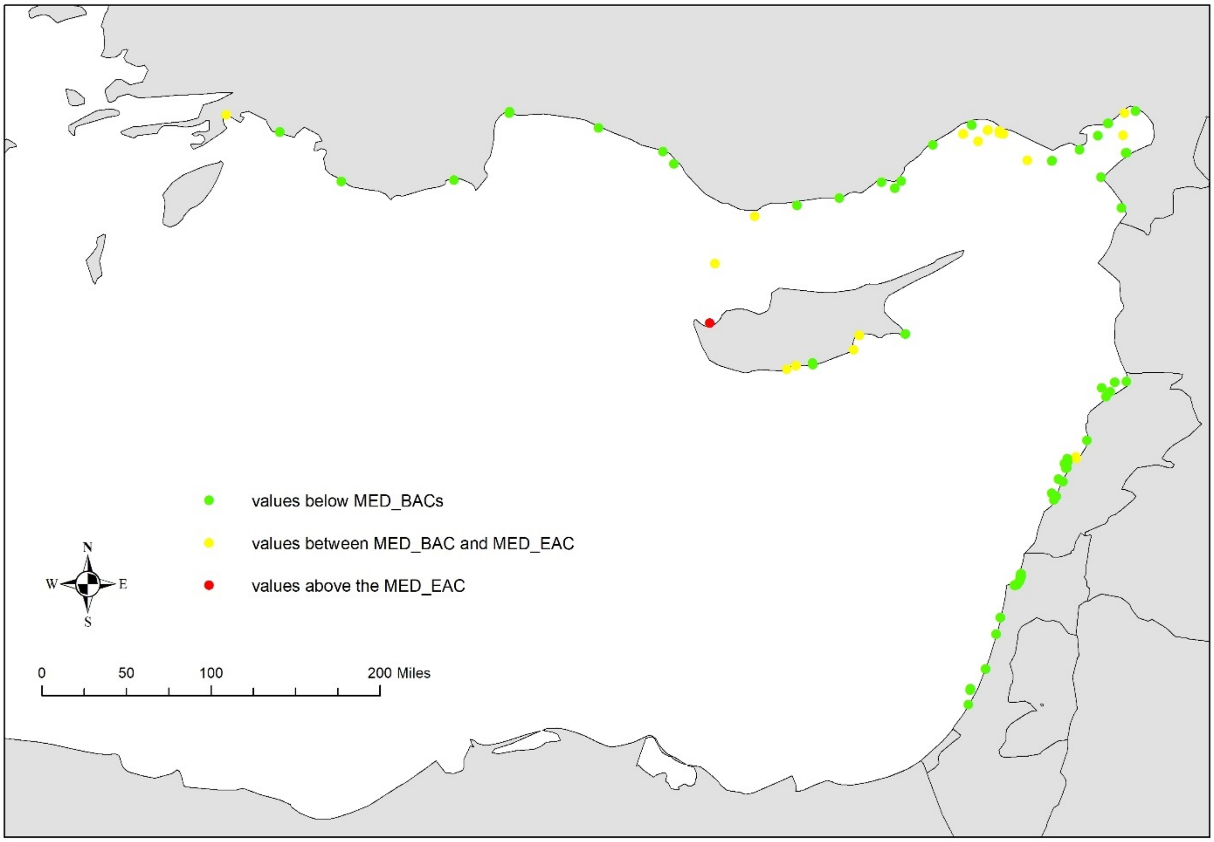

Figure 3. Results of the “traffic light” approach to assess the environmental status of Pb in sediments in the Levantine Sea Basin; stations marked in green indicate the values below MED_BACs; stations marked in yellow indicate the values between MED_BAC and MED_EAC; stations marked in red indicate the values above the MED_EAC; stations marked in green and yellow are considered in GES, and stations in red are considered in non-GES.

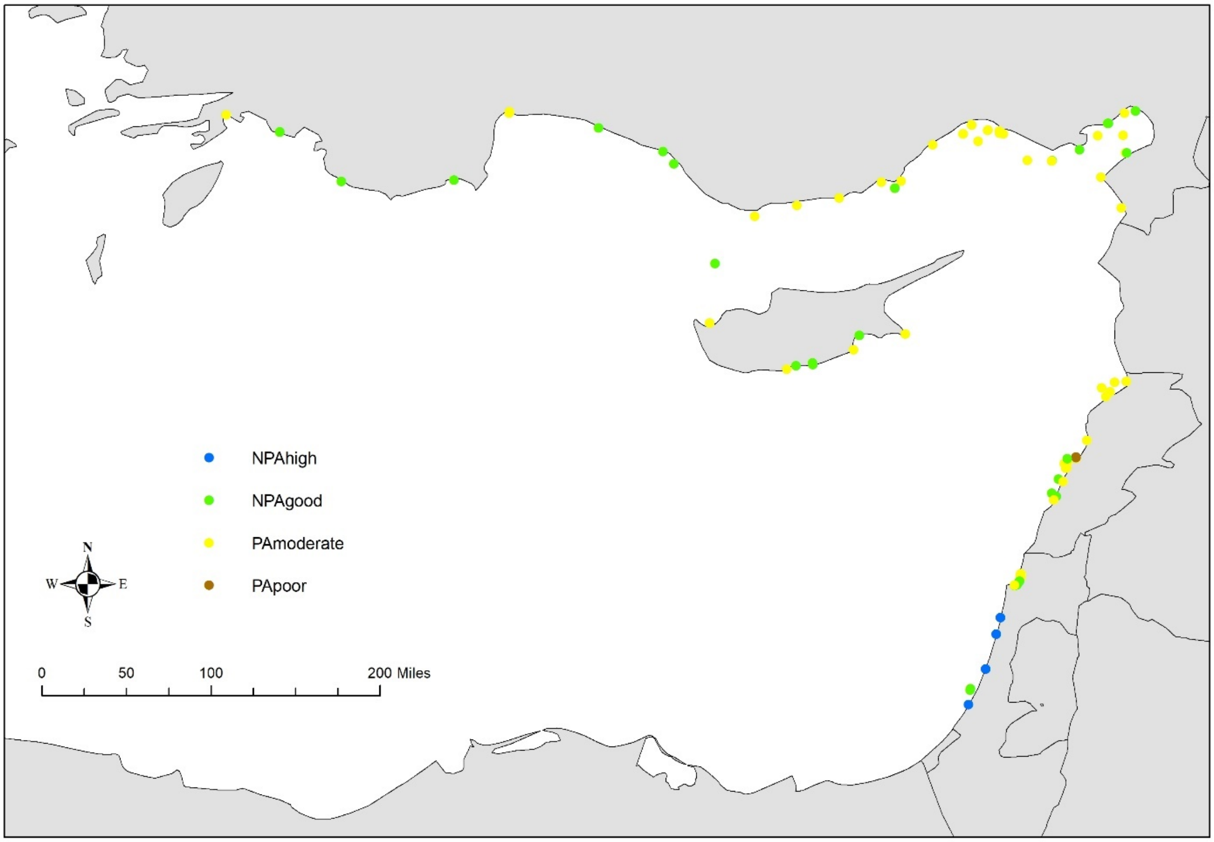

Figure 4. Results of the CHASE+ approach to assess the environmental status of trace metals (Cd, Hg, Pb) in sediments in the Levantine Sea Basin, using MED_BACs; stations in blue - NPAhigh (CS=0.0-0.5); stations in green- NPAgood (CS =0.5-1.5); stations in yellow- PAmoderate (CS =1.5-5.0); stations in brown - PApoor (CS =5.0-10.0) and stations in red - PAbad (CS > 10.0); stations in blue and green are considered in GES, and stations in yellow, brown and red are considered in non-GES.

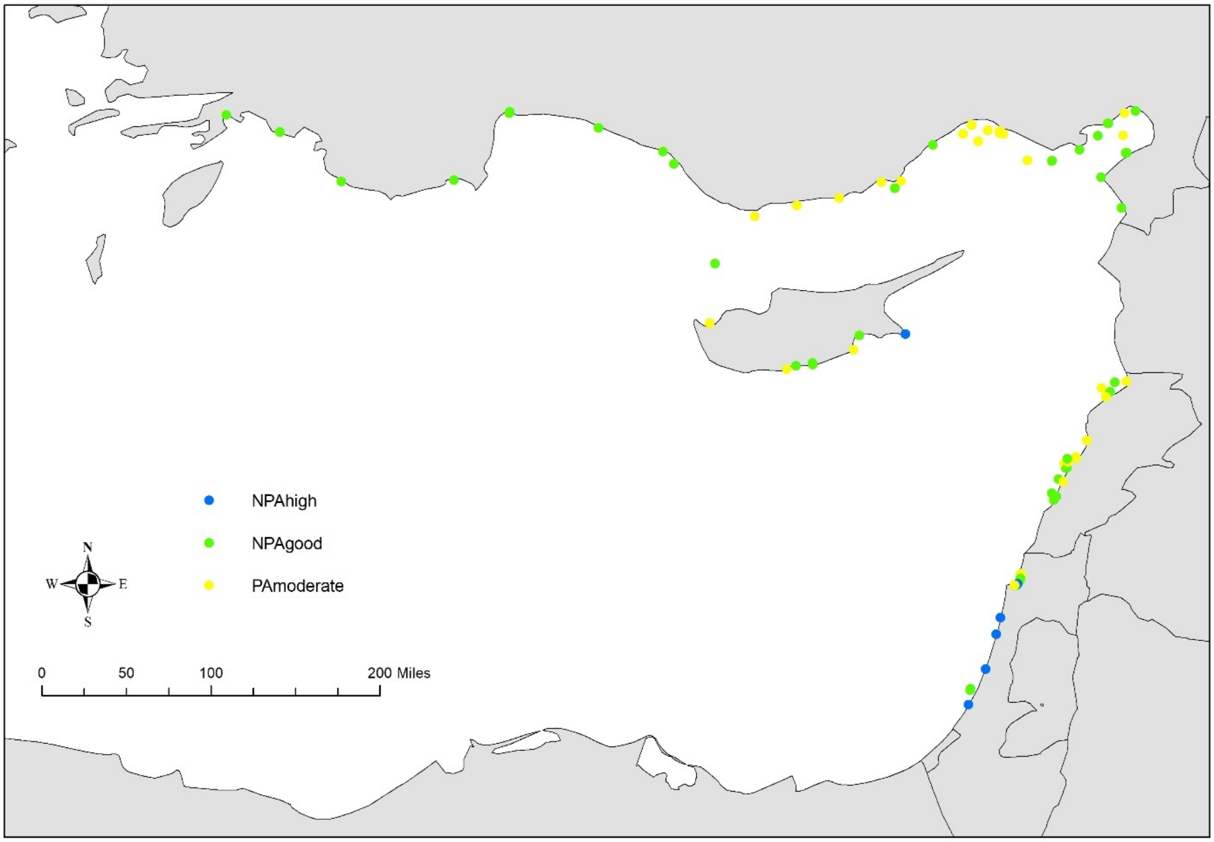

Figure 5. Results of the CHASE+ approach to assess the environmental status of trace metals (Cd, Hg, Pb) in sediments in the Levantine Sea Basin, using AEL_BACs; stations in blue - NPAhigh (CS=0.0-0.5); stations in green- NPAgood (CS =0.5-1.5); stations in yellow- PAmoderate (CS =1.5-5.0); stations in brown - PApoor (CS =5.0-10.0) and stations in red - PAbad (CS > 10.0); stations in blue and green are considered in GES, and stations in yellow, brown and red are considered in non-GES.

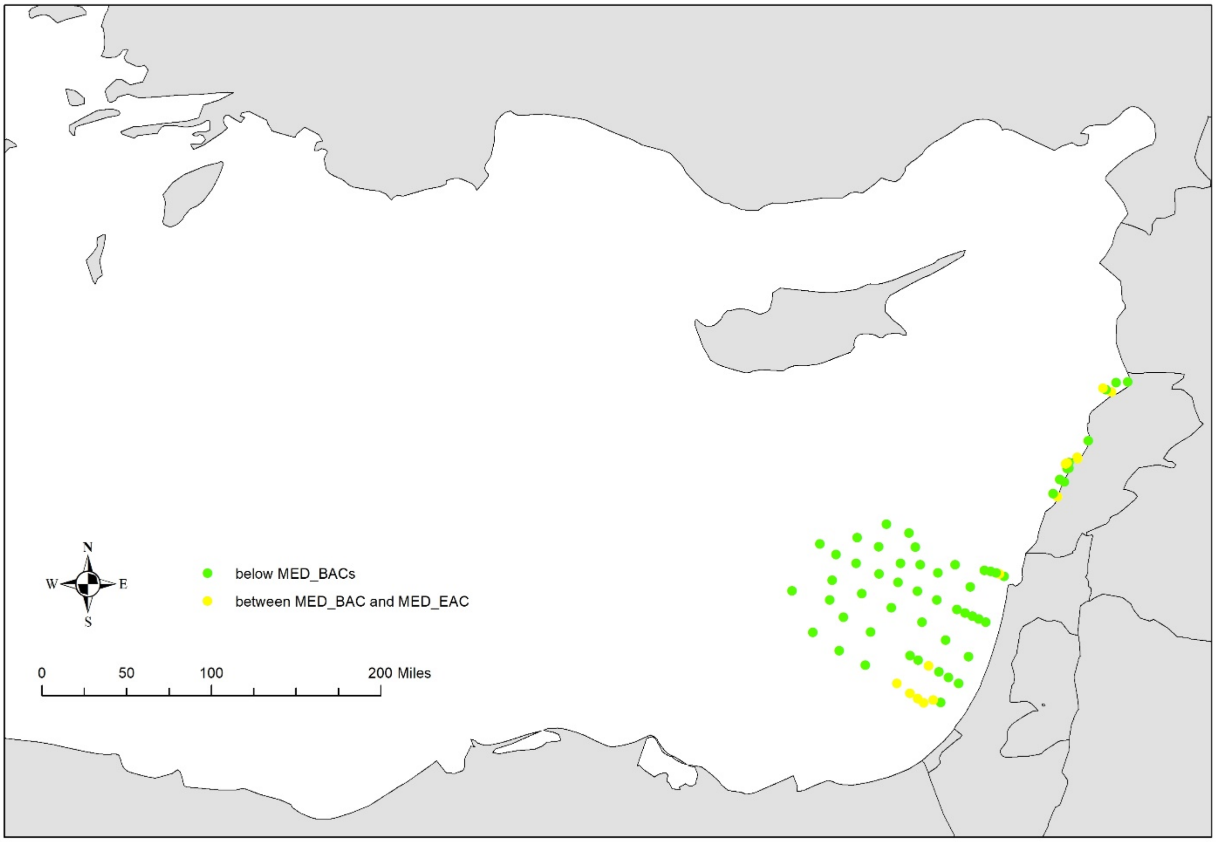

Figure 6. Results of the “traffic light” approach to assess the environmental status of Σ16 PAHs in sediments in the Levantine Sea Basin; stations in green correspond to the values below MED_BACs; stations in yellow correspond to the values between MED_BAC and MED_EAC; stations in red correspond to the values above the MED_EAC; stations in green and yellow are considered in GES, and stations in red in non-GES

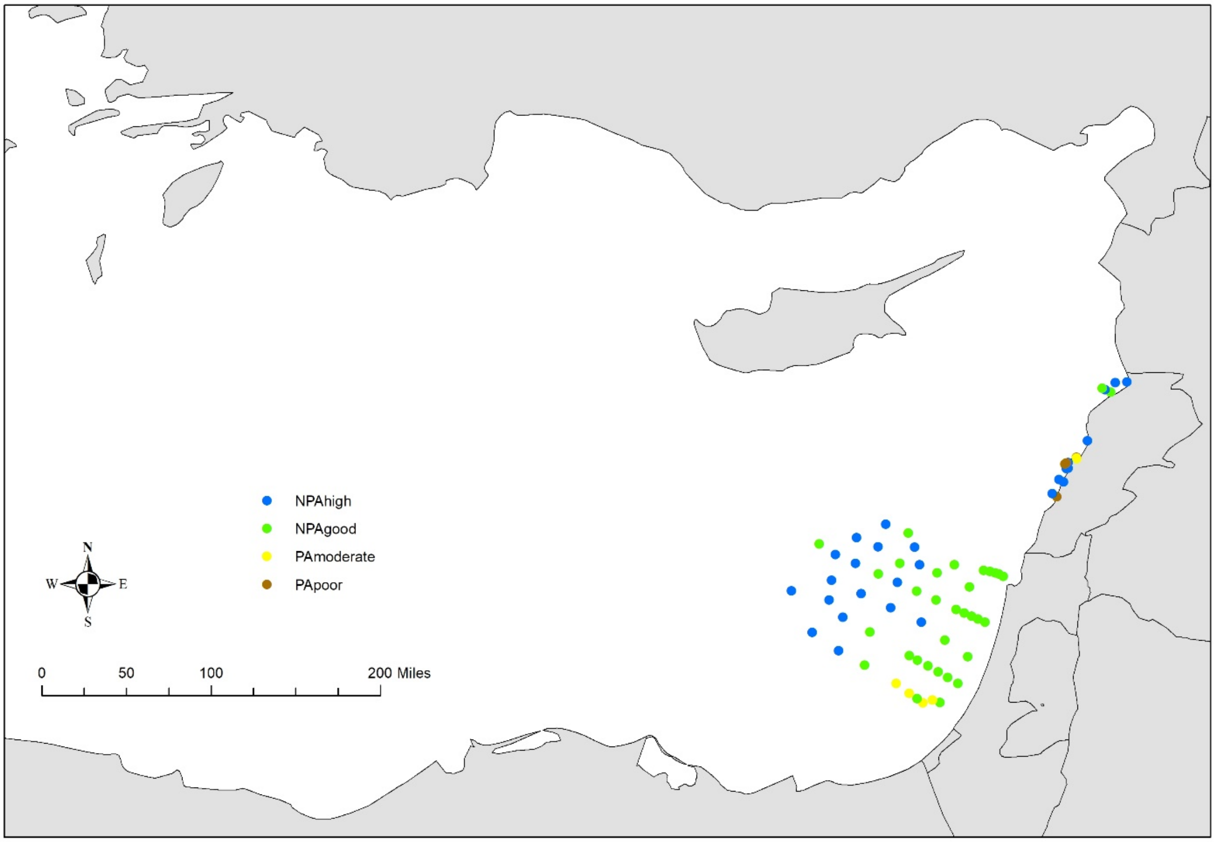

Figure 7. Results of the CHASE+ approach to assess the environmental status of Σ16 PAHs in sediments in the Levantine Sea Basin, using MED_BACs; stations in blue - NPAhigh (CS=0.0-0.5); stations in green- NPAgood (CS =0.5-1.5); stations in yellow- PAmoderate (CS =1.5-5.0); stations in brown - PApoor (CS =5.0-10.0) and stations in red - PAbad (CS > 10.0); stations in green and yellow are considered in GES, stations in yellow, brown and red are considered in non-GES.

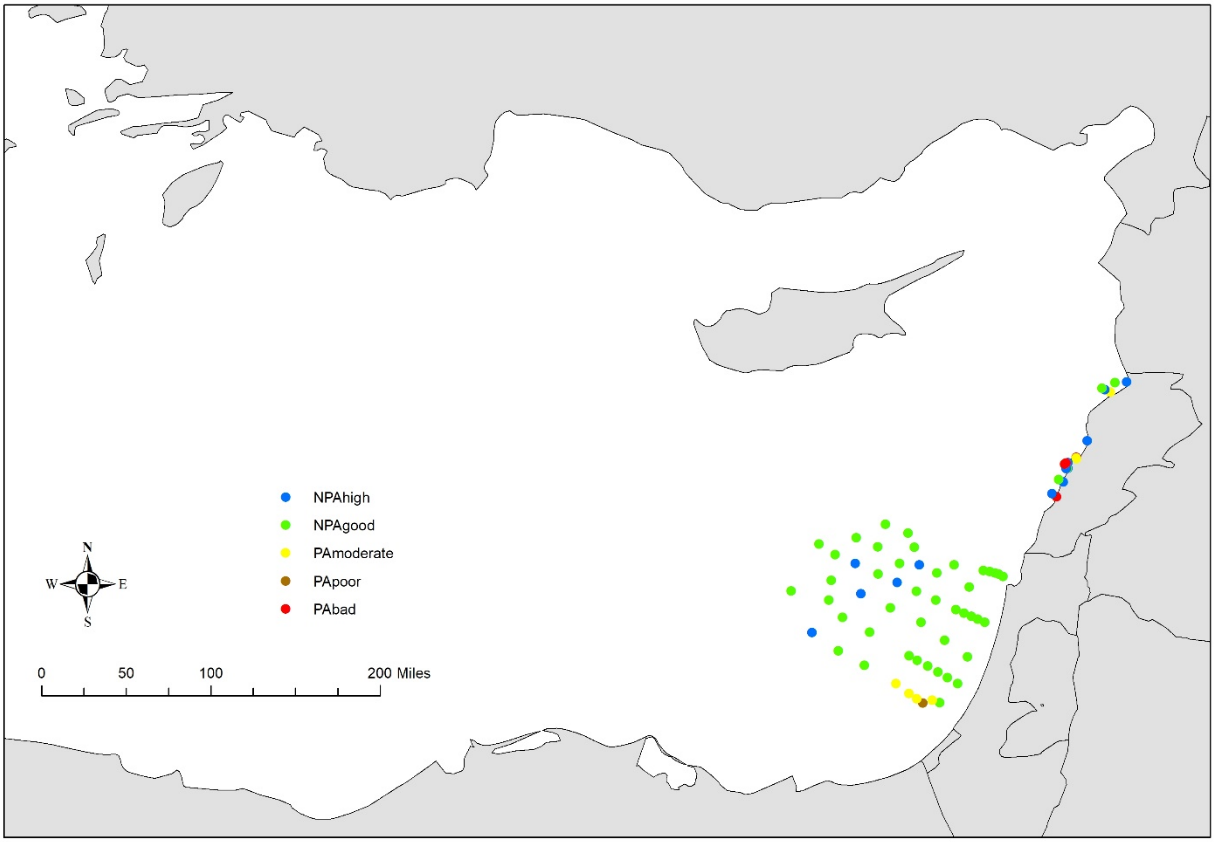

Figure 8. Results of the CHASE+ approach to assess the environmental status of Σ16 PAHs in sediments in the Levantine Basin, using AEL_BACs; stations in blue - NPAhigh (CS=0.0-0.5); stations in green-NPAgood (CS =0.5-1.5); stations in yellow- PAmoderate (CS =1.5-5.0); stations in brown - PApoor (CS =5.0-10.0) and stations in red - PAbad (CS > 10.0); stations in green and yellow are considered in GES, stations in yellow, brown and red are considered in non-GES.

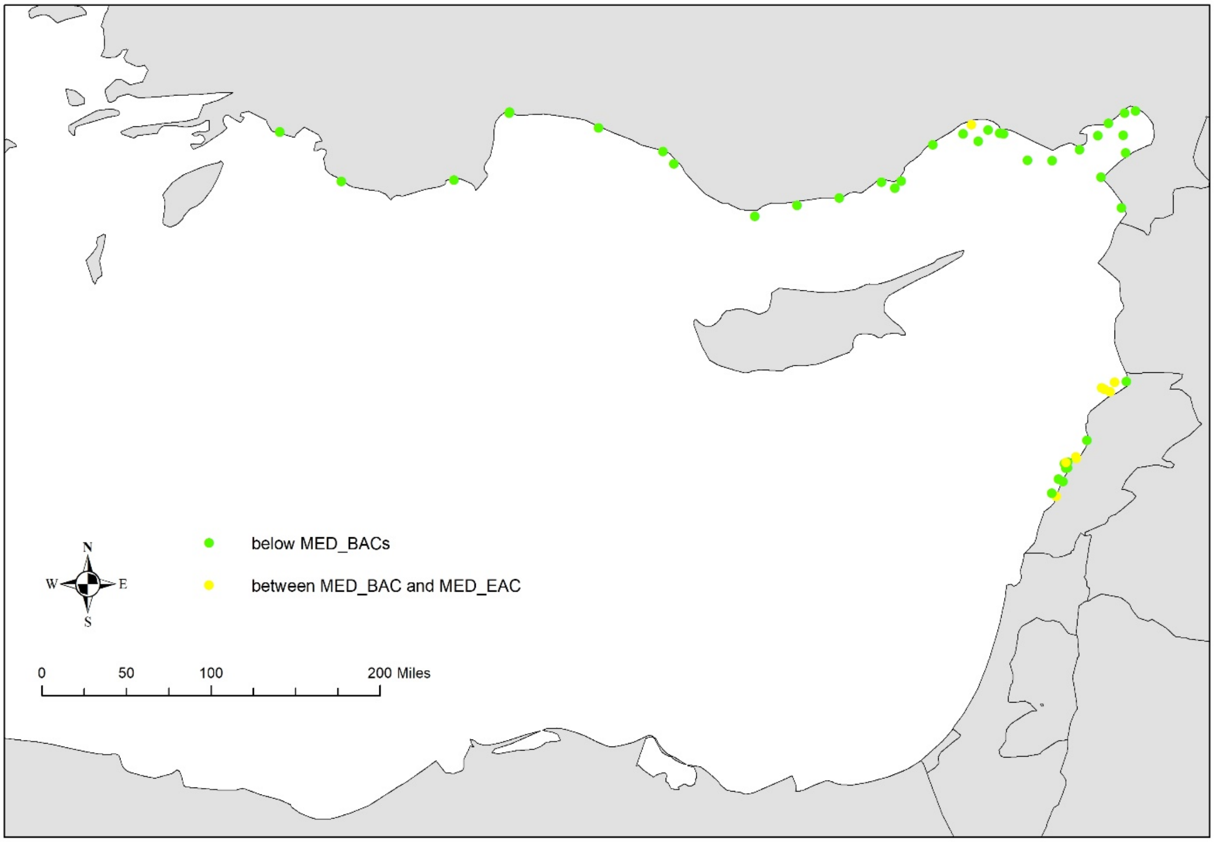

Figure 9. Results of the “traffic light” approach to assess the environmental status of Σ7 PCBs in sediments in the Levantine Sea Basin; stations n green indicate the values below MED_BACs; stations in yellow indicate the values between MED_BAC and MED_EAC; stations in red indicate the values above the MED_EAC; green and yellow stations are considered in GES, and red stations in non-GES.

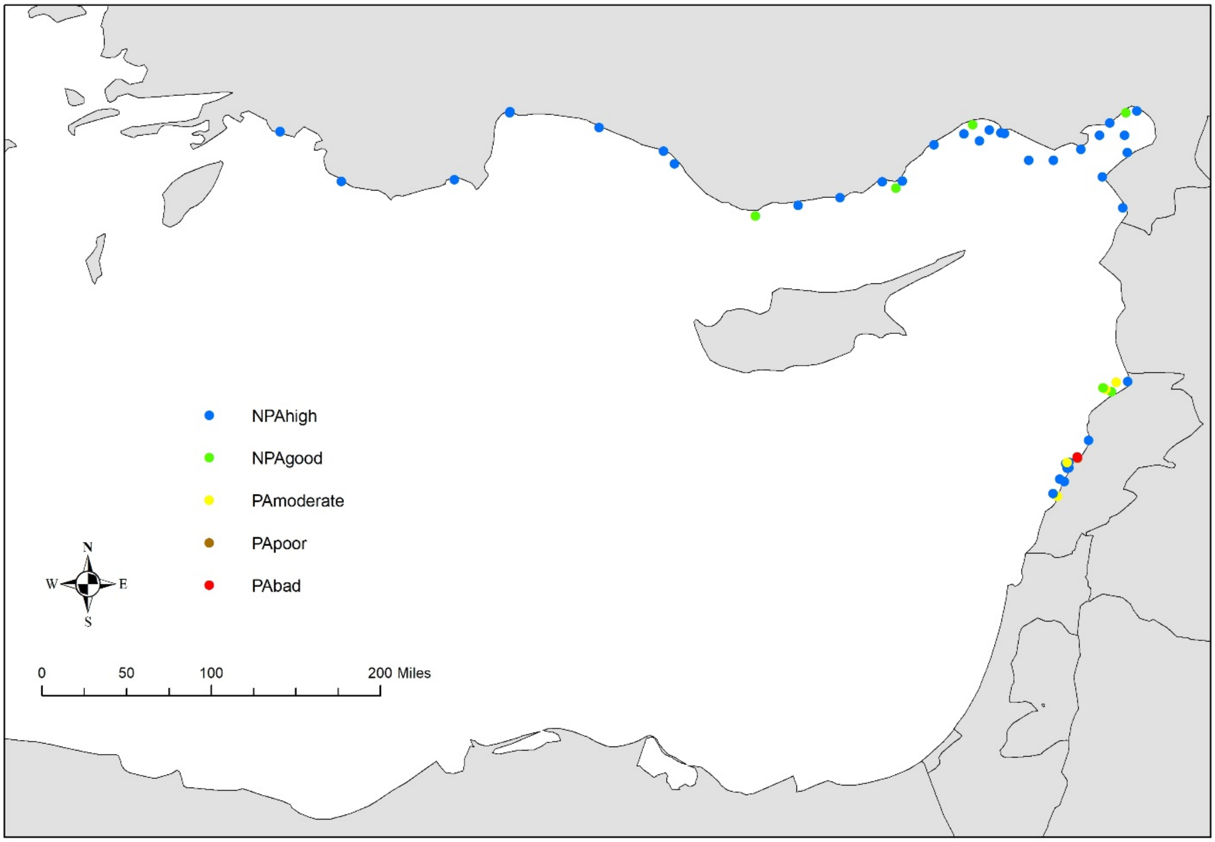

Figure 10. Results of the CHASE+ approach to assess the environmental status of Σ7 PCBs in sediments in the Levantine Sea Basin, using as threshold 3xMED_BCs; stations in blue - NPAhigh (CR=0.0-0.5); stations in green- NPAgood (CR =0.5-2.0); stations in yellow- PAmoderate (CR =2.0-5.0); stations in brown - PApoor (CR =5.0-10.0) and stations in red - PAbad (CR > 10.0); stations in blue and green stations are considered in GES, yellow, brown and red stations are considered in non-GES.

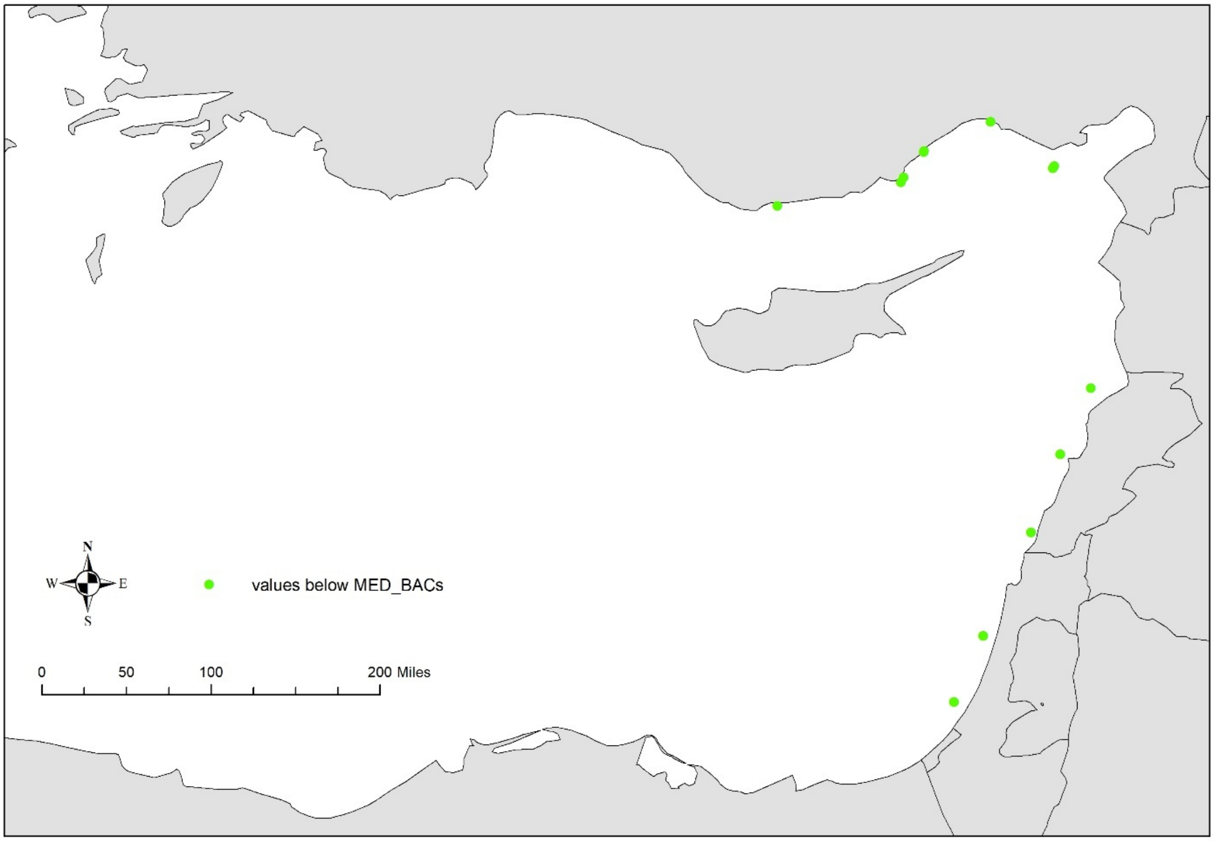

Figure 11. Results of the “traffic light” approach to assess the environmental status of Cd in M. barbatus in the Levantine Sea Basin; stations in green indicate the values below MED_BACs; stations in yellow indicate the values between MED_BAC and MED_EAC; stations in red indicate the values above the MED_EAC; stations in green and yellow are considered in GES, and stations in red are considered in non-GES.

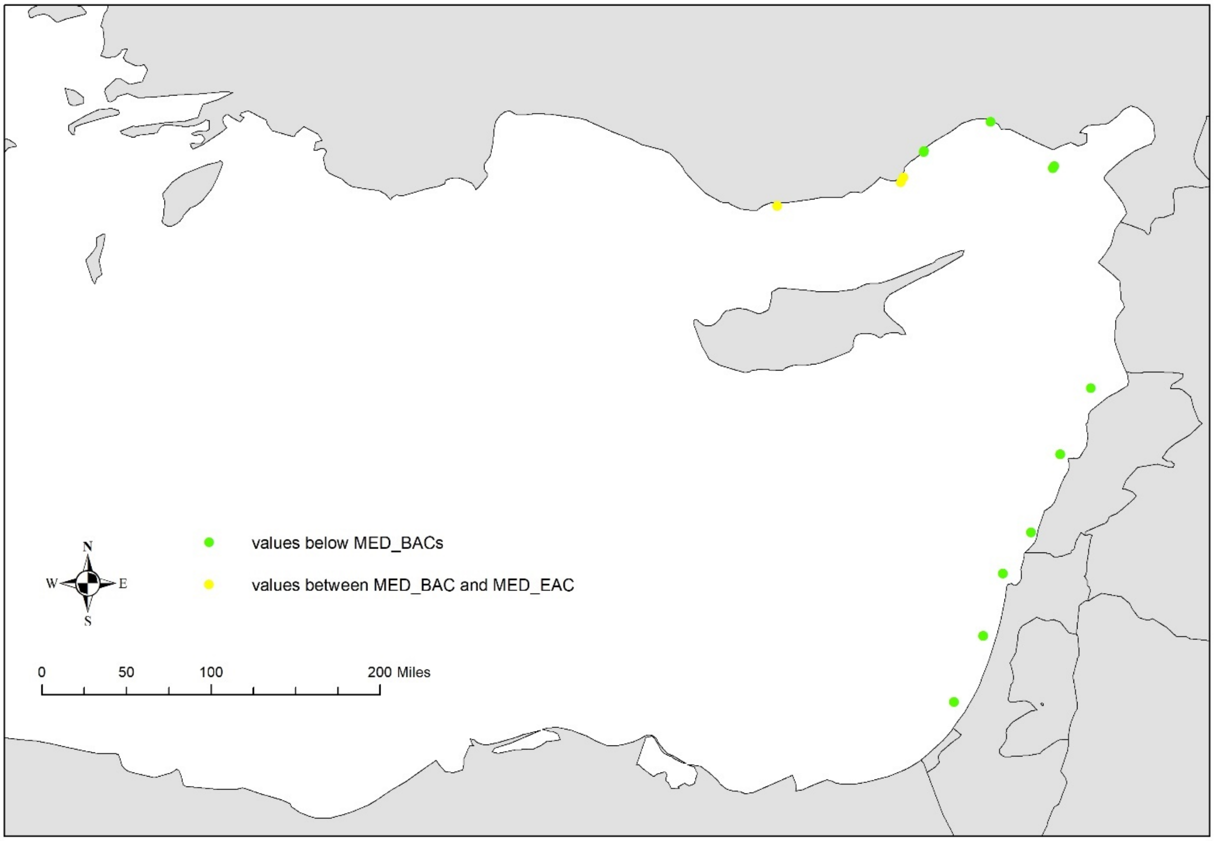

Figure 12. Results of the “traffic light” approach to assess the environmental status of Hg in M. barbatus in the Levantine Sea Basin; stations in green indicate the values below MED_BACs; stations in yellow, indicate the values between MED_BAC and MED_EAC; stations in red indicate the values above the MED_EAC; stations in green and yellow are considered in GES, and stations red are considered in non-GES.

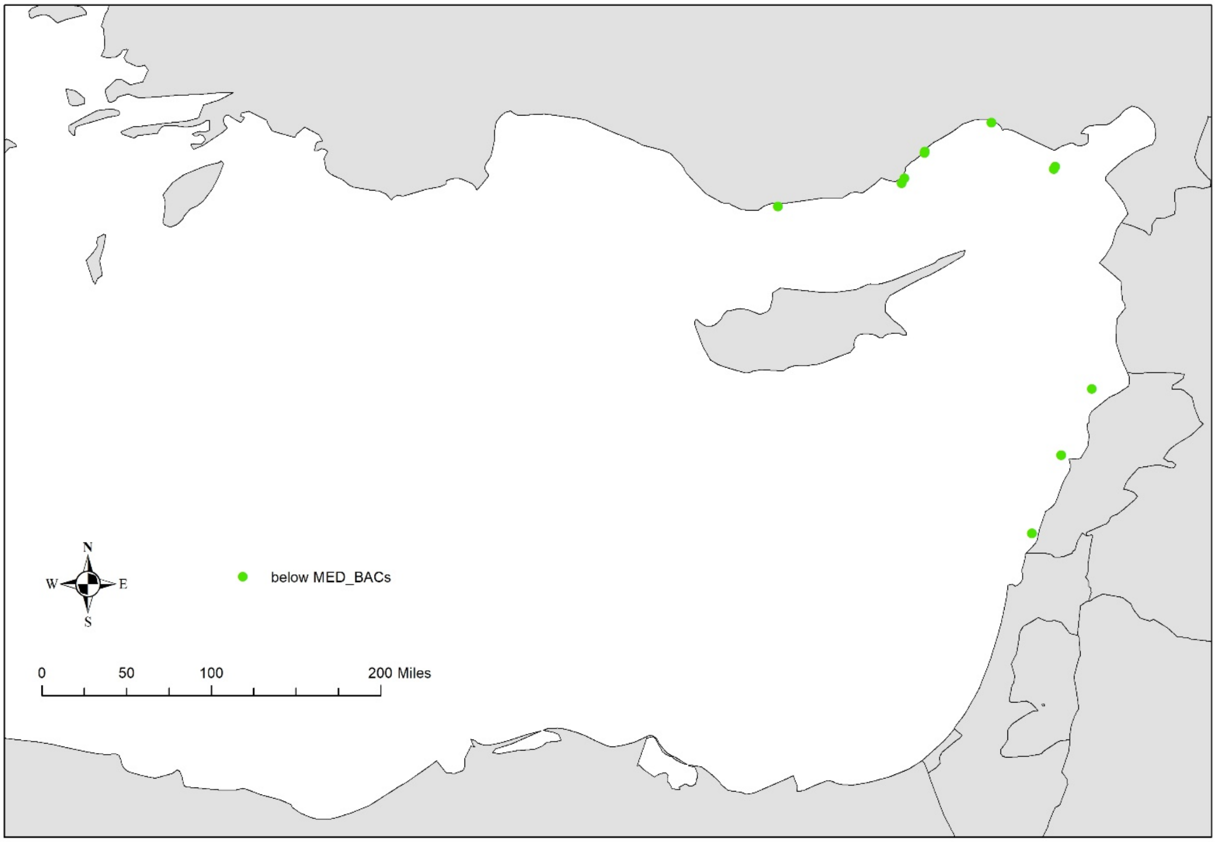

Figure 13. Results of the “traffic light” approach to assess the environmental status of Pb in M. barbatus in the Levantine Sea Basin; stations in green indicate the values below MED_BACs; stations in yellow indicate the values between MED_BAC and MED_EAC; stations in red indicate the values above the MED_EAC; stations in green and yellow are considered in GES, and stations in red are considered in non-GES.

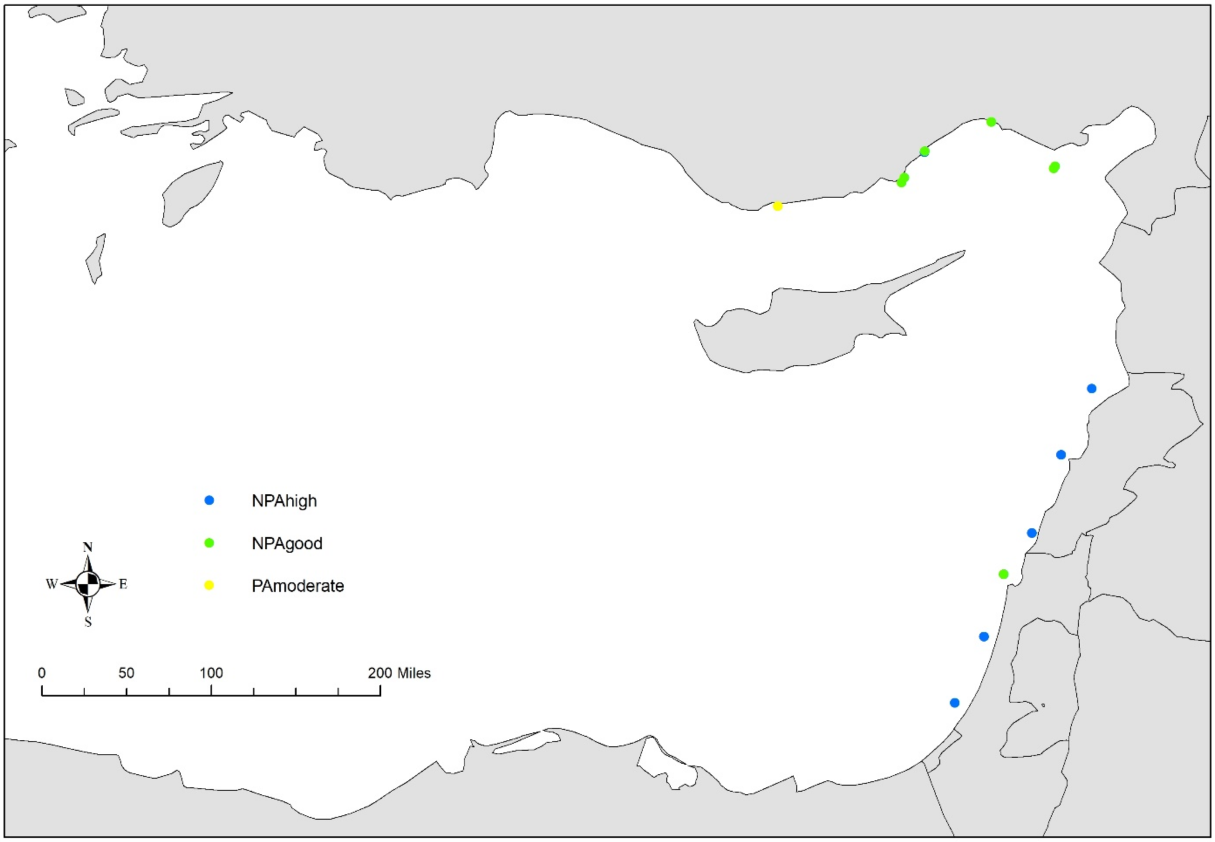

Figure 14. Results of the CHASE+ approach to assess the environmental status of trace metals (Cd, Hg, Pb) in M. barbatus in the Levantine Sea Basin, using MED_BACs; stations in Blue - NPAhigh (CS=0.0-0.5); stations in green- NPAgood (CS =0.5-1.5); stations in yellow- PAmoderate (CS =1.5-5.0); stations in brown - PApoor (CS =5.0-10.0) and stations in red - PAbad (CS > 10.0); stations in blue and green are considered in GES, and stations in yellow, brown and red are considered non-GES.

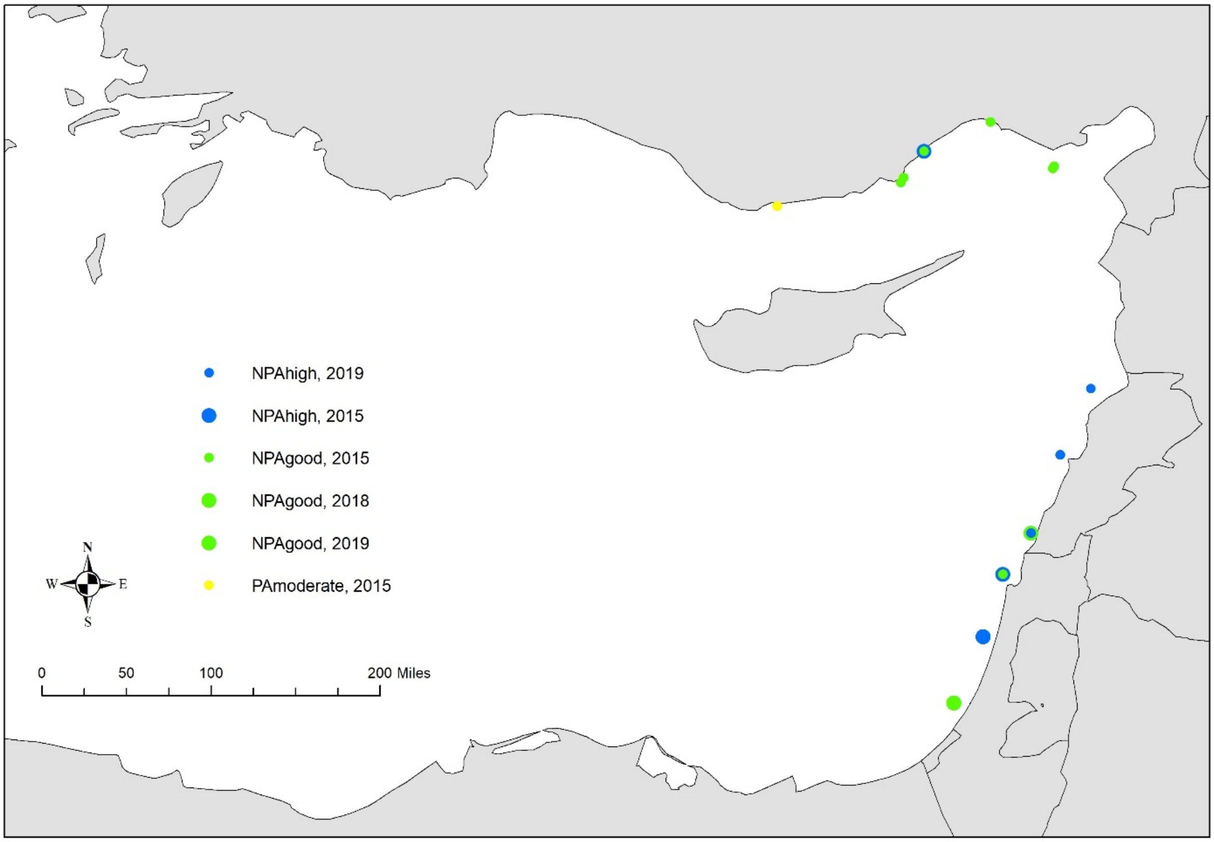

Figure 15. Results of the CHASE+ approach to assess the environmental status of trace metals (Cd, Hg, Pb) in M. barbatus in the Levantine Sea Basin, using AEL_BACs; stations in blue - NPAhigh (CS=0.0-0.5); stations in green- NPAgood (CS =0.5-1.5); stations in yellow- PAmoderate (CS =1.5-5.0); stations in brown - PApoor (CS =5.0-10.0) and stations in red - PAbad (CS > 10.0); stations in blue and green stations are considered in GES, and stations in yellow, brown and red are considered in non-GES.

Annex IV

References

Andersen, J.H., Murray, C., Larsen, M.M., Green, N., Høgåsen, T., Dahlgren, E., Garnaga-Budrė, G., Gustavson, K., Haarich, M., Kallenbach, E.M.F., Mannio, J., Strand, J. and Korpinen, S. (2016) Development and testing of a prototype tool for integrated assessment of chemical status in marine environments. Environmental Monitoring and Assessment 188(2), 115.

Anon (2019) Contaminants in Europe's Seas. Moving towards a clean, non-toxic marine environment. EEA Report No 25/2018.

Astrahan, P., Silverman, J., Gertner, Y. and Herut, B. (2017) Spatial distribution and sources of organic matter and pollutants in the SE Mediterranean (Levantine Basin) deep water sediments. Marine Pollution Bulletin 116(1), 521-527.

Ghosn, M., Mahfouz, C., Chekri, R., Ouddane, B., Khalaf, G., Guérin, T., Amara, R. and Jitaru, P. (2020) Assessment of trace element contamination and bioaccumulation in algae (*Ulva lactuca*), bivalves (*Spondylus spinosus*) and shrimps (*Marsupenaeus japonicus*) from the Lebanese coast. Regional Studies in Marine Science 39, 101478.

Herut, B., Hornung, H., Kress, N. and Cohen, Y. (1996) Environmental relaxation in response to reduced contaminant input: The case of mercury pollution in Haifa Bay, Israel. Marine Pollution Bulletin 32(4), 366-373.

Herut B., Segal Y., Silverman J., Gertner Y. Tibor G. (2021). The National Monitoring Program of Israel's Mediterranean waters – Scientific Report on Marine Pollution for 2020, Israel Oceanographic and Limnological Research, IOLR Report H27/2021. (In Hebrew)

Kress, N., Shoham-Frider, E. and Galil, B.S. (2016) Twenty two years of sewage sludge marine disposal monitoring in the Eastern Mediterranean Sea: Impact on sediment quality and infauna and the response to load reduction. Marine Pollution Bulletin 110(1), 99-111.

Kress, N., Shoham-Frider, E. and Lubinevski, H. (2020) Marine monitoring at the Shafdan marine outfall. Final report for the 2019 surveys. IOLR Report H21/2020 (In Hebrew).