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Malta, 22-24 May 2023

**Agenda item 4: Progress report on the activities carried out to implement SPA/RAC activities under the UNEP/MAP Programme of Work for the biennium 2022-2023**

**Synthesis of the TDA (2023) -Transboundary Diagnostic Analysis for the Mediterranean Sea and Coast**

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## **Note by the Secretariat**

The 22<sup>nd</sup> Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols (COP 22, Antalya, Türkiye, 7-10 December 2021) adopted Decision IG.25/19 on the Programme of Work and Budget for the biennium 2022-2023. The Contracting Parties called for the preparation of the Transboundary Diagnostic Analysis (TDA) for the Mediterranean Sea.

To that extent, and in coordination with, and support of the GEF-funded Mediterranean Sea Programme (MedProgramme/Child Project CP1.1, Component 2), the Secretariat (MED POL) prepared an update of the 2005 Transboundary Diagnostic Analysis (TDA) for the Mediterranean Sea and Coast. The assessment and reporting of the TDA was performed based on the global GEF TDA/SAP methodology (October 2020 Guidelines). This methodology focuses on strengthening regional cooperation frameworks as a means for identifying priorities and actions.

The progress on the preparation of the TDA report was presented to the Third Project Steering Committee (SC) Meeting of the MedProgramme, Child Project 1.1 (Sarajevo, 14-15 March 2023). The Steering Committee agreed to convene an additional TDA-SC Meeting in 4<sup>th</sup> Quarter of 2023 for the initial endorsement of the report prior to submission to the next Child Project 1.1 SC Meeting planned for the 1<sup>st</sup> Quarter of 2024 for approval.

Further to the scientific and technical regional assessment of pollution and coastal and marine ecosystems, with the analysis of their causes and effects, including the socioeconomic and governance contexts, undertaken as part of the preparation of the 2023 TDA report, the Secretariat elaborated the current document UNEP/MED WG.548/Inf.15 “**Synthesis of the TDA (2023) -Transboundary Diagnostic Analysis for the Mediterranean Sea and Coast.**”. The meeting of SPA Focal Points is expected to take note of the transboundary diagnostic analysis.

## Table of Contents

	Pages
1. Introduction .....	1
2. Objective and Scope of the TDA report .....	2
3. The “a priori” and “a posteriori” for development of the TDA 2023 and contributors.....	3
4. The Causal Chain Analysis (CCA) methodology .....	5
5. Brief messages on the transboundary prioritized environmental concerns .....	6
5.1 Pollution .....	6
5.2 Biodiversity: .....	7
5.3 Climate change: .....	8
Annex I: TDA 2023 – Scope of Report Chapters	

## List of Abbreviations / Acronyms

<b>BD</b>	Biodiversity
<b>CC</b>	Climate Change
<b>CCA</b>	Causal Chain Analysis
<b>Chl-<i>a</i></b>	Chlorophyll <i>a</i>
<b>COP</b>	Conference of the Parties
<b>CU</b>	Coordinating Unit of the Mediterranean Action Plan
<b>CW</b>	Chemical and Waste
<b>DPSIR</b>	Drivers/Pressures/Status/Impacts/Response
<b>EcAp</b>	Ecosystem Approach
<b>EEA</b>	European Environment Agency
<b>EMSA</b>	European Maritime Safety Agency
<b>EO</b>	Ecological Objective
<b>GEF</b>	Global Environmental Facility
<b>H2020</b>	Horizon 2020
<b>HNS</b>	Hazardous and Noxious Substances
<b>IMAP</b>	Integrated Monitoring and Assessment Programme
<b>IMO</b>	International Maritime Organization
<b>IW</b>	International Waters
<b>LBS</b>	Land Based Sources
<b>LME</b>	Large Marine Ecosystem
<b>MCSD</b>	Mediterranean Commission on Sustainable Development
<b>MedECC</b>	Mediterranean Experts on Climate and environmental Change
<b>MED POL</b>	Mediterranean Pollution Control and Assessment Programme
<b>MedProgramme</b>	Mediterranean Sea Programme
<b>MHW</b>	Marine Heat Waves
<b>MME</b>	Marine Mortality Events
<b>MPA</b>	Marine Protected Areas
<b>NBB</b>	National Baseline Budget of Pollutants
<b>NIS</b>	Non-Indigenous Species
<b>QSR</b>	Quality Status Report
<b>RAC</b>	Regional Activity Center
<b>REMPEC</b>	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
<b>SAP</b>	Strategic Action Programme
<b>SAPBIO</b>	Strategic Action Programme for the Conservation of Biodiversity and Sustainable Management of Natural Resources in the Mediterranean Region
<b>SDG</b>	Sustainable Development Goals
<b>SoED</b>	State of the Environment and Development Report
<b>SST</b>	Sea Surface Temperature
<b>TDA</b>	Transboundary Diagnostic Analysis
<b>UNEP/MAP</b>	United Nations Environment Programme /Mediterranean Action Plan
<b>WWTP</b>	Wastewater Treatment Plant

## 1. Introduction

1. Almost 20 years after the publication of the 2005 Transboundary Diagnostic Analysis, UNEP/MAP is undertaking, in coordination with, and support of the GEF-funded Mediterranean Sea Programme (MedProgramme) the update of the 2005 Transboundary Diagnostic Analysis (TDA) for the Mediterranean Sea and Coast. UNEP/MAP was mandated to prepare the updated TDA for 2023 further to COP22 Decision IG.25/19 on the Programme of Work and Budget for the biennium 2022-2023 (Antalya, Türkiye, 7-10 December 2021).

2. The GEF TDA reports are scientific and technical assessments of the water related ecosystems mainly in terms of pollution impacts, either the freshwater (continental) environments or the world's LMEs. The TDA 2023 Report is related primarily to the GEF International Waters (IW) Focal Area concerning the scientific assessment and reporting of the Mediterranean Sea Large Marine Ecosystem (LME).<sup>1</sup>

3. The 2023 update of the TDA for the Mediterranean is undertaken further to recent emerging global problems and agendas such as related scientific updates and developments; holistic ecosystem-based management approaches; marine litter issues; new regional and global indicators frameworks; gender and social perspectives; sustainable economy trends; COVID-19 effects and digital technologies; as well as transitions in progress in the Mediterranean region which are impacting the Mediterranean Sea Large Marine Ecosystem (LME). To this aim, the 2023 TDA is designed to update and strengthen the knowledge and connections between several environmental issues and their causes, such as impact of emerging pollution on marine ecosystems, relationships of pollution with climate change and natural and socio-economic systems and potential for sustainable blue economy; to mention a few.

4. The development process of the TDA over the 2021-2023 period was based on recent work pertaining to four key Mediterranean publications with different perspectives from natural, social and economic sciences. These publications are:

- a. Climate and Environmental Change in the Mediterranean Basin – Current situation and risk for the future – Report produced by the Mediterranean Experts on Climate and environmental Change (MedECC, 2020);
- b. State of the Environment and Development Report in the Mediterranean – SoED Report (Plan Bleu, 2020);
- c. Post-2020 SAPBIO content (Strategic Action Programme for the Conservation of Biodiversity and Sustainable Management of Natural Resources in the Mediterranean Region (SAPBIO, SPA/RAC, 2020); and
- d. Joint H2020 EEA/UNEP work and reports related to pollution.

5. The TDA update was also developed taking into consideration the alignment with the current IMAP-Quality Status Report 2023, as well as the policies (ca. COP22) of the UNEP/MAP-Barcelona Convention System.

6. To support the preparation process of the 2023 TDA, UNEP/MAP undertook four thematic assessments for pollution, biodiversity, climate change and environmental economics. These coastal and marine pollution transboundary assessments were based on integrated Causal Chain Analysis (CCA) exercises undertaken to identify the related transboundary issues. In parallel, UNEP/MAP facilitated the mobilization of multidisciplinary teams of national experts to prepare country assessment reports on the National Transboundary Diagnostic Analysis. Based on the foregoing, the transboundary issues were assessed within the geographical scope of the Mediterranean Large Marine Ecosystem (LME) further to the scientific evidence and existing basin-wide policies. Accordingly, “a priori” transboundary shared problems (environmental changes) and socioeconomic challenges were

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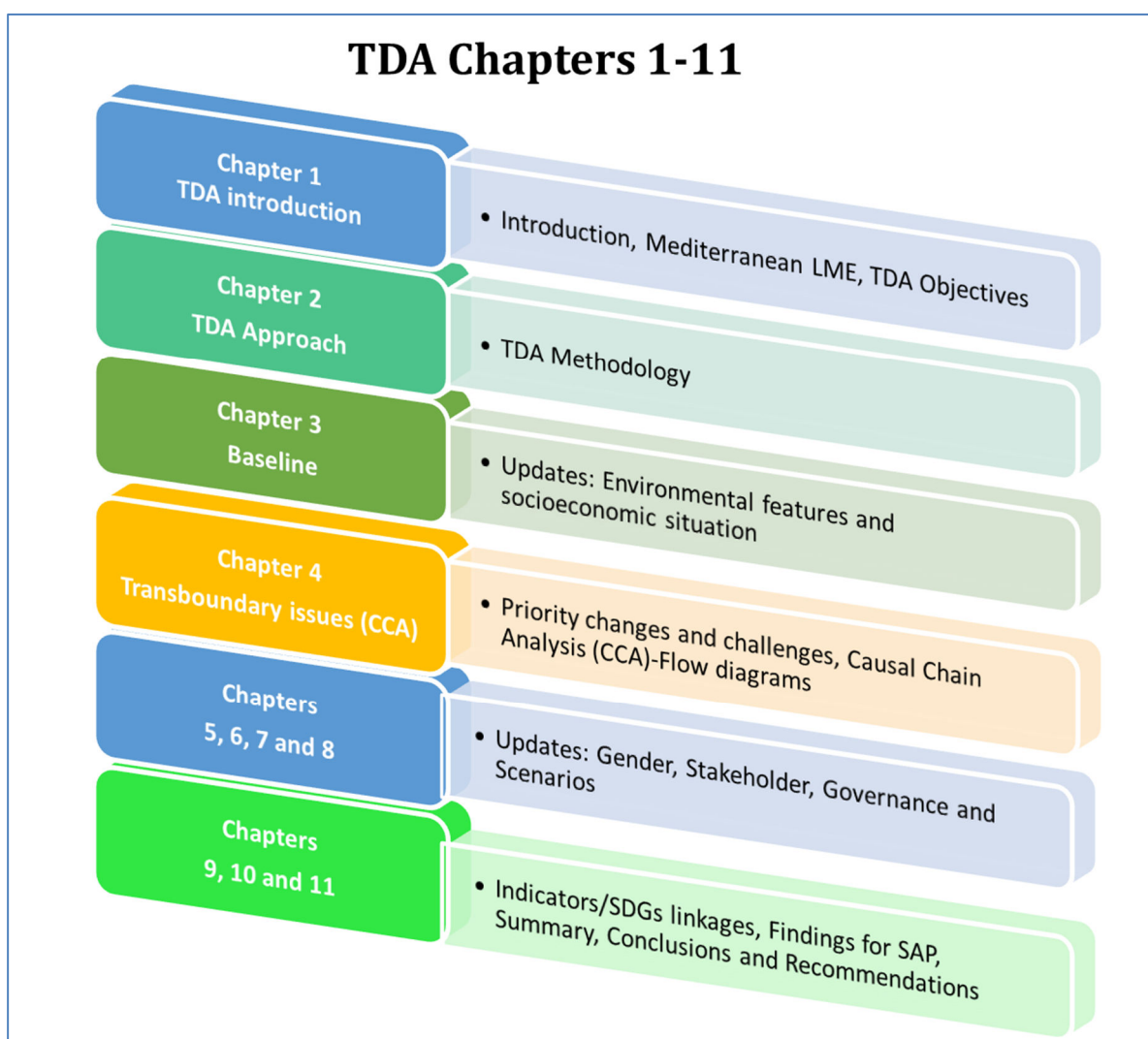
<sup>1</sup> LME: Large Marine Ecosystem (respond to the GEF denomination). The Mediterranean Sea is the LME number 26

decided and classified along with their causes and impacts. The “a posteriori” transboundary issues were then identified further to inputs and feedback obtained from scientists and experts at national and regional levels, as well as from countries’ stakeholders.

## 2. Objective and Scope of the TDA report

7. The objective of the TDA Report 2023 is to provide a factual basis and integrated diagnostic analysis of priority transboundary issues, impacts and causes by means of a causal chain analysis (CCA), which includes the socioeconomic and governance context. The aim of the TDA is to effectively contribute to the formulation of the next Strategic Action Programme (SAP) for the Mediterranean LME which will set priorities beyond 2025.

8. The scope of the TDA report chapters is presented in Annex I to the present report. The TDA report consists of eleven chapters as illustrated below addressing baseline socio-economy, transboundary issues, gender, stakeholders and governance scenario analyses as well as links to SDGs, followed by the conclusions and recommendations of the TDA report.



9. The prepublication version of the TDA report is presented to the Meeting of the MED POL Focal Points as information document UNEP/MED WG.563/Inf.13.

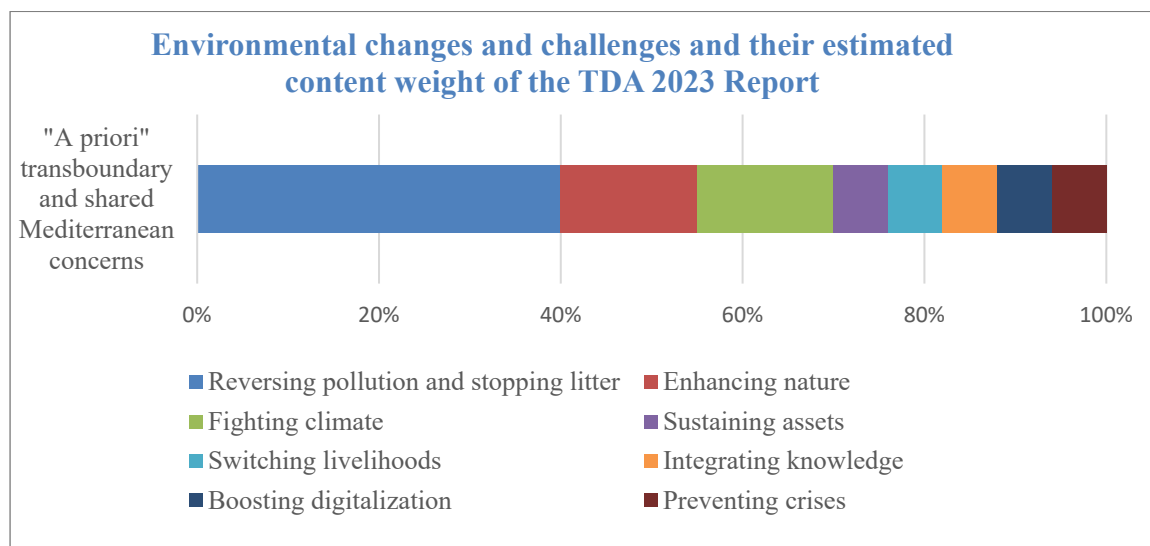
### 3. The “a priori” and “a posteriori”<sup>2</sup> for development of the TDA 2023 and contributors

10. An initial “a priori” transboundary and shared known problems (environmental changes) and social and economic context (challenges) were the basis for the set up and development of the TDA 2023 report. These changes (a-d, i) and challenges (e-h) are classified as follows:

- a. Reversing pollution
- b. Stopping litter
- c. Enhancing nature
- d. Fighting climate change
- e. Sustaining assets
- f. Switching livelihoods
- g. Integrating knowledge
- h. Boosting digitalization
- i. Long-term LME regulation.

11. The above transboundary and shared issues were developed and updated with the support of a team of international consultants (ca. experts on pollution, environmental economists, biodiversity and fisheries and climate change) as well as several Contracting Parties (ca. CP1.1 Partner countries) from the Adriatic Sea (Bosnia and Hercegovina, Montenegro and Albania), the Eastern Mediterranean (Lebanon); and the southern Mediterranean (Morocco, Algeria, Tunisia, Libya and Egypt). National TDA perspective reports were prepared for that purpose. Moreover, within the UNEP/MAP Secretariat, the EcAP-QSR Unit, SPA/RAC and Plan Bleu provided also support led by the MED POL Programme and the MedProgramme Project Support Unit.

12. The “a posteriori” judgement on the relevant issues was undertaken, through expert discussions; national TDA workshops; also considering the current regional agendas and perspectives of other countries and stakeholders. The environmental changes and challenges and their estimated weight of the content of the TDA 2023 Update Report are shown in Figure 1. The linkages between ‘a priori’ transboundary and shared Mediterranean concerns (ca. environmental changes and challenges) for the elaboration of the TDA 2023 Update Report are explained in Table 1.



*Figure 1. Environmental and socioeconomic concerns and their estimated content weight of the TDA 2023 Report*

<sup>2</sup> “A priori” and “a posteriori” refer primarily to how, or on what basis, a proposition might be known. In general terms, a proposition is knowable a priori if it is knowable independently of experience, while a proposition knowable “a posteriori” is knowable on the basis of experience.



Table 1: Linkages between ‘a priori’ transboundary and shared Mediterranean concerns (ca. environmental changes and challenges) for the elaboration of the TDA 2023 Update Report and relationships with ongoing regional and global environmental governance.

Issues	TDA/SAP changes and challenges in the Mediterranean LME	Related Section in the TDA Chapter 4 report related to the Transboundary Issues	Related CU/RACs	GEF Focal Areas	IMAP related EOs	UNEP MAP MTS 2022-2027	UNEP “Triple crisis”	Green/blue transition targeted pillars
Environmental transboundary issues (changes)	1. Reversing Pollution	4.1. on Land and sea-based chemical, biological and physical pollution in transitional waters, coasts and offshore	CU, MED POL, REMPEC	CW and IW	EO5, EO9, EO10, EO11	1, (6)	Pollution	Environmental
	2. Stopping Litter	4.2. Sources and fate of litter and waste pollution, including coasts and offshore seafloor	CU, MED POL, SCP/RAC (MedWaves)	CW, IW	EO9, EO10	1, (6)	Pollution	Environmental
	3. Enhancing Nature	4.3. on Nature value loss, focusing in marine habitats, biodiversity and ecosystems	SPA/RAC	BD	EO1, EO2, EO3, EO4, EO6	2, (6)	Biodiversity	Environmental
	4. Fighting Climate Change	4.4. on Climate change adaptation, mitigation and socio-ecological resilience	Plan Bleu	CC	EO7, EO8	3	Climate change	Environmental
Welfare transboundary issues (challenges)	5. Sustaining Assets	4.5. on Coastal belts degradation, sustainability and restoration	PAP/RAC	-	(EO8)	4, (6)	-	Social and economic
	6. Switching Livelihoods	4.6. on Socio-economic drivers of transformation, green recovery and sustainable blue finance	SCP/RAC	-	-	1, 4	-	Social and economic
	7. Integrating knowledge	4.7. on Observing infrastructures, including joint IMAP national monitoring data flows, regional and global indicators	CU, MED POL, REMPEC, SPA/RAC, PAP/RAC, Plan Bleu, Info/RAC	CW, IW, BD and CC	All	(6)	All	Social
	8. Boosting Digitalization	4.8. on Environmental digitalization, marine literacy and forecasting research	PAP/RAC, Info/RAC	-	-	(7)	-	Social
	9. Preventing Crises	4.9. on Long-term global regulation affecting the Mediterranean LME	CU Plan Bleu	-	-	5, (6), (7)	-	Social and economic

#### 4. The Causal Chain Analysis (CCA) methodology

13. The Causal Chain Analysis method is the core element of the GEF-TDA Report. The TDA/SAP approach is a highly collaborative process consolidated as a major strategic planning tool by GEF International Waters Projects over the last 26 years.<sup>3</sup>

14. The CCA requires the consideration of appropriate elements from multiple dimensions related to the environment (i.e., science, technology, social, gender, economic, policy, etc.). Like the well-known DPSIR model (mostly used in the European region), the CCA is a methodology aiming to assess, understand and provide robust and clear connections between impacts and root problems (ca. drivers) in order to implement accurate actions (ca. responses) for the main environmental concerns as well as towards the sustainability of the ecosystem services and the environment itself (ca. Mediterranean LME).

15. The 2023 TDA Report proposes the conceptual comparison between the CCA and DPSIR models. Below in Figure 2, the parallelism between these two models is shown. Disregarding the fact that the TDA impacts (I) are analyzed at the transboundary level (ca. cross-border) based on the CCA method and at any “geographical unit” for the DPSIR; the main difference is that the CCA method seeks a more detailed analysis between the impacts and their origins by elucidating a sequence of causes (C1, C2, C3, etc.) aiming to offer a more fair and clearer outcomes. In other words, the CCA method aims to provide a robust “causality framework” for each transboundary issue; hence, facilitating environmental law development and policies (ca. responses).


Causal Chain Analysis (CCA)				Tranboundary Issue	Impacts (Environment and Economy)
<b>C</b>	<b>C3(no R)</b>	<b>C2</b>	<b>C1</b>	<b>Issue</b>	<b>I/E(E&amp;E)</b>
ROOT CAUSE(S)	UNDERLAYING/ INTERMEDIATE CAUSE(S)/(Social and economic drivers/Pressures)	PROXIMATE CAUSE(S)/ Environmental pressures (Resource uses)	DIRECT CAUSE(S) (Casue-effect)	TRANSBOUNDARY CONCERN(S)	IMPACT(S)/ (Environmental and Welfare)/ Direct & Indirect
<b>Environmental Law</b>					<b>Policy</b>
<b>D</b>	<b>P</b>			<b>S</b>	<b>I</b>

Figure 2. Comparison of the CCA method used for the Mediterranean TDA Report 2023 and the DPSIR method used for the IMAP-QSR Reports.

<sup>3</sup> IW:LEARN | Documents - TDA/SAP Methodology (iwlearn.net) 2020 Edition.

## 5. Brief messages on the transboundary prioritized environmental concerns

### 5.1 Pollution

#### *Priority Issue 1: EUTROPHICATION (& COASTAL WATER QUALITY)*

16. Natural and anthropogenic eutrophication comprise among the major concerns as far as transboundary pollution is concerned around the Mediterranean Sea. This is particularly evident from the scientifically observed decadal trends in the Western Mediterranean (i.e., primary production) of satellite-derived Chl-*a*. On the other hand, related environmental and socioeconomic impacts in coastal water systems (i.e., eutrophication, bathing water quality) continue to pose pressure on the ecosystem; therefore, comprise a transboundary issue for the Mediterranean countries. The situation is being addressed at a multilayer level (e.g., policy-governance, WWTPs installations, Regional Plans, etc.), but the eutrophication phenomena and random incidents still occur; along both the northern and southern Mediterranean coasts.

#### *Priority Issue 2: CHEMICAL POLLUTION (& EMERGING)*

17. Well-known issues of legacy chemicals and emerging pollution still remain a complex transboundary problem despite the well-known policy successes (i.e., global leaded-fuel ban). The lifecycle management (i.e., monitoring-assessment-response) is in place for legacy chemicals with bans or disposal actions (e.g., CP1.1. MedProgramme). The coastal and marine hotspots of legacy pollution are controlled under national monitoring and assessment programmes; however, taking into account that the chemicals we know do not comprise more than 10% of the released chemicals; thus, a large number is not under control nor enough investigated. In fact, many different chemical groups of concern (both legacy and emergent) are well established in earlier policy documents in the Mediterranean region for industrial, water systems and the marine environment for monitoring programs (ca. MED POL). Unfortunately, only a very limited number of chemicals have been monitored and the issue remains not well-quantified. The coastal and marine environmental monitoring programmes (i.e., land, sea and atmospheric sources) of new/emerging substances require the same level of coordination to deliver successful legal and policy actions. Similarly, this is needed for the direct source contributions (ca. National Baseline Budget of Pollutants - NBB) to assess the pollutants lifecycles (ca. industrial, agricultural, etc.). As the number of chemicals is enormous, similar candidate lists of substances and surveillance approaches (e.g., HELCOM, EU, US-EPA, etc.) are highly complementary for the Mediterranean countries (ca. Barcelona Convention LBS Protocol (SAP-MED), and other UN Conventions).

#### *Priority Issue 3: OIL & & HAZARDOUS AND NOXIOUS SUBSTANCES (HNS) POLLUTION*

18. Pollution from oil and noxious substances is of great concern when it comes to chronic pollution (i.e., quantification and assessment of operational, illicit and non-reported spills). However, it is not related to acute pollution events (ca. spills >7 tonnes or >50 m<sup>3</sup> depending on the protocol). The number of oil related spills in the Mediterranean has plummeted progressively over the last decades due to regional and global (ca. IMO) policy response implementation (e.g., double-hull tankers). In comparison, for HNS, there is not much evidence and the regular operational discharges are less recognized and understood. Nevertheless, as shipping is a major issue in the Mediterranean Sea, the potential risk for a major accident is always present with known costly environmental and economic (ca. ecosystem services) losses. The recent scientific publications have reviewed the main Mediterranean databases to this regard from EMSA, REMPEC and other sources to provide an updated and a trend overview for the Mediterranean LME.

#### *Priority Issue 4: MARINE LITTER & MICROPLASTICS (WASTES)*

19. Anthropogenic solid waste, comprising to a great extent of plastic materials, have been monitored and assessed over the last decade. These lightweight items/particles can be transferred around the Mediterranean (e.g., oceanographic conditions, water circulation); thus, can be only addressed at regional

level with multiple environmental, economic, social and health impacts. Nowadays, numerous research publications, policy reports and relevant information are available mainly focusing on the quantitative and qualitative characteristic, including the pertaining impact on the environment and its biota (i.e., ingestion and entanglement, etc.). Regional policy instruments are in place, including the updated Regional Plan on Marine Litter Management in the Mediterranean (adopted 2013 and updated in 2021) and multi-stakeholder partnerships and platforms.

*Priority Issue 5: NANO LITTER & CHEMICALS LEACHING (& TOXICITY)*

20. Marine litter, when at sea, is fragmented into smaller sized particles (e.g., micro- and nano-sized particles), which in turn release several chemical substances, therefore, leading to chemical pollution and toxicity issues mainly related to the unknown emerging compounds pool yet to be fully investigated and environmental impacts to be understood. At present, these transboundary issues are only addressed at science/research level.

## 5.2 Biodiversity

*Priority Issue 6: FISHERIES HARM (OVERFISHING & TRAWLING)*

21. Fisheries and its socioeconomic transboundary concerns were reported in the 2005 TDA. Similarly, like the water quality issues (n°1) or chemical pollution issues (n°2), and despite the improvement of the fisheries overexploitation management, the problems and declining trends persist according to both scientific and policy studies. Therefore, unsustainable fisheries and its impacts remain a priority issue with costly socioeconomic and environmental bills (ca. biodiversity), having also side effects on pollution generation (e.g. marine litter generation). Primarily, over the last two decades, scientific research linked to national and regional coordinated monitoring programmes in most of the Mediterranean countries has improved to provide responses to fisheries management; however, it is still seen as a potential economic sector along the aquaculture sector. Environmental harm and damage from fisheries exploitation models are obvious (ca. scientific evidences) in both overfishing and trawling practices and continue to be examined by Mediterranean scientists and stakeholders.

*Priority Issue 7: BIODIVERSITY DECLINE (BY-CATCH, KEY SPECIES & NON-INDIGENOUS SPECIES (NIS))*

22. Biodiversity is under pressure by several threats (ca. cumulative pressures). In terms of species, issues originate directly or indirectly by our societal and economic models. A major pressure (ca. collateral impact from fisheries, n°6) is by-catch of non-target species and discards and mortality of non-commercial species leading to the degradation of the pelagic, demersal and benthic habitats. Furthermore, key emblematic species (ca. long-lived species) (ca. turtles, monk seal, fan shell, etc.) in the Mediterranean are also threatened, but most if not all transboundary issues (n°1 to 12) and their causes have been identified. Non-Indigenous Species (NIS) phenomena is both an old and current issue being mostly problematic when affecting species, exploited or not, displacements (ca. fast anthropogenic species succession changes interfering with natural distributions and evolution). The large and complex cumulative pressures and impacts within the Mediterranean marine biodiversity as a whole provoke many socioeconomic challenges, as well as result in worrying uncertainties related to the future climate change (ca. species extinctions) according scientific forecast studies.

*Priority Issue 8: HABITAT CHANGES (CONTAMINATION, DAMAGE & LOSS)*

23. The coastal land-sea transitions and the marine seafloor in the Mediterranean basins are rich in geomorphologies responding to a rich diversity of habitats and species characteristic of the Mediterranean Sea. Mediterranean transboundary habitats (ca. and transboundary species distributions) from coastal land through the deep sea habitats, such as wetlands, coastal lagoons, mesophotic habitats/communities (ca. seagrass meadows, coralligenous formations, maërl) and seafloor/bottom characteristics are threatened by a large list of anthropogenic pressures (ca. causes) with growing evidences of polluted, damaged or already lost in some parts of the Mediterranean over the last decades by multiple stressors, whilst policy responses continues (ca. Coastal and Marine Protected Areas) for protection accompanied by new tools, such as the global System of Environmental-Economic Accounting, to illustrate and address the conservation needs.

### 5.3 Climate change

*Priority Issue 9: ATMOSPHERIC EMISSIONS (& POLLUTANTS)*

24. Atmospheric chemicals, chemical processes and their relationships with the marine environment are transboundary by nature (ca. the atmosphere over the sea) and bidirectional exchanges and fluxes occur for particles, compounds and gases at the sea surface. As such, particles (ca. dust), chemicals (ca. NO<sub>x</sub>, SO<sub>x</sub>) and gases (ca. CO<sub>2</sub>) displaced from the equilibrium pose a threat to the natural steady state and biogeochemistry cycles with secondary long-term consequences due to phenomena, such as sea acidification with potential environmental and socioeconomic impacts. Most of the research in this topic has been separately addressed by science in the Mediterranean region not always linked to the marine environment and the interactions observed, whilst recent policy has been established to that extent (ca. SECA-REMPEC).

*Priority Issue 10: MARINE ANOMALIES (SEA SURFACE TEMPERATURE (SST)-HEAT WAVES)*

25. Climate change led to an increase in the frequency and intensity of marine heat-waves (MHWs) in the Mediterranean Sea related to the displacements of the steady state responding to altered heat exchanges between the atmosphere and the sea surface. Evidences of mortality events (MMEs) of marine organisms are one of their main ecological impacts, as it is currently investigated. The Mediterranean Sea is experiencing exceptional thermal conditions variabilities to be yet well understood, add to that the yearly summer heat waves and forest fires expected to worsen according to climate forecasting studies. This sums another factor to the occurrence, distribution of chemical compounds and pollutants in the environment and their effects.

*Priority Issue 11: COASTAL WATER SYSTEMS (POLLUTION & FLOODING)*

26. Land-sea and sea-land flooding processes are the result of complex combinations of environmental factors (ca. storm surge, sea level rise, geomorphology, water stressors, etc.) with highly socioeconomic and environmental impacts varying among the different Mediterranean coastal areas. In terms of pollution issues (from n°1 to n°5), uncertainty is high as it is a collateral effect and depends on the flows variabilities during the events and the coastal-water systems (both surface and groundwater flows and reservoirs). Chemical and litter pollution of land, transitional, groundwater and coastal freshwater flows have a clear impact in the marine environment (ca. LBS Protocol) with direct and indirect ecosystem services costs, yet to be fully accounted and understood.

*Priority Issue 12: COASTAL PLANNING (ASSETS & DROUGHT)*

27. Climate change and its multiple impacts, such as droughts, pose a systemic challenge to Mediterranean assets, such as freshwater and drinking water resources and other ecosystem services maintenance. Therefore, coastal planning is a major challenge in the Mediterranean at transboundary level. The Mediterranean region with a population of 531.7 million inhabitants is considered one of the regions of

the globe with the highest socioeconomic exposure to drought that is likely be exacerbated in the future (ca. water abstraction, rain/moisture patterns variability, etc.). Coastal and marine ecosystem services; both transboundary and shared (ca. by countries), are interlinked with many transboundary issues, and new digital tools, such as Marine and Maritime Spatial Planning, along socioeconomical transitions could be the way forward.

**Annex I**

**TDA 2023 – Scope of Report Chapters**

The **GEF TDA methodology** provides an opportunity to revise and update the science related to pollution issues and ecosystems concerns in the Mediterranean LME. This new Mediterranean Sea TDA was undertaken by applying the global GEF TDA/SAP methodology (October 2020)<sup>4</sup> by adapting the outline and content to the environmental and multiculturalism present in the Mediterranean LME, whilst conserving the GEF TDA report characteristics, as detailed in the description of the chapters below:

**CHAPTER 1: Introduction**, firstly, the importance of the international scope of the TDA reports under the GEF International Waters (IW) Focal area has been highlighted since its origin and initial developments within the world Large Marine Ecosystems (LMEs) framework including the two-step IW GEF reporting process (GEF TDA/SAP methodology) until the latest updates and tools provided by IW:LEARN. Secondly, the Mediterranean Sea environmental concerns with the current execution of the GEF MedProgramme (2020-2025) and recent UNEP/MAP achievements are described to provide an introduction to the particularities and demands of this multicultural region where riparian countries under the UN Barcelona Convention cooperate for over 40 years. Finally, the alignment with the UNEP/MAP (Mediterranean Action Plan) current activities and mid-term strategic program is considered to place the TDA update report in the current framework regarding environmental policy in the region.

**CHAPTER 2: TDA Approach** describes both the building of the structure of the report and the collaborative process undertaken with multinational stakeholders, including the partner countries participating in the Child Project 1.1., to deliver an innovative and coherent TDA update. In first place, the approach for: the overall methodology, identification of priorities, causal chain analysis (CCA) exercises, thematic assessments, stakeholder analysis, governance analysis, scenario analysis, and for an indicator based TDA/SAP implementation, as well as the findings for the SAP. The approach for each is justified by explaining the differences with the TDA 2005 version and the adaptation needs through conceptualizing and enlarging the ecosystem concepts used in the earlier version to interlink them with the current implemented Ecosystem Approach (EcAp) in the Mediterranean Sea. For example, using the word 'ecosystem' (e.g., marine ecosystem) through the text instead of the simple use of 'water quality' as a concept, such as in 2005, to diagnose and analyze the situation of the coastal and marine (water) systems in the Mediterranean LME. Similarly, describing fisheries as a part of the whole biodiversity loss concerns, along other habitats and species within recent years have been impacted at transboundary level (i.e., benthic habitats degradation, *Pinna nobilis* mortality events); and therefore, towards a more holistic approach of the marine ecosystem as it is now required given the larger growing complexity of environmental problems.

It is worth to mention here that pollution matters (e.g., chemicals) still the focus of the Mediterranean TDA reports within the coastal and marine systems (e.g., ecosystems) under MEDPOL/UNEP/MAP, and later on, with a transversal analysis of the problems, impacts and causes, including relationships with other transboundary concerns (e.g., seawater aquifer intrusions) aiming at TDA integration.

Further, the intense coordination work over the two years together with CP1.1. Component 2, GEF MedProgramme and partner countries and other different national stakeholders (involved through the participation in the organized national TDA Stakeholder Workshops) are described in this Chapter. Five out of nine country partners were engaged through UNEP/GEF legal instruments, namely Small-Scale Funding Agreements (SSFA): Albania, Bosnia and Herzegovina, Lebanon, Montenegro and Morocco, to deliver National TDA thematic assessments (composed of 6 synthesis reports), whilst updating on environmental sciences-policies (i.e., environmental law ) achievements, as well as provide their particular transboundary perspectives of environmental Mediterranean (either transboundary or shared concerns).

The updates on the Mediterranean Sea region can be found in **CHAPTER 3: Baseline information on the Mediterranean**, with the known and new scientific insights regarding the LME functioning, environmental and socioeconomic changes at regional level. The Chapter is based in the classical description structure of environmental and socioeconomic terms of the Mediterranean basin, namely, geographical scope (of the

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<sup>4</sup> <https://iwlearn.net/resolveuid/2cc6db95-cc24-46e6-8f18-8c894c156a27>



basin and sub basins), environmental characteristics (with clear references to the water systems under concern), climatic features (related to climate change observed variabilities), and natural resources (with reference to natural resources both renewable and non-renewable), whilst focusing on socio-economy. The socioeconomic update and facts on selected well-known sectors in transition and blue economy sectors in expansion in the Mediterranean Sea are presented (i.e., tourism, fisheries, aquaculture, maritime transport, energy, marine mining, water abstraction, wastewater technologies, maritime infrastructures, and coastal development).

With regard the Mediterranean LME characteristics the subsection in Chapter 3 aimed to consider the relevant water systems and related ecosystems and processes involved. In this way, the subsection enumerates the hydrological cycle and their water related fluxes: the watersheds and catchment areas (with mainly focus on rivers and lakes in the coastal area), the role of the forest, groundwaters (coastal aquifers), marine and coastal wetlands, marine ecosystems and the atmosphere. Regarding Natural resources these are explained in terms of renewable and non-renewable resources, coastal and marine resources, offshore energy production, and ecosystem services. Regarding to Climatic features, two indicators temperature and precipitation are described within the well-known Mediterranean climate, as recent investigations and evidences allow to refine the earlier knowledge. However, readers are pointed to the recent and first MAR1 Report from MedEEC that was published in 2020 and contained information on climate change aligned with the IPCC. It is worth to mention here for the latter, that the socioeconomic update has been limited majorly for the issues during the period 2019 until 2022, and therefore, the beginning and end of the COVID-19 pandemics, thus reflecting on the global and regional effects and measures taken. The socioeconomic update was done in collaboration with Plan Bleu who published the SOED 2020 Report containing the diagnostic and trends in the Mediterranean region up to 2019 before the pandemics. To this regard, the new data after COVID-19, clearly shows both breakpoints and step changes in time trends, however, its effects are treated as a one-off event regarding the changes and challenges ahead. The content of this Chapter is majorly detailed and used in the report as a basis to develop the CCA methodology in Chapter 4.

The core chapter of the TDA Report is the **CHAPTER 4: LME Transboundary changes and challenges**. The changes (environmental problems and impacts) and challenges (socioeconomic transformations, including research and technology) known at a transboundary level in the region were initially listed and provided as a starting point for the update and coordination of the TDA update work, and aligned with the existing known UNEP/MAP activities and strategies, the nature of the GEF MedProgramme, and other regional organizations programmes of work in the Mediterranean region (e.g., GFCM, UNESCO-IHP, GWP-Med, etc.) dealing with transboundary environmental problems at present, as well as the revision of the concerns identified in the previous TDA 2005 version.

Chapter 4 approach then, operated based on initially '*a priori*' transboundary known problems (environmental changes and issues) and social and economic context (challenges) gathered from an initial knowledge pooling phase (see Table 1) classified as, 4.1. Reversing pollution, 4.2. Stopping litter, 4.3. Enhancing nature, 4.4. Fighting climate, 4.5. Sustaining assets, 4.6 Switching livelihoods, 4.7. Integrating knowledge, 4.8. Boosting digitalization, and 4.9. Long-term LME regulation. Later on, '*a posteriori*' judgement on the highlighted and relevant issues was undertaken (see Section 5), through expert discussions, national TDA workshops and considering the current regional agendas and perspectives of many other countries and stakeholders. These were developed and updated with the support of a team of international consultants (ca. experts on pollution, biodiversity and fisheries and climate change) and a number of contracting parties (ca. CP1.1. Partner countries) from the Adriatic Sea (Bosnia and Hercegovina, Montenegro and Albania), the Eastern Mediterranean (Lebanon) and the southern part of the Mediterranean (Morocco, Algeria, Tunisia, Libya and Egypt) through developing national TDA perspectives reports. Further, within the UNEP/MAP system, the Secretariat EcAP-QSR Unit, SPA/RAC and Plan Bleu RAC were also supporting the TDA Process under CP1.1., led by MEDPOL/UNEP/MAP.

Further, after an initial study on the prioritization of the transboundary long-term LME regulation undertaken by Plan Bleu from an exosystemic point of view, the initial suggested transboundary changes and challenges were worked out by the lead and regional consultants through joint CCA sessions to develop the Causal

Chain Analysis (see Section 4). As a result, the subsections in Chapter 4 depict the transboundary environmental problems and their impacts along the elucidation of their causes through the Causal Chain Analysis (CCA), including diagrams; and therefore, with the purpose to analyze the transboundary/shared environmental impacts and diagnose both the immediate, underlying, and root causes for each issue, as well as the socio-economic and environmental consequences (see Section 5).

An overview on gender equality related to the environment can be found in a specific chapter entitled **CHAPTER 5: Gender Assessment**. The regional data obtained from high level UN Women programmes and standards was attempted to be complemented with newer national statistics or case studies from the partner countries with low success. The gender data to monitor progress regarding gender equality in relation to the environment and its socioeconomic links is not available nor exists despite gender policies are considered beyond TDA activities. For this reason, the requirements from GEF in terms of gender indicators have been difficult to fulfill. Some information is presented, including case studies through reports recently published by FAO on gender in the Mediterranean region.

There are two chapters within the report, **CHAPTER 6: Stakeholder Analysis** and **CHAPTER 7: Governance Analysis**, to illustrate the present-day public national and regional governance and current strategies in the Mediterranean Sea LME for assessment, protection, and conservation, including the UNEP/MAP system with its Regional Activity Centers (RACs). Further, the type of associated regional and sub regional organizations supporting, promoting and executing the programmes and policies at all levels in the region are also mentioned.

The **CHAPTER 8: Scenario Analysis** presents a descriptive view of the potential near future concerns for the Mediterranean LME by showing some scientific opinions on both natural and anthropogenic (i.e., pollution) adaptation regarding different components of the marine ecosystem. Within the UNEP/MAP system, the scenario analysis and foresight is a process lead by Plan Bleu, as it was in the TDA 2005, and currently under its Med2050 framework, which offered the introduction to this Chapter. Though, there are no direct references to the future climate change concerns in the Mediterranean region and readers are redirected to consult the recent and first MAR1 report (2020) which depicts the future scenarios to this regard.

With reference to the growing ecosystem indicator-based management (and integrated) approaches **CHAPTER 9: TDA and SAP indicators (linked to SDGs)** describes some of the existing frameworks at regional level (i.e., of transboundary concern, MSCD), and linked the Global SDGs. Discussion is provided with regard the future gaps and challenges for the effective implementation of indicator frameworks in the LME and utility for the GEF TDA/SAP global methodology.

Finally, **CHAPTER 10: Findings for the Strategic Action Program (SAP)** and **CHAPTER 11: Summary, conclusions, and recommendations** presents LME diagnostic analysis and the way forward to be considered for the elaboration of a Pollution focus SAP to halt the identified transboundary changes and challenges, and surely through Mediterranean states transboundary cooperation.