

Appendix 2: Summary tables of existing indicators (Regional Seas Programmes)

These are the summary tables of existing indicators for eutrophication, marine plastic litter, the ecosystem approach, and marine protected area coverage currently used by Regional Seas Programmes and other key intergovernmental, international or regional bodies.

Final draft

Final draft

Indicator 14.1.1: Index of coastal eutrophication [...]

Summary of existing indicators and methodologies for monitoring and assessing coastal eutrophication used by Regional Seas Programmes and other key intergovernmental, international or regional bodies

Agency/Organisation/Convention	Indicators for coastal eutrophication	Monitoring methods for chlorophyll-a	Comments/Explanations Documents and resources
Regional Seas Programmes			
OSPAR Commission, Oslo-Paris Convention North East Atlantic	<p>OSPAR harmonised assessment criteria under the Common Procedure:</p> <p>Category I: Degree of nutrient enrichment</p> <ol style="list-style-type: none"> 1. Riverine inputs and direct discharges [elevated inputs and/or increased trends of total N and total P (compared with previous years)] 2. Nutrient concentrations [elevated level(s) of winter DIN and/or DIP] 3. N/P ratio (area specific) [elevated winter N/P ratio (Redfield N/P=16)] <p>Category II: Direct effects of nutrient enrichment (during growing season)</p> <ol style="list-style-type: none"> 1. Chlorophyll-a concentration (area specific) [elevated maximum, mean and/or 90 percentile level] 2. Phytoplankton indicator species (area specific) [elevated levels of nuisance/toxic phytoplankton indicator species (and increased duration of blooms)] 3. Macrophytes including macroalgae (area specific) [shift from long-lived to short-lived nuisance species; elevated levels (biomass or area covered) especially of opportunistic green macroalgae] <p>Category III: Indirect effects of nutrient enrichment (during growing season)</p> <ol style="list-style-type: none"> 1. Oxygen deficiency [decreased levels (< 2 mg l⁻¹: acute toxicity; 2–6 mg l⁻¹: deficiency) and 	<p>Monitoring methods for chlorophyll-a used by OSPAR Contracting Parties include:</p> <ul style="list-style-type: none"> - Remote sensing by satellite (advantage: enhanced temporal and spatial coverage; daily/near daily snapshots, 1km² grid; Gaps due to cloud cover can be corrected using algorithms that interpolate in space and time) - In-situ measurements (from ships)* - SmartBuoys <p>*high spatial and temporal variability of chlorophyll-a requires intensive monitoring (approx. biweekly during the growing season)</p> <p>See JAMP Eutrophication Monitoring Guidelines: Chlorophyll a in water (OSPAR Agreement 2012-11)</p>	<p>The OSPAR Coordinated Environmental Monitoring Programme (CEMP) includes the OSPAR Eutrophication Monitoring Programme, which is an integral part of OSPAR Eutrophication Strategy. As part of the Eutrophication Monitoring Programme, OSPAR developed the Common Procedure for the Identification of the Eutrophication Status of the OSPAR maritime area (updated 2013) which provides a framework for Contracting Parties to assess and classify the eutrophication status of their part of the OSPAR maritime area.</p> <p>OSPAR Joint Assessment and Monitoring Programme (JAMP) 2014 – 2021¹</p> <p>With regard to chlorophyll-a, the Common Procedure requires Contracting Parties to assess mean and maximum concentrations. The Second OSPAR Integrated Report on the Eutrophication Status of the OSPAR Maritime Area² found that a number of countries had difficulties with using maximum concentrations because of the high frequency of measurements needed. Instead, these countries used 90 percentile, which is also used as a tool to assess chlorophyll-a under the Water Framework Directive.</p> <p>The JAMP Eutrophication Monitoring Guidelines:</p>

¹ OSPAR (2014). OSPAR Joint Assessment and Monitoring Programme (JAMP) 2014-2021. Available at <https://www.ospar.org/work-areas/cross-cutting-issues/jamp>

² OSPAR (2009). Eutrophication Status of the OSPAR Maritime Area. Second OSPAR Integrated Report. Available at: <https://www.ospar.org/documents?v=7107>

	<p>lowered % oxygen saturation]</p> <ol style="list-style-type: none"> 2. Zoobenthos and fish [Kills (in relation to oxygen deficiency and/or toxic algae); Long-term area-specific changes in zoobenthos biomass and species composition] 3. Organic carbon/organic matter (area specific) [Elevated levels (in relation to III.1) (relevant in sedimentation areas)] <p>Category IV: Other possible effects of nutrient enrichment (during growing season)</p> <ol style="list-style-type: none"> 1. Algal toxins [Incidence of DSP/PSP mussel infection events (related to II.2)] <p>Eutrophication-related common indicators under development:</p> <ul style="list-style-type: none"> - Nutrient inputs - Nutrient concentrations - Chlorophyll-a concentration - <i>Phaeocystis</i> abundance - Dissolved oxygen concentration - <p>OSPAR Ecological Quality Objectives (EcoQOs) for eutrophication (OSPAR 2009):</p> <ul style="list-style-type: none"> • Winter concentrations of dissolved inorganic nitrogen and phosphate should remain below a justified salinity-related and/or area-specific % deviation from background not exceeding 50% • Maximum and mean phytoplankton chlorophyll a concentrations during the growing season should remain below a justified area-specific % deviation from background not exceeding 50% • Area-specific phytoplankton species that are indicators of eutrophication should remain below respective nuisance and/or toxic elevated levels (and there should be no increase in the average duration of blooms) 	<p style="font-size: 48px; opacity: 0.3; transform: rotate(-45deg);">draft</p>	<p><i>Chlorophyll a in water (OSPAR Agreement 2012-11)</i>³ outlines a sampling strategy, sampling equipment requirements and analytical procedures for chlorophyll-a. "Chlorophyll a is the most used operational indicator for phytoplankton biomass. [...]" (p. 2)</p> <p>Other eutrophication monitoring guideline documents include:</p> <ul style="list-style-type: none"> - Revised JAMP Eutrophication Monitoring Guideline: Oxygen (Agreement 2013-05) (Replaces Agreement 1997-03) - Revised JAMP Eutrophication Monitoring Guideline: Nutrients (Agreement 2013-04) (Replaces Agreement 1997-02) - CEMP Eutrophication Monitoring Guidelines: Phytoplankton Species Composition (Agreement 2016-06) - JAMP Eutrophication Monitoring Guidelines: Benthos (Agreement 2012-12) (replaces Agreement 1997-06) <p>The Common Indicators under development focus on trends and contribute to assessing progress towards the objective of the Eutrophication Strategy. Four of the Common Indicators are in line with criteria of the EU Marine Strategy Framework Directive. (OSPAR 2017, p. 16)⁴</p> <p>The <i>Joint Monitoring Programme of the Eutrophication of the North-Sea with SATellite data (JMP EUNOSAT)</i> project started in February 2017 in support of the implementation of the second cycle of the MSFD. The aim is 1) to enhance coherence between countries, and 2) to reduce the cost of</p>
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³ OSPAR (2012). JAMP Eutrophication Monitoring Guidelines: Chlorophyll a in water (OSPAR Agreement 2012-11). Available at: <https://www.ospar.org/convention/agreements?q=Eutrophication+Monitoring+Guidelines&t=&a=&s>

⁴ OSPAR (2017). Third Integrated Report on Eutrophication Status of the OSPAR Maritime Area. Available at: <https://www.ospar.org/work-areas/hasec>

	<ul style="list-style-type: none"> • Oxygen concentration, decreased as an indirect effect of nutrient enrichment, should remain above area-specific oxygen assessment levels, ranging from 4 – 6 mg oxygen per liter • There should be no kills in benthic animal species as a result of oxygen deficiency and/or toxic phytoplankton species.” 		monitoring for chlorophyll-a. ⁵
Helsinki Convention (HELCOM) Baltic Sea	<p>HELCOM Core Indicators for eutrophication⁶:</p> <ul style="list-style-type: none"> - Water clarity - Nitrogen/DIN - Total nitrogen (TN) - Chlorophyll-a [average chlorophyll-a concentration in the surface water (0 – 10 m) during summer (June – September)]⁷ - Oxygen debt - Inputs of nutrients to the subbasins - Phosphorus/DIP - Total phosphorus (TP) - Cyanobacterial bloom index 	<p>Chlorophyll-a is measured in-situ and by satellite remote sensing⁸</p> <p>See <i>Guidelines for monitoring of chlorophyll-a</i>⁹ for in-situ measurements</p>	<p>The Core Indicator on chlorophyll-a is in line with MSFD Descriptor 5 ‘Human-induced eutrophication’, Criterion 2 (D5C2) ‘Chlorophyll a concentrations are not at levels that indicate adverse effects of nutrient enrichment’.</p> <p>The Guidelines for monitoring of chlorophyll-a provide monitoring strategies, sampling and analysis methods for ship based and ship-of-opportunity based monitoring. “Regardless of its shortcomings, the Chl a method – being easy to sample and fast to analyze – is the method of choice for environmental studies.” (p. 1)</p> <p>See also HELCOM Eutrophication Assessment Manual (2015)¹⁰</p> <p>*Chlorophyll-a is the indicator that is used across the largest number of Contracting Parties</p> <p>Chlorophyll-a factsheet</p> <p>See also the <i>Manual for Marine Monitoring in the</i></p>

⁵ Presentation by Lisette Enserink Rijkswaterstaat at MEDCIS kick-off meeting, 5 April 2017, Rome: JMP EUNOSAT. Available at: http://www.quietmed-project.eu/wp-content/uploads/2017/06/MEDCIS-Kick-Off-Meeting-5_April_2017_JMP-EUNOSAT-project_Enserink-Lisette.pdf

⁶ HELCOM Core Indicators. Indicator List. Online: http://helcom.fi/baltic-sea-trends/indicators/?View=%7b28c665bc-a13e-41ca-9586-464072ae0fc9%7d&SortField=BSAP_x0020_Objectives&SortDir=Asc&FilterField1=MSFD%5F0020%5FDescriptor&FilterValue1=D5%20%2D%20Eutrophication

⁷ HELCOM (2017). Chlorophyll a. HELCOM core indicator report. Online. [viewed 02/11/2017] <http://helcom.fi/baltic-sea-trends/indicators/chlorophyll-a>

⁸ HELCOM (2017). Chlorophyll-a. HELCOM core indicator report (July 2017). Available at: http://helcom.fi/Core%20Indicators/Chlorophyll%20a%20-%20Updated%20core%20indicator%20report_HOLAS%20I%20component.pdf

⁹ HELCOM. Guidelines for monitoring of chlorophyll a. Available at: <http://www.helcom.fi/Documents/Action%20areas/Monitoring%20and%20assessment/Manuals%20and%20Guidelines/Guidelines%20for%20measuring%20chlorophyll%20a.pdf>

¹⁰ HELCOM (2015). HELCOM Eutrophication Assessment Manual. Available at: <http://helcom.fi/Documents/Eutrophication%20assessment%20manual.pdf>

			<p>COMBINE Programme of HELCOM¹¹ and the HELCOM Monitoring and Assessment Strategy¹² for a comprehensive overview of monitoring under HELCOM.</p>
<p>Barcelona Convention (UNEP/MAP) Mediterranean</p>	<p>Integrated Monitoring and Assessment Programme (IMAP)¹³: Ecological Objective 5 Eutrophication (EO5)</p> <ul style="list-style-type: none"> - Common Indicator 13 Concentration of key nutrients in water column - Common Indicator 14 Chlorophyll-a concentration in water column 	<p>Integrated Monitoring and Assessment Guidance: Monitoring methods for chlorophyll-a include:</p> <ul style="list-style-type: none"> - In situ measurements using e.g. thermo-salinometer, dissolved oxygen sensors and in vivo fluorometer and/or nephelometer (from ships, ferry boxes or other autonomous measuring devices) - Modelling (requires ground truthing) - Remote sensing (requires ground truthing). <p>In-situ more suitable:</p> <ul style="list-style-type: none"> - In (sub) regions/areas/sites with an increasing eutrophication problem, - When a sub-region/area/site is close to or under GES for eutrophication - When the status with respect to eutrophication is still unclear - In sub-regions/areas/sites where for other reasons accurate and reliable data are needed (generally these are coastal sub-regions, in particular close to rivers) <p>Modelling more suitable:</p> <ul style="list-style-type: none"> - In (sub) sub-regions with a stable, predictable eutrophication status - In sub-regions in GES or where the eutrophication problem is decreasing 	<p>The Integrated Monitoring and Assessment Programme (IMAP) recommends that Contracting Parties use the classification scheme on Chlorophyll-a concentration (µg/l) (including indicative thresholds and reference values) developed by MEDGIG as an easily applicable assessment method. Appendix 2 presents water typologies for the Mediterranean and assessment criteria for eutrophication.</p> <p>IMAP refers to water typology as an important factor for the definition of sub-regional thresholds for chlorophyll-a in the further development of classification schemes.</p> <p>IMAP also points out that different techniques for monitoring eutrophication are needed in different sub-regions and countries depending on the local level of the eutrophication problem.</p> <p>The geographical scale of monitoring to determine good environmental status for eutrophication depends on the hydrological and morphological conditions of an area (incl. freshwater inputs, salinity, general circulation, upwelling, stratification). Spatial distribution and frequency of monitoring stations should be determined based on the anticipated extent of eutrophication and hydrographic characteristics of a sub-region.</p>

¹¹ HELCOM (2017). Manual for Marine Monitoring in the COMBINE Programme of HELCOM. Available at: <http://www.helcom.fi/Documents/Action%20areas/Monitoring%20and%20assessment/Manuals%20and%20Guidelines/Manual%20for%20Marine%20Monitoring%20in%20the%20COMBINE%20Programme%20of%20HELCOM.pdf>

¹² HELCOM (2013). HELCOM Monitoring and Assessment Strategy. Part of the 2013 HELCOM Ministerial Declaration. Available at: <http://helcom.fi/Documents/Action%20areas/Monitoring%20and%20assessment/Monitoring%20and%20assessment%20strategy/Monitoring%20and%20assessment%20strategy.pdf>

¹³ UNEP/MAP (2017). Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria. UN Environment/MAP Athens, Greece. Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/17012/imap_2017_eng.pdf?sequence=5&isAllowed=y

		<ul style="list-style-type: none"> - In offshore areas where taking in situ measurements is costly and where nutrient levels are correlated with levels in the coastal zone (extrapolation) - In case satellite data are inaccurate or not available - Where there is a need for an average picture of the local eutrophication status; models are very good at calculating this average picture combining hydraulic models and in situ measurements of standard sampling sites (interpolation) <p>Satellite data more suitable:</p> <ul style="list-style-type: none"> - In (sub) sub-regions/areas/sites with a stable, predictable eutrophication status - In sub-regions/areas/sites in GES or where the eutrophication problem is decreasing - In offshore sub-regions/areas/sites where taking in situ measurements is costly and where nutrient levels are correlated with levels in the coastal zone - In case models are inaccurate or not available - For comparisons of the eutrophication status over large sub-regions - For validation and calibration of the information on spatial distribution - In sub-regions/areas where funds are limiting - In sub-regions/areas where for other reasons the accuracy can be lower than provided by in situ measurements (generally these are offshore areas) - In addition to in situ measurements <p>Modelling and remote sensing provide data with higher spatial and temporal resolution. However, generally, modelling and remote sensing data needs to be ground truthed with</p>	<p>Eutrophication monitoring under IMAP builds on the existing UN Environment/MAP MED POL Monitoring programme and Contracting Party national programmes.</p> <p>The Integrated Monitoring and Assessment Guidance¹⁴ provides information to Contracting Parties on methodologies and quality control and assurance measures that they can use to update their national monitoring programmes. Section 3.1. includes considerations about suitability of different methods in different contexts.</p> <p>*With adoption of IMAP in 2016, chlorophyll-a monitoring and reporting became mandatory for Contracting Parties. Contracting Parties submit data to the MEDPOL database on a yearly basis. Before IMAP, chlorophyll-a monitoring was not mandatory but has been reported by the majority of countries. As a result, MEDPOL has over 3,000 records of chlorophyll-a data from 2001 to the present from Croatia, Cyprus, Egypt, France, Greece, Israel, Slovenia, Tunisia and Turkey. Based on this data trends analysis reports have been produced and data has been used to calculate Background Values (BCs) and Good Environment Status (GES) values.</p>
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¹⁴ UNEP/MAP (2016). Integrated Monitoring and Assessment Guidance. Available at: http://www.rac-spa.org/sites/default/files/ecap/ig22_inf7.pdf

		in-situ measurements. The adopted UNEP/MAP MED POL short term eutrophication monitoring strategy monitored parameters to support the TRIX index. This Index is widely used to synthesize key eutrophication variables into a simple numeric expression to make information comparable over a wide range of trophic situations. (p.71)	
Bucharest Convention Black Sea	Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea 2009 ¹⁵ : Long-term Ecosystem Quality Objective (EcoQO) 3 'Reduce eutrophication' Only policy level indicators; no chemical parameters used as indicators		The Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea 2009 includes a long-term Ecosystem Quality Objective to reduce eutrophication (EcoQO 3) and has provisions for monitoring and reducing the inputs of nutrients (nitrogen and phosphorous). Chlorophyll-a is not monitored.
Nairobi Convention Eastern African/ Western Indian Ocean Region	Chlorophyll-a concentration (mg m ⁻³) is reported in The Regional State of the Coast Report: Western Indian Ocean ¹⁶ in relation to phytoplankton primary productivity.	Method for measuring chlorophyll-a: Satellite data (SeaWiFS)	
Abidjan Convention West, Central and Southern Africa	No evidence of a regional monitoring programme was found.		The COP12 Draft Decisions include plans to set up an action plan regarding land-based sources of marine and coastal pollution, under which a monitoring programme might be set up in the future.
East Asian Seas Action Plan (COBSEA, PEMSEA) East Asian Seas	No information about a coordinated monitoring programme for the East Asian Seas under the auspices of COBSEA was found.		
Northwest Pacific Action Plan (NOWPAP) Northwest Pacific	NOWPAP Common Procedures for Eutrophication Assessment: Minimum required parameters : 1) Trend in chemical oxygen demand (DOD) or Total Organic Carbon (TOC)	Monitoring method for chlorophyll-a: Remote sensing (satellite data)	The Common Procedures for Eutrophication Assessment ¹⁷ present a detailed outline of the approach and methods for assessing eutrophication in the NOWPAP region. Chlorophyll-a concentration (field data) [ug/L] is

¹⁵ Black Sea Commission (2009). Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea. Online: http://www.blacksea-commission.org/bssap2009.asp#_Toc22222324

¹⁶ Nairobi Convention: Regional State of the Coast Report: Western Indian Ocean. Online: <http://web.unep.org/nairobiconvention/regional-state-coast-report-western-indian-ocean-0//>; See chapter 16: http://wedocs.unep.org/bitstream/handle/20.500.11822/11349/rsocr_printedition.compressed_Part16.pdf?sequence=17&isAllowed=y

¹⁷ NOWPAP CEARAC (2015). Procedures for assessment of eutrophication status including evaluation of land-based sources of nutrients for the NOWPAP region (Revision: 2015-Feb). UNEP/NOWPAP/CEARAC/FPM 13/13 Annex XIV. Available at: http://cearac.nowpap.org/fpm/meeting_report/13/Annex14.pdf

	<p>2) Frequencies of red tide and hypoxia events 3) Level and trend in satellite derived Chlorophyll-a</p> <p>Ecological Quality Objectives agreed in 2014 include: EcoQO 3: Eutrophication adverse effects (such as loss of biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters) are absent [CEARAC to provide advice and facilitate data collection]</p> <p>MTS 2018-2023 Objective for priority area “Prevent and reduce land- and sea-based pollution” is NOWPAP countries develop and adopt effective measures for mutual support in marine pollution emergencies and in the prevention and mitigation of coastal and marine pollution.</p> <p>MTS 2018-2023 <i>Outcomes/ Expected Accomplishments</i> for this priority area are as follows: - 3.1. NOWPAP member states have effective measures in place against marine pollution emergencies through the NOWPAP Regional Oil and NHS Spill Contingency Plan (RCP); - 3.2. NOWPAP member states are provided with reliable information, guidelines and best practices addressing prevention and mitigation of coastal and marine pollution, including eutrophication; - 3.3. NOWPAP member states effectively deal with marine litter, including microplastics, through the effective implementation of the NOWPAP Regional Action Plan on Marine Litter (RAP MALI).</p>		<p>included as assessment parameter for direct effects of nutrient enrichment. (see Table 2, p. 9)</p> <p>4 assessment categories by degree and effects of nutrient enrichment :</p> <ol style="list-style-type: none"> 1) Parameters that indicate degree of nutrient enrichment 2) Parameters that indicate direct effects of nutrient enrichment 3) Parameters that indicate indirect effects of nutrient enrichment 4) Parameters that indicate other possible effects of nutrient enrichment <p>6 eutrophication categories by level of concentration or occurrence of an event and by trend :</p> <ol style="list-style-type: none"> 1) High increase 2) High no trend 3) High decrease 4) Low increase 5) Low no trend 6) Low decrease <p>Table 2 (p. 9) presents the recommended assessment parameters for each of the 4 assessment categories :</p> <p>Category 1 :</p> <ul style="list-style-type: none"> - Riverine input : total nitrogen and phosphorous (T-N and T-P) [t/year] - Input from direct discharge : T-N and T-P [t/year] - Total nitrogen/Total phosphorous [mg/L] - Winter dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorous (DIP) concentrations [mg/L] - Winter N/P ration (DIN/DIP) <p>Category 2 :</p> <ul style="list-style-type: none"> - Chlorophyll-a concentration [ug/L] - Red-tide events (diatom species) [event/year] - Red-tide events (flagellate species) [event/year] <p>Category 3 :</p>
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			<ul style="list-style-type: none"> - Dissolved oxygen (DO) at bottom layer [mg/L] - Abnormal fish kill incidents [event/year] - Chemical oxygen demand (COD) [mg/L] - Transparency [m] <p>Category 4 :</p> <ul style="list-style-type: none"> - Red-tide events (Noctiluca sp.) [event/year] Shellfish poisoning incidents [event/year] <p>See also the 2014 report Application of the NOWPAP Common Procedure for Eutrophication Assessment in Selected Sea Areas in the NOWPAP Region¹⁸, and the 2011 report Integrated Report on Eutrophication Assessment in Selected Sea Areas in the NOWPAP Region: Evaluation of the NOWPAP Common Procedure¹⁹:</p> <p>Most countries report annual mean concentrations for chlorophyll-a, some also annual maximum concentrations.</p> <p>See also the following for more information about remote sensing for eutrophication monitoring in the NOWPAP region: Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region. Integrated Report on Ocean Remote Sensing for the NOWPAP Region: Towards Assessment of the Marine and Coastal Environment²⁰</p> <p>The NOWPAP POMRAC State of the Marine Environment Report 2014²¹ reports chlorophyll-a concentration (mg m-3) from satellite images in</p>
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¹⁸ NOWPAP CEARAC (2014). Application of the NOWPAP Common Procedure for Eutrophication Assessment in Selected Sea Areas in the NOWPAP Region. Available at: http://www.cearac-project.org/cearac-project/integrated-report/eut_2013.pdf

¹⁹ NOWPAP CEARAC (2011). Integrated Report on Eutrophication Assessment in Selected Sea Areas in the NOWPAP Region: Evaluation of the NOWPAP Common Procedure. Available at: http://www.cearac-project.org/cearac-project/integrated-report/eut_2011.pdf

²⁰ NOWPAP CEARAC (2011). Integrated Report on Ocean Remote Sensing for the NOWPAP Region: Towards Assessment of the Marine and Coastal Environment. Available at: www.cearac-project.org/cearac-project/integrated-report/rs_2011.pdf

²¹ NOWPAP POMRAC (2014). State of the Marine Environment Report for the NOWPAP region (SOMER 2). Available at: <http://pomrac.nowpap.org/Pub/Report%20for%20the%20NOWPAP%20region%20SOMER%202.pdf>

			relation to primary productivity. Chlorophyll-a satellite data reported in the NOWPAP POMRAC State of the Marine Environment Report 2014 came from SeaWiFS for 1997-2007 and MODIS/AQUA for 2002-2012.
Noumea Convention/ Pacific Regional Environment Programme (SPREP) Pacific	No evidence of indicators for eutrophication was found.		The Guidelines for environmental impact assessment for Pacific Island countries ²² mentions dissolved oxygen, total nitrogen and total phosphorus as indicators for water quality, but not chlorophyll-a.
South Asian Seas Action Plan South Asian Seas	No agreed indicators for eutrophication could be identified.		The evidence suggests that eutrophication is monitored through nutrient loads. ²³
Kuwait Convention and its Protocols ROPME Sea Area	No evidence for monitoring of/indicators for eutrophication was found. Chlorophyll-a concentration is used as indicator of phytoplankton biomass.	Chlorophyll-a is regularly measured in situ (oceanographic cruises) and through satellite imagery in offshore marine areas of ROMPE Sea Area. ²⁴	
Teheran Convention Caspian Sea	No evidence for monitoring of/indicators for eutrophication was found.		The Tehran Convention and associated Protocol for the protection of the Caspian Sea against pollution from land-based sources and activities do include provisions for monitoring programmes. The results of these were summarised in the 2011 State of the Environment report. The report includes information about nutrient input into the Caspian Sea (nitrogen and phosphorous) but does not directly relate this to eutrophication. Eutrophication appears to be a recent problem in the Caspian Sea and currently not systematically monitored.
Jeddah Convention (PERSGA) Red Sea and Gulf of Aden	No evidence for monitoring of/indicators for eutrophication was found.	No information about methods used for chlorophyll-a monitoring was found.	In the 2006 State of the Marine Environment

²² SPREP (2016). Strengthening environmental impact assessment: guidelines for Pacific Island countries and territories. Apia, Samoa. Available at: <https://wedocs.unep.org/bitstream/handle/20.500.11822/9963/strengthening-env-impact-assessment.pdf?sequence=1&isAllowed=y>

²³ Presentation by Dr. Muhammad Khurshid at a Technical and Policy Workshop on Sustainable Nutrient Management, Vietnam, November 2015: South Asian Seas Programme (SASP). Available at: http://eascongress.pemsea.org/sites/default/files/file_attach/PPT-TPW-03-MuhammadKhurshid.pdf; SACEP. A Scoping Study of Nutrient Pollution on the Coastal and Marine Systems of South Asia. Online: <http://www.sacep.org/?p=2414>; Nutrient loading and eutrophication of coastal waters of the South Asian Seas – a scoping study. Available at: <http://www.sacep.org/pdf/Reports-Technical/2014.05.21-22-Scoping-study-on-Nutrient-loading-in-SAS-Region.pdf>; SACEP (2017). Marine environment pollution: challenges and opportunities in South Asian Seas Region. Available at: <http://www.sacep.org/pdf/Reports-Technical/2017.05-Marine-Environment-Pollution-Challenges-and-Opportunities-in-South-Asian-Seas-Region.pdf>

²⁴ ROMPE. Satellite-based Marine Environmental Monitoring. Online: http://ropme.org/31_SAT_OBSERV_EN.clx; and ROMPE Winter 2006 Cruise. Online: http://ropme.org/355_Winter2006_EN.clx

	Nutrients (nitrogen and phosphorous), turbidity and chlorophyll-a are core parameters in the Regional Environmental Monitoring Programme (see Conceptual Framework ²⁵); however, the conceptual framework does not specify what is monitored through these parameters.		report ²⁶ , Chlorophyll-a concentrations are reported in relation to primary productivity, but not in relation to eutrophication.
Cartagena Convention Wider Caribbean	No evidence for monitoring of/indicators for eutrophication was found.		
Antigua Convention Northeast Pacific	No evidence for monitoring of/indicators for eutrophication was found.		The Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Areas of the North-East Pacific ²⁷ includes a provision for the formulation of strategies to promote the control of anthropogenic nitrogen and phosphorous inputs into coastal areas prone to eutrophication; it does not include provisions for the monitoring of Chlorophyll-a.
Lima Convention Permanent Commission of the South Pacific (CPPS) Southeast Pacific	SPINCAM ²⁸ indicator 7: water quality index (WQI) Parameters include: - phosphate, - nitrate, - dissolved oxygen, - chlorophyll-a.	No information on methods	The SPINCAM project “Southeast Pacific data and information network in support to integrated coastal area management” developed a set of seven indicators to support the evaluation of integrated coastal area management in the South East Pacific Region.
Hamilton Declaration Sargasso Sea	No evidence for the monitoring of indicators related to eutrophication was found.		
Arctic Council Arctic	No evidence for the monitoring of indicators related to eutrophication was found.		
Antarctic Treaty (CCAMLR) Southern Ocean (Southern Ocean, CCAMLR)	No evidence for the monitoring of indicators related to eutrophication was found.		
Other policies			

²⁵ PERSGA. Conceptual framework for Regional Environmental Monitoring Programme for the Red Sea and Gulf of Aden. Online: <http://www.persga.org/inner.php?id=85>

²⁶ PERSGA (2006). State of the Marine Environment, Report for the Red Sea and Gulf of Aden. PERSGA, Jeddah. Available at: <https://www.cbd.int/doc/meetings/mar/epsaws-2015-02/other/epsaws-2015-02-persga-submission1-en.pdf>

²⁷ Antigua Convention. Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Areas of the North-East Pacific. Available at: http://wedocs.unep.org/bitstream/handle/20.500.11822/11137/nep_action_plan_en.pdf?sequence=1&isAllowed=y

²⁸ IOC/UNESCO and CPPC (2015). Coastal and marine indicators of the Southeast Pacific. IOC Technical Series 124, ICAM Dossier 9. Available at: <http://unesdoc.unesco.org/images/0024/002430/243002M.pdf>

Convention on Biological Diversity (CBD)	<p>Aichi Target 8 "By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity"</p> <p>Target element 8.4</p> <p>Indicators for 'Trends in nutrient levels' include:</p> <ul style="list-style-type: none"> - Trends in Nitrogen deposition (International Nitrogen Initiative) - Trends in Loss of reactive nitrogen to the environment (International Nitrogen Initiative) - Trends in Global surplus of nitrogen (The Netherlands Environmental Assessment Agency) - Proportion of bodies of water with good ambient water quality (UNEP) - Proportion of wastewater safely treated (WHO, UN-Habitat, UNSD) 		
European Environmental Agency (EEA)	<p>EEA core set of indicators²⁹: Indicator 23 'Chlorophyll in transition, coastal and marine waters'</p>	<p>This indicator illustrates the levels and trends in mean summer surface concentrations of chlorophyll-a (microgram/l) in the regional seas of Europe.</p> <p>The concentration of chlorophyll-a is expressed as microgramme per litre (mg/l) in the uppermost 10m of the water column during summer.</p> <p>See EEA: Chlorophyll in transitional, coastal and marine waters. Online: https://www.eea.europa.eu/data-and-maps/indicators/chlorophyll-in-transitional-coastal-and-2/assessment for indicator calculation methodology</p>	<p>Key policy question addressed by indicator 23: 'Is eutrophication in European surface waters decreasing?'</p> <p>The EEA core set of indicators document identifies data sets and sources for chlorophyll in transition.</p> <p>Data sets:</p> <ul style="list-style-type: none"> - Waterbase - Euromaps <p>Data sources:</p> <ul style="list-style-type: none"> - EEA - ICES - Black Sea Environmental Programme (OceanBase Version 2.02 TU-BS) - Bartholomew Digital Data (Harper Collins Publishers) <p>The document also identifies identical or similar indicators by international organisations:</p> <ul style="list-style-type: none"> - CSD1996 Algae index - CSD2001 Algae concentration in coastal waters - Helcom indicator fact sheets (12): Chlorophyll concentrations from satellite remote sensing of ocean colour and temporal variations and

²⁹ EEA (2005). EEA core set of indicators – Guide. Technical report No 1/2005. Available at: https://www.eea.europa.eu/publications/technical_report_2005_1 (Annex 1, 4, 5)

			regional differences in chlorophyll concentrations from satellite remote sensing of ocean colour
European Union Marine Strategy Framework Directive (MSFD)	<p><u>Good environmental status</u>³⁰</p> <p>Descriptor 5: Eutrophication “Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.”</p> <p>Criteria and indicators:</p> <p>5.1. <i>Nutrients levels</i></p> <ul style="list-style-type: none"> — Nutrients concentration in the water column (5.1.1) — Nutrient ratios (silica, nitrogen and phosphorus), where appropriate (5.1.2) <p>5.2. <i>Direct effects of nutrient enrichment</i></p> <ul style="list-style-type: none"> — Chlorophyll concentration in the water column (5.2.1) — Water transparency related to increase in suspended algae, where relevant (5.2.2) — Abundance of opportunistic macroalgae (5.2.3) — Species shift in floristic composition such as diatom to flagellate ratio, benthic to pelagic shifts, as well as bloom events of nuisance/toxic algal blooms (e.g. cyanobacteria) caused by human activities (5.2.4) <p>5.3. <i>Indirect effects of nutrient enrichment</i></p> <ul style="list-style-type: none"> — Abundance of perennial seaweeds and seagrasses (e.g. fucoids, eelgrass and Neptune grass) adversely impacted by decrease in water transparency (5.3.1) — Dissolved oxygen, i.e. changes due to increased organic matter decomposition and size of the area 	<p>The European Commission’s Joint Research Centre (JRC) has published a report on <i>Monitoring for the Marine Strategy Framework Directive</i>³¹ that includes suggested monitoring methods for eutrophication indicators/Chlorophyll:</p> <ul style="list-style-type: none"> - Moorings and buoys - Ships of opportunity - Continuous Plankton Recorder (CPR) - Remote sensing - Autonomous Underwater Vehicles (AUVs) and Gliders <p>The JRC has also published a report on <i>Technical guidance on monitoring for the Marine Strategy Framework Directive</i>³² that aims to provide guidance on minimum agreed standards and concepts for monitoring for MSFD. With regard to eutrophication, this report covers:</p> <ul style="list-style-type: none"> - In situ sampling/measurements - Modelling and remote sensing 	Decision 2010/477/EU on criteria and methodological standards on good environmental status of marine waters

³⁰ European Commission Decision 2010/477/EU on criteria and methodological standards on good environmental status of marine waters. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:232:0014:0024:EN:PDF>

³¹ JRC (2012). Monitoring for the Marine Strategy Framework Directive: requirements and options. Available at: <http://mcc.jrc.ec.europa.eu/documents/201702065135.pdf>

³² JRC (2014). Technical guidance on monitoring for the Marine Strategy Framework Directive. JRC Scientific and Policy Reports. Available at: <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC88073/lb-na-26499-en-n.pdf.pdf>

	concerned (5.3.2).		
European Union Water Framework Directive (WFD)	<p>WFD³³ list of main pollutants includes:</p> <ul style="list-style-type: none"> - Substances which contribute to eutrophication (in particular, nitrates and phosphates) <p>Decision (2008/915/EC)</p> <p>Biological Quality Element: Phytoplankton</p> <ul style="list-style-type: none"> - Chlorophyll-a as phytoplankton parameter indicative of biomass 		<p>Target chlorophyll concentrations/ranges that support the WFD biological quality elements at a good status have been defined in the Commission Decision (2008/915/EC)³⁴. These are based on the results of the intercalibration exercise carried out by the geographical intercalibration groups in Baltic Sea, North East Atlantic and Mediterranean. These target chlorophyll concentrations/ranges are determined locally for different water types and water categories, including coastal and transitional water bodies.</p> <p>See also Common Implementation Strategy for the Water Framework Directive (2000/60/EC)³⁵</p>
Transboundary Waters Assessment Programme (TWAP) for Large Marine Ecosystems	Includes Chlorophyll-a concentrations and trends as indicator for productivity		Transboundary Waters Assessment Programme (TWAP) for Large Marine Ecosystems ³⁶
National Oceanic and Atmospheric Administration (NOAA)	Chlorophyll-a as an indicator of primary eutrophication symptoms ³⁷		
ChloroGIN		Ocean colour and related satellite observations	Data sources and Data portals for Chlorophyll http://www.chlorogin.org/index.php

³³ European Commission (2000). Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Available at: http://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF

³⁴ European Commission (2008). Commission Decision of 30 October 2008 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:332:0020:0044:EN:PDF>

³⁵ European Commission (2009). Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Guidance Document No. 23. Guidance document on eutrophication assessment in the context of European water policies. Available at: https://circabc.europa.eu/sd/a/9060bdb4-8b66-439e-a9b0-a5cfd8db2217/Guidance_document_23_Eutrophication.pdf

³⁶ IOC-UNESCO and UNEP (2016). Large Marine Ecosystems: Status and Trends. United Nations Environment Programme (UNEP), Nairobi. Available at: <http://www.geftwap.org/publications/lmes-technical-report>

³⁷ NOAA. ASSETS. Assessment of Estuarine Trophic Status. Online: <http://www.eutro.org/state.aspx>

Indicator 14.1.1: [...] Floating plastic debris density

Summary of existing indicators and methodologies for monitoring and assessing marine plastic litter used by Regional Seas Programmes and other key intergovernmental, international or regional bodies

Agency/Organisation/Convention	Indicators for marine plastic litter	Monitoring methods	Comments/Explanations Documents and resources
Regional Seas Programmes			
OSPAR Commission, Oslo-Paris Convention North East Atlantic	<p>Three indicators related to marine litter³⁸:</p> <ol style="list-style-type: none"> 1) Beach litter 2) Plastic particles in Fulmars' stomachs 3) Seabed litter <p>Indicators under development:</p> <ul style="list-style-type: none"> • Indicators using other biota • Indicators for microplastics 	<p>Monitoring methods described on the OSPAR website:</p> <p>1) Beach litter: Monitored using a standardised monitoring protocol; Reference beaches are monitored 4 times a year against a list of over 100 commonly found items; Monitoring parameter: number of litter items recorded per 100m of coastline.</p> <p>The beach litter indicator assesses: Trends in the amount of litter washed ashore and/or deposited on coastlines (including composition, spatial distribution and source).</p> <p>The monitoring data is assessed using the Litter Analyst 2 statistical analysis tool: trends in beach litter at the beach, country, regional or OSPAR wide scale for the most common items.</p> <p><i>For standardised monitoring procedure, see: OSPAR (2010). Guidelines for monitoring marine litter on the beaches in the OSPAR Maritime Area</i></p> <p>2) Plastic Particles in Fulmars' Stomachs: Samples of 50 to 100 beach-washed fulmars from each of 4 to 5 areas of the North Sea over a period of at least five years; Ecological quality objective: less than 10% of northern fulmars having more than 0.1 g plastic particles in the stomach.</p> <p>The indicator assesses: abundance of marine litter, plastics in particular, in surface waters; and estimated ecological harm caused by</p>	<ul style="list-style-type: none"> • Guidelines for monitoring marine litter on the beaches in the OSPAR Maritime Area (2010)³⁹ • Marine Litter Regional Action Plan (2014)⁴⁰ • Communication plan for OSPAR Marine Litter Regional Action Plan⁴¹ • OSPAR Pilot project on monitoring marine beach litter (2007)⁴² • Data viewer showing average number of litter items⁴³ • Online beach litter database⁴⁴

³⁸ OSPAR (2017). Marine Litter Indicators. Website: <https://www.ospar.org/work-areas/eiha/marine-litter/marine-litter-indicators>

³⁹ OSPAR (2010). Guidelines for monitoring marine litter on the beaches in the OSPAR Maritime Area. Available at: <https://www.ospar.org/ospar-data/10-02e-beachlitter%20guideline-english%20only.pdf>

⁴⁰ OSPAR (2014). Marine Litter Regional Action Plan. Available from: <https://www.ospar.org/documents?v=34422>

⁴¹ OSPAR Marine Litter Regional Action Plan Communication Plan. Available from: https://www.ospar.org/site/assets/files/2019/ml_rap_comms_plan-1.pdf

⁴² OSPAR Commission (2007). OSPAR Pilot project on monitoring marine beach litter. Monitoring of marine litter on beaches in the OSPAR Region. Biodiversity series.

⁴³ IA2017 – Beach Litter – Average Number of Litter Items. Online data viewer: <http://odims.ospar.org/maps/526>

⁴⁴ OSPAR Beach Litter Database: <https://www.mcsuk.org/ospar/>

		<p>such litter. Limitation: natural range of the species.</p> <p>3) Seabed litter: Monitored through International Bottom Trawl Surveys (IBTS) for fisheries management, which have adopted a protocol to monitor 39 commonly found litter items under 6 categories (plastic, metal, rubber, glass/ceramics, natural products/clothes, miscellaneous).</p>	
<p>Helsinki Convention (HELCOM) Baltic Sea</p>	<p>HELCOM indicators for marine litter⁴⁵:</p> <ol style="list-style-type: none"> 1) Indicator on beach litter 2) Status of implementation of the HELCOM Regional Action Plan on Marine Litter <p>Indicators under development:</p> <ul style="list-style-type: none"> • Litter on the seafloor • Micro litter in the water column 	<p>Monitoring methods for macrolitter⁴⁶:</p> <ol style="list-style-type: none"> 1) Seafloor litter (quantity and type of litter items): Bottom trawl surveys used for fish; IBTS/BITS programmes (IBTS/BITS protocol⁴⁷; 2 or 4 (seasonal) surveys per year) 2) Beach litter (quantity and type of litter items): <ul style="list-style-type: none"> EE: Litter items > 2,5 cm (in the longest dimension), 100-1000 m sampling units/assessment areas; 3 surveys per year (following: <i>UNEP/IOC (2009). Operational Guidelines for Comprehensive Beach Litter Assessment</i>). DE: OSPAR beach litter monitoring, 100 m long, x m wide; 4 surveys per year (following: <i>OSPAR Commission (2010). Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area</i>). LT: Sieving 5 cm of surface sand of 50cmx50cm quadrat with 2 mm sieve; seasonal. PL: coastline is divided into 10 areas of 50 km length; each area is further divided into segments of 5 km length; in each of the segments (as far as possible) monitoring of litter [washed ashore and left] will be conducted yearly. Litter will be counted, classified and characterized in terms of composition. Monitoring to take place in close cooperation with local administrations non-governmental organizations. 3) Litter in the water column and floating litter (quantity and type of 	<p>The HELCOM indicators for marine litter were identified to be in line with the SDG 14.1 target. Marine litter monitoring efforts in the HELCOM region aim to align with implementation of the EU Marine Strategy Framework Directive⁴⁹. Currently no coordinated monitoring of marine litter exists in the region. National monitoring programmes address macroscopic litter on beaches, water surface, seafloor and in biota, and microlitter in surface water and sediments.</p> <ul style="list-style-type: none"> • Measuring Progress for the same Targets in the Baltic Sea (2017) • Marine litter action plan (2015)⁵⁰ • HELCOM Monitoring and Assessment Strategy (2013)⁵¹

⁴⁵ HELCOM (2017). Measuring Progress for the same Targets in the Baltic Sea. Available at: <http://www.helcom.fi/Lists/Publications/BSEP150.pdf>

⁴⁶ HELCOM (2017). Sub-Programme: Macrolitter Characteristics and Abundance/Volume. Website: <http://www.helcom.fi/action-areas/monitoring-and-assessment/monitoring-manual/litter/macrolitter-characteristics-and-abundance-volume>

⁴⁷ ICES/CIEM. Dattras: Survey descriptions: Trawl Survey Details. Website: <http://datras.ices.dk/Home/Descriptions.aspx#IBTS>

⁴⁹ HELCOM (2017). Monitoring Manual. Online: <http://www.helcom.fi/action-areas/monitoring-and-assessment/monitoring-manual/introduction#Litter>

⁵⁰ HELCOM (2015). Marine litter action plan. Available at: <http://www.helcom.fi/action-areas/marine-litter-and-noise/marine-litter/marine-litter-action-plan>

⁵¹ HELCOM (2013). HELCOM Monitoring and Assessment Strategy. Available at: <http://www.helcom.fi/Documents/Action%20areas/Monitoring%20and%20assessment/Monitoring%20and%20assessment%20strategy/Monitoring%20and%20assessment%20strategy.pdf>

		<p>litter items):</p> <ul style="list-style-type: none"> Monitoring to be carried out on monitoring cruises devoted to other parameters (hydrochemistry and biology); yearly. Methodology: visual ship-based observations of floating litter at monitoring stations and at transects, and categorization of material and size. Litter monitoring will be integrated with fish monitoring (trawling for fish stock assessments). Also the results of projects focusing on marine litter on seafloor, coordinated by non-governmental organizations (eg. WWF Poland) will be used. Every 2 years. <p>Monitoring methods for microlitter⁴⁸:</p> <ol style="list-style-type: none"> 1) Microlitter on water surface: Manta trawl survey (25 stations, yearly) 2) Microlitter in water and sediments (amount and composition): Sampling in the water column with plankton nets and bottom sediments sampling with Nemisto corer or van Veen grab (6 stations, yearly) 3) Microlitter in sand: Sieving 5cm of surface sand of 50cmx50cm quadrat with 2mm sieve (seasonally) 	
Barcelona Convention (UNEP/MAP) Mediterranean	<p>Common Indicators under Ecological Objective 10 (EQ10) Marine Litter:</p> <p>Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastlines.</p> <p>Common Indicator 23: Trends in the amount of litter in the water column including microplastics and on the seafloor.</p> <p>Candidate indicator 24: Trends in the amount of litter ingested by or entangling marine organisms focusing on selected</p>	<p>Common Indicator 22 Beach litter: Counts of litter items minimum lower limit 0.5 cm in the longest dimension on at least 1 section of coastline of 100m on lightly to moderately littered beaches (optimum 2 sections) and 2 sections of 100m on heavily littered beaches (exceptionally 50m section with a normalization factor of up to 100m to ensure coherence); at least 2 surveys per year in spring and autumn (ideally 4 surveys per year in spring, summer, autumn and winter).</p> <p>Common Indicator 23 Litter in the water column and on the seafloor:</p> <ol style="list-style-type: none"> 1) Litter in the water column: Items of floating litter, 2.5 to 50cm, per km²: For floating litter visual ship-based monitoring of floating litter 2.5cm to 50cm as items/km²; 2) Litter on the seafloor shallow coastal waters (0-20m): visually surveyed litter items size above 2.5cm: For litter on the seafloor 	<p>The Common Indicators for EQ10 are in line with 'Descriptor 10' indicators of the EU Marine Strategy Framework Directive (see below). Currently no coordinated monitoring of marine litter exists in the region.</p> <ul style="list-style-type: none"> Integrated Monitoring and Assessment Guidance (2016)⁵² (from p. 93) Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (2017)⁵³ (builds on UNEP/IOC (2009) <i>Guidelines on Survey and Monitoring of Marine Litter</i> and JRC (2013) <i>Guidance on Monitoring of Marine Litter in European Seas</i>)

⁴⁸ HELCOM (2017). Sub-Programme: Microlitter Particle Abundance and Characteristics. Website: <http://www.helcom.fi/action-areas/monitoring-and-assessment/monitoring-manual/litter/litter-microparticle-abundance-volume#Requirements>

⁵² UNEP/MAP (2016). Integrated Monitoring and Assessment Guidance. Available at: http://www.rac-spa.org/sites/default/files/ecap/ig22_inf7.pdf (from page 93)

⁵³ UNEP/MAP (2017). Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria. UN Environment/MAP Athens, Greece. Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/17012/imap_2017_eng.pdf?sequence=5&isAllowed=y (pages 21-23)

	mammals, marine birds, and marine turtles.	shallow coastal waters (0-20m): minimum annual, maximum quarterly underwater visual surveys with SCUBA/snorkelling based on line transect surveys in use for evaluation of benthic fauna; 3) Litter on the seafloor 20-800m: items/ha or items/km2 of litter collected in bottom trawl surveys: For seafloor 20-800m collection of litter data through on-going and continuous bottom trawl fish stock survey programmes (such as MEDITS). Common Indicator 24 Ingested litter: Quantities of ingested litter (minimum size 1mm) by mass (weight in grams) in the stomach contents of stranded Loggerhead sea turtles (<i>Caretta caretta</i>): Continuous sampling of dead sea turtles collected from beaches or at sea from accidental mortalities such as victims of long-line fishing (by-catch) or of boat collisions.	<ul style="list-style-type: none"> Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Land Based Sources Protocol⁵⁴
Bucharest Convention Black Sea	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea (2009) ⁵⁵ : Ecological Quality Objective 2b <i>Conserve coastal and marine habitats and landscapes</i> ; Policy 19: Develop regional and national marine litter monitoring and assessment methodologies on the basis of common research approaches, evaluation criteria and reporting requirements
Nairobi Convention Eastern African/ Western Indian Ocean Region	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	A Regional Overview and Assessment of Marine Litter Related Activities in the West Indian Ocean Region (2007) ⁵⁶ found that “ <i>monitoring of marine based and land based sources of litter is inadequate at present</i> ” (p. 29).

⁵⁴ UNEP(DEPI)/MED. Decision IG.21/7. Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Land Based Sources Protocol. Available at: <https://wedocs.unep.org/rest/bitstreams/8222/retrieve>

⁵⁵ Black Sea Convention (2009). Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea. Online: <http://www.blacksea-commission.org/bssap2009.asp#Toc22222324>

⁵⁶ Lane, SB et al. (2007). Regional Overview and Assessment of Marine Litter Related Activities in the West Indian Ocean Region. Report to the United Nations Environment Programme. Available at: http://www.unep.org/nairobiconvention/sites/unep.org.nairobiconvention/files/regional_assessment_of_marine_litter_wio_region_0.pdf

			Regional State of the Coast Report: Western Indian Ocean (2015) ⁵⁷ : marine litter is not considered to be a major issue in the region.
Abidjan Convention West, Central and Southern Africa	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	12 th Conference of the Contracting Parties, March 2017, Draft decisions ⁵⁸ : Intention to monitor marine litter across the region.
East Asian Seas Action Plan (COBSEA, PEMSEA) East Asian Seas	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found (<i>likely to follow UNEP/IOC methodology</i>)	COBSEA Regional Action Plan on Marine Litter (RAP-MALI) (2008) ⁵⁹ : Action 6 Monitoring and assessment: “COBSEA will seek to work closely with UNEP and the IOC, which are jointly developing global standards for marine litter surveys and monitoring.” Clean Up East Asian Seas Campaign 2008: COBSEA member countries are being encouraged to register their local cleanup activities to the campaign and to report their data
Northwest Pacific Action Plan (NOWPAP) Northwest Pacific	Ecological Quality Objective (EcoQO) 5 ⁶⁰ : Marine litter does not adversely affect coastal and marine environments Indicator for marine plastic litter (EcoQO5) to be developed	Monitoring methodology for (macro) marine litter on beaches and shorelines: Collection and categorization of marine litter to identify type, amount and source; Annual monitoring surveys, in conjunction with existing monitoring surveys and cleanup events; Selection of suitable survey sites (NOT within 1km or river mouths, harbours, ports and swimming beaches; NOT rocky beaches and breakwaters); • Record name, size and position of the survey site; • Collect litter and record it onto a form; • Sort litter into categories and weigh by category. (see e.g. Results of monitoring surveys in 2007-2008 ⁶¹ : 10 x 10m grids were set up on the surveyed beaches and all beached marine litters	NOWPAP EcoQO 5 is in line with SDG14.2. EcoQO5 is addressed by Medium-Term Strategy (2018-2023) Priority Area 3: Prevent and reduce land-and sea-based pollution. MTS 2018-2023 <i>Outcomes/ Expected Accomplishments</i> for this priority area include: 3.3. NOWPAP member states effectively deal with marine litter, including microplastics, through the effective implementation of the NOWPAP Regional Action Plan on Marine Litter (RAP MALI). • Guidelines for Monitoring Marine Litter on the

⁵⁷ UNEP-Nairobi Convention and WIOMSA (2015). The Regional State of the Coast Report: WEstern Indian Ocean: UNEP and WIOMSA, Nairobi, Kenya. Available at:

http://www.unep.org/nairobiconvention/sites/unep.org.nairobiconvention/files/rsocr_printedition.compressed.pdf

⁵⁸ UN Environment/ABS-WACAF/COP.12/6. Draft Decisions. Availalbe at: <http://cop12.abidjanconvention.org/images/Fichiers/Working%20Documents/ABC%20-%20WACAF%20-%20COP12%20-%206%20Eng%2025%20March.pdf>

⁵⁹ UNEP (2008). Marine Litter in the East Asian Region. COBSEA Secretariat, United Nations Environment Programme. Available at:

http://www.cobsea.org/documents/Meeting_Documents/Marine%20Litter/Marine%20Litter%20Report%202008.pdf

⁶⁰ Draft NOWPAP Medium-term Strategy (MTS) 2018-2023

⁶¹ NOWPAP CEARAC. Monitoring survey results 2007-2008. Online: http://www.cearac-project.org/RAP_MALI/Current_Situation_of_Marine_Litter/The_results_of_the_monitoring_surveys_in_2007.htm

		<p>within the grids were collected and sorted into 8 different litter categories (e.g. plastic, glass, etc.). The number and weight of marine litter in each category were then counted and measured.)</p> <p>In addition, International Coastal Cleanup (ICC) data cards⁶² produced by Ocean Conservancy are being used by all four member states (China, Japan, Korea and Russia).</p>	<p>Beaches and Shorelines of the Northwest Pacific Region (2007)⁶³</p> <ul style="list-style-type: none"> Regional Action Plan on Marine Litter, one aim of which is to monitor the quantities and distribution of marine litter (year?) Overview of Marine Litter activities in NOWPAP: http://cearac.nowpap.org/marinelitter/index.html
Noumea Convention/ Pacific Regional Environment Programme (SPREP) Pacific	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	
South Asian Seas Action Plan South Asian Seas	No indicator for marine plastic litter found	<p><i>Likely to follow UNEP/IOC methodology</i></p> <p>Methodologies currently followed in some of the countries:</p> <p>1) Coastline surveys:</p> <ul style="list-style-type: none"> The coastline of each country to be divided into a number of zones based on available information on the logistics, the prevailing wind conditions, tidal amplitude, currents, and types of marine debris found. In each zone, a number of sites covering 500-metre each should be surveyed every month. The potential sites to be selected based on specific criteria advocated by other marine debris monitoring studies elsewhere and by a geographically stratified random selection process. For assessing more accurately the floating debris, Remote Sensing data and for sea-bed data, side scan sonar and other acoustic/underwater instruments, need to be used. A minimum of 30 indicator items should be surveyed every month, on the same day at all the sites within a zone. This approach would facilitate zonal as well as national comparisons. 	<p>Marine litter in the South Asian Seas Region (2007)⁶⁴: “A <i>National Marine Litter Monitoring Programme</i>, to support an expanded understanding of the problem in each of the five countries of the SAS Region, needs to be initiated.” (p. 70)</p> <p>Methodologies for this are likely to follow UNEP/IOC (2009) <i>Guidelines on Survey and Monitoring of Marine Litter</i></p>

⁶² Ocean Conservancy. International Coastal Cleanup Data Card. Available at: http://act.oceanconservancy.org/site/DocServer/ICC_Eng_DataCardFINAL.pdf?docID=4221 ; Ocean Conservancy International Coastal Cleanup website: <https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/>

⁶³ NOWPAP CEARAC (2007). Guidelines for Monitoring Marine Litter on the Beaches and Shorelines of the Northwest Pacific Region. Available at: http://www.cearac-project.org/RAP_MALI/monitoring%20guidelines.pdf

⁶⁴ South Asia Co-operative Environment Programme (2007). Marine Litter in the South Asian Seas Region. Available at: http://apps.unep.org/redirect.php?file=/publications/pmtdocuments/-/Marine%20Litter%20in%20the%20South%20Asian%20Seas%20Region-2007Marine_Litter_in_the_SAS_Region.pdf

		<ul style="list-style-type: none"> • The programme should adhere to all scientific protocol, and quality assurance procedures to ensure quality at all levels. • The change in the frequency of indicator items, its percentage of change, etc., over a long period of 3 to 5 years should be assessed and the data collected should be statistically analysed. • Monitoring to be conducted by trained and certified personnel, who could be guided and checked by a survey coordinator/leader, who in turn is to be supervised by a Project Team. <p>2) Remote sensing for floating debris 3) Side scan sonar and other acoustic/underwater instruments for debris on the seabed</p>	
Kuwait Convention and its Protocols ROPME Sea Area	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	
Teheran Convention Caspian Sea	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Marine litter included as substance category in the <i>Protocol for the protection of the Caspian Sea against pollution from land based sources and activities (2012)</i> ⁶⁵
Jeddah Convention (PERSGA) Red Sea and Gulf of Aden	No indicator for marine plastic litter found	Methodology used in Jordan: Beach litter Beach transects where litter is counted, weighed and classified	Marine Litter in the PERSGA Region (2008) ⁶⁶ : “A monitoring programme for coastal and marine litter exists in Jordan. In contrast, the other member countries lack such a programme.” (p. 12) The report includes the Regional Action Plan: Research and Monitoring Objective 5: To monitor litter accumulation in the marine environment of the region; Actions include: 1) develop and adopt a regional monitoring programme; 2) adopt the upcoming monitoring methodologies of UNEP; 3) develop regional standard methods.

⁶⁵ Teheran Convention (2012). Protocol for the protection of the Caspian Sea against pollution from land based sources and activities. Available from: http://www.tehranconvention.org/IMG/pdf/Protocol_on_Pollution_from_Land_Based_Sources_and_Activities.pdf

⁶⁶ PERSGA/UNEP (2008). Marine Litter in the PERSGA Region. PERSGA, Jeddah. Available at: http://www.persga.org/Files/Common/Flipping_Books_Downloads/Marine_Litter_in_the_PERSGA_Region.pdf

Cartagena Convention Wider Caribbean	No indicator for marine plastic litter found	International Coastal Cleanup (ICC) data cards ⁶⁷ produced by the Ocean Conservancy are being used by some countries in the region.	Regional Action Plan on Marine Litter Management for the Wider Caribbean Region (2014) ⁶⁸ : Ocean Conservancy's International Coastal Cleanup is used as monitoring programme but not consistently in all countries, and few data is collected.
Antigua Convention Northeast Pacific	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Yet to enter into force
Lima Convention Permanent Commission of the South Pacific (CPPS) Southeast Pacific	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Does not appear to have a Regional Action Plan on Marine Litter.
Hamilton Declaration Sargasso Sea	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Work Programme Priorities (2016-2018) ⁶⁹ include: "Consider the issue of plastics as an important negative impact on the ecosystem and how Commission can contribute and consider involvement in UN consultative process on marine debris and the global partnership for marine litter" (p.2)
Arctic Council Arctic	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Arctic Marine Strategic Plan 2015-2015 ⁷⁰ : Strategic action 7.1.3 "Improve the understanding of cumulative impacts on marine ecosystems from multiple human activity-induced stressors such as... marine litter..."
Antarctic Treaty (CCAMLR) Southern Ocean	No indicator for marine plastic litter found	Standard data forms and instructions for: 1) Beach survey data collection 2) Marine mammal entanglement 3) Seabird colony debris data collection	Members annually submit information on marine debris from 1) beach surveys, 2) seabird colony debris, and 3) marine mammal entanglement, using standard forms and instructions ⁷¹ for data

⁶⁷ Ocean Conservancy. International Coastal Cleanup Data Card. Available at: http://act.oceanconservancy.org/site/DocServer/ICC_Eng_DataCardFINAL.pdf?docID=4221 ;
<https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/>

⁶⁸ UNEP-CAR/RCU (2014). Regional Action Plan on Marine Litter Management (RAPMaLi) For the Wider Caribbean Region 2014. CEP Technical Report 72. UNEP and Caribbean Environment Programme. Available at: http://www.cep.unep.org/cep-documents/rapmali_web.pdf

⁶⁹ Sargasso Sea Commission (2016). Work Programme Priorities (2016-2018). Available at: http://www.sargassoseacommission.org/storage/documents/MOS_SSC_2016_2_Doc.1_Work_Programme_2016-2018_revised_1.pdf

⁷⁰ Arctic Council (2015). Arctic Marine Strategic Plan 2015-2025. Available at: <https://oarchive.arctic-council.org/handle/11374/413>

⁷¹ CCAMLR Data forms. Available at: <https://www.ccamlr.org/en/data/data-forms>

			collection/submission. <ul style="list-style-type: none"> Marine Debris Database containing data from 13 sites⁷²
Other policies			
UN Environment	Beach litter as a proxy indicator for floating plastic density ⁷³	<ol style="list-style-type: none"> 1) Beach litter surveys; 2) Benthic litter surveys, which include: <ol style="list-style-type: none"> a) Observations made by divers, submersibles or camera tows; b) Collection of litter via benthic trawls; 3) Floating litter surveys, which include: <ol style="list-style-type: none"> a) Observations made from ship or aerial based platforms; b) Collection of litter via surface trawls. 	UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter (2009) ⁷⁴
European Union Marine Strategy Framework Directive (MSFD)	<p>MSFD Descriptor 10 Properties and quantities of marine litter do not cause harm to the coastal and marine environment</p> <p>Descriptor 10 indicators⁷⁵:</p> <p><i>Criteria 10.1 Characteristics of litter in the marine and coastal environment:</i></p> <ul style="list-style-type: none"> Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (EC 10.1.1). Trends in the amount of litter in the water column (including floating at the surface) and deposited on the seafloor, including analysis of its composition, spatial distribution and, 	<ol style="list-style-type: none"> 1) Beach – visual 2) Floating – visual 3) Floating – manta trawl 4) Seafloor IBTS 5) Seafloor video deep sea 6) Seafloor – divers 7) Seafloor – video shallow waters 8) Micro particles – beach samples 9) Biota – ingestion by birds 10) Biota – ingestion by turtles 11) Biota – ingestion by fish 12) Biota – plastic litter in nests and entanglement 13) Biota – entanglement 	<p>European Commission Joint Research Centre (JRC) <i>Guidance on Monitoring of Marine Litter in European Seas (2013)</i>⁷⁶:</p> <p>Protocols are provided for the monitoring of beach litter, floating litter, seafloor litter, litter in biota and microlitter. Further consideration is being given to monitoring strategies in general and associated costs. The guidance document is designed to support EU member states in implementing harmonized monitoring programmes for marine litter.</p>

⁷² CCAMLR. Marine Debris. Website: <https://www.ccamlr.org/en/science/marine-debris>

⁷³ Presentation given by Elisabetta Bonotto on the margin of the Ocean Conference (New York, 2017).

⁷⁴ Cheshire, A.C., Adler, E., et al. (2009). UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter. UNEP Regional Seas Reports and Studies, No. 186; IOC Technical Series No. 83: xii + 120 pp. Available at: <http://staging.unep.org/gpa/Documents/Publications/MarineLitterSurveyandMonitoringGuidelines.pdf>

⁷⁵ European Commission Decision 2010/477/EU on criteria and methodological standards on good environmental status of marine waters. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:232:0014:0024:EN:PDF>

⁷⁶ European Commission. (2013). Guidance on Monitoring of Marine Litter in European Seas. Luxembourg: MSFD Technical Subgroup on Marine Litter. Available at: <https://ec.europa.eu/jrc/sites/jrcsh/files/lb-na-26113-en-n.pdf>

	<p>where possible, source (10.1.2).</p> <ul style="list-style-type: none"> Trends in the amount, distribution and, where possible, composition of microparticles (in particular microplastics) (10.1.3). <p><i>Criteria 10.2 Impacts of litter on marine life:</i></p> <ul style="list-style-type: none"> Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1). 		
European Environmental Agency (EEA)	No indicator for marine plastic litter found	Marine LitterWatch: Citizen science based app that aims to help fill data gaps in beach litter monitoring	Marine Litter Watch data viewer ⁷⁷ : provides a map of beach litter data collection events organised by MLW communities. It also provides overview graphs and tables of both the data collected and community engagement.
Convention on Biological Diversity (CBD)	“Index of Coastal Eutrophication (ICEP) and Floating Plastic debris Density”	No monitoring methodologies for marine plastic litter found	<ul style="list-style-type: none"> Updated list of indicators for the Strategic Plan for Biodiversity 2011-2020⁷⁸ Marine debris: understanding and mitigating the significant adverse impacts on marine and coastal biodiversity (2016)⁷⁹
UNEP Global Partnership on Marine Litter (GPML) ⁸⁰ , under the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)	No indicator for marine plastic litter found	Monitoring methods for: <ol style="list-style-type: none"> Shoreline macroplastics Shoreline microplastics Watercolumn macroplastics Watercolumn microplastics Seabed macropastics Sampling biota Automated systems 	<p>UNEP (2016). Marine Plastic Debris and Microplastics: Global Lessons and Research to Inspire Action and Guide Policy Change⁸¹:</p> <ul style="list-style-type: none"> - Monitoring methods (p.168-170) - Guidance on what makes a good indicator (p.171) - Definition of criteria used in developing indicators for marine litter in European seas (p. 172)

⁷⁷ European Environment Agency. Marine Litter Watch data viewer. Online: https://www.eea.europa.eu/themes/coast_sea/marine-litterwatch/data-and-results/marine-litterwatch-data-viewer-1

⁷⁸ CBD (2016). Indicators for the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets. Available at: <https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-28-en.doc>

⁷⁹ CBD (2016). Marine Debris: Understanding, Preventing and Mitigating the Significant Adverse Impacts on Marine and Coastal Biodiversity. Technical Series No.83. Secretariat of the Convention on Biological Diversity, Montreal, 78 pages. Available at: <https://www.cbd.int/doc/publications/cbd-ts-83-en.pdf>; in particular see sections 3 and 4

⁸⁰ <http://web.unep.org/gpa/what-we-do/global-partnership-marine-litter>

⁸¹ UNEP (2016). Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change. United Nations Environment Programme, Nairobi. Available at: <https://wedocs.unep.org/rest/bitstreams/11700/retrieve>

Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Global assessment of “Sources, fate and effects of microplastics in the marine environment” (2016) ⁸² : Includes a chapter on method development and harmonization.
Global Environment Facility Transboundary Waters Assessment Programme (GEF/TWAP)	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	In Large Marine Ecosystems ⁸³ (LMEs): reliable and consistent observational monitoring data on floating plastics in LMEs are lacking; models simulating the movements of floating pieces of plastic in the ocean can help estimate plastic concentrations. In the Open Oceans ⁸⁴ : general lack of reliable and consistent observational monitoring data on floating plastics, preventing quantitative estimates of abundance in space and time, even when good time-series exist due to data heterogeneity. Data collection is expensive and difficult, compared to shoreline litter. Cites two Programmes that have produced the most comprehensive monitoring datasets on floating plastic debris: NOAA’s Marine Debris Programme (see below), and the Sea Education Association (http://www.sea.edu/plastics/).
Ocean Conservancy	Ocean Trash Index ⁸⁵ : presence of litter items in five ‘activity categories’: 1) Shoreline and recreational 2) Ocean and waterway 3) Smoking related	International Coastal Cleanup (ICC) data cards ⁸⁶	International Coastal Cleanup initiative https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/

⁸² GESAMP (2016). “Sources, fate and effects of microplastics in the marine environment: part two of a global assessment” (Kershaw, P.J., and Rochman, C.M., eds). (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 93, 220 p. <http://unesdoc.unesco.org/images/0024/002475/247517e.pdf>

⁸³ IOC-UNESCO and UNEP (2016). Large Marine Ecosystems: Status and Trends. United Nations Environment Programme (UNEP), Nairobi. Available at: <http://www.geftwap.org/publications/lmes-technical-report/view>, chapter 7.1

⁸⁴ UNESCO IOC and UNEP (2016). The Open Ocean: Status and Trends. United Nations Environment Programme (UNEP), Nairobi. Available at: http://www.geftwap.org/publications/copy_of_TWAPVolume5OpenOcean.pdf/view, chapter 7.2

⁸⁵ Ocean Conservancy (2017). International Coastal Cleanup 2017 Report. Available at: <https://oceanconservancy.org/wp-content/uploads/2017/06/International-Coastal-Cleanup-2017-Report.pdf>

⁸⁶ Ocean Conservancy. International Coastal Cleanup Data Cards. Available at: http://act.oceanconservancy.org/site/DocServer/ICC_Eng_DataCardFINAL.pdf?docID=4221

	4) Dumping 5) Medical or personal hygiene		
National Oceanic and Atmospheric Administration (NOAA)	No indicator for marine plastic litter found	Monitoring methods for: <ul style="list-style-type: none"> • Shoreline • Surface water • At sea visual • Benthic 	Marine Debris Programme (http://marinedebris.noaa.gov/ , for waters around the USA), including: <ul style="list-style-type: none"> • Marine Debris Monitoring and Assessment Project: citizen science initiative • Monitoring toolbox: includes Protocol documents and Field datasheets⁸⁷ • “<i>Marine Debris Shoreline Survey Field Guide</i>”⁸⁸ and “<i>Marine Debris Monitoring and Assessment: Recommendations for Monitoring Debris Trends in the Marine Environment</i>”⁸⁹ • Data viewer⁹⁰
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Litterbase ⁹¹ : Online viewer showing litter quantities taken from 600+ publications. Most commonly used units are items/km ² , items/km and items/m ³ .
Plastic Adrift	No indicator for marine plastic litter found	No monitoring methodologies for marine plastic litter found	Plastic Adrift ⁹² : Online interface that visually show where marine plastic ends up and when (up to 10 years after release), based on ocean circulation models.

⁸⁷ NOAA. Marine Debris Program. MDMAP Protocol Documents and Field Datasheets. Available at: <https://marinedebris.noaa.gov/mdmap-protocol-documents-and-field-datasheets>

⁸⁸ Opfer, S, Arthur, C, and Lippiatt, S (2012). NOAA Marine Debris Shoreline Survey Field Guide. NOAA Marine Debris Program. Available at: <https://marinedebris.noaa.gov/sites/default/files/ShorelineFieldGuide2012.pdf> (Opfer et al, 2012)

⁸⁹ Lippiatt, S, Opfer, S, and Arthur, C (2013). Marine Debris Monitoring and Assessment. NOAA Technical Memorandum NOS-OR&R-46. Available at: <https://marinedebris.noaa.gov/sites/default/files/Lippiatt%20et%20al%202013.pdf>

⁹⁰ NOAA Marine Debris Monitoring and Assessment Project. MDMAP Database User Guide. Available at: <https://marinedebris.noaa.gov/mdmap-database-user-guide>

⁹¹ Litterbase. Online: <http://litterbase.awi.de/litter>

⁹² Plastic Adrift. Online: <http://plasticadrift.org/>

Indicator 14.2.1: Proportion of national exclusive economic zones managed using ecosystem-based approaches

Summary of existing indicators and methodologies for monitoring and assessing the implementation of ecosystem-based approaches used by Regional Seas Programmes and other key intergovernmental, international or regional bodies

Agency/Organisation/Convention	Indicators for implementation of ecosystem-based approaches	Comments/Explanations
Regional Seas Programmes		
OSPAR Commission, Oslo-Paris Convention North East Atlantic	Implementation of the ecosystem approach is monitored and assessed using ecological indicators* that are in line with MSDF Descriptors of good environmental status	<p>*The Intermediate Assessment 2017 encompassed 21 indicators to assess human pressures and resulting impacts in the OSPAR Maritime Area. https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/introduction/what-assessed/</p> <p>OSPAR is committed to implementing the ecosystem approach⁹³ and regards marine spatial planning as a tool for delivering ecosystem based management⁹⁴.</p> <p>The North-East Atlantic Environment Strategy 2010-2020⁹⁵ states that “[the] OSPAR Commission will implement the Ecosystem Approach through a continuous cycle of steps of (i) setting and coordinating ecological objectives and associated targets and indicators, (ii) ongoing management, and (iii) regular update of ecosystem knowledge, research and advice.” (p. 5). The Strategy sets out strategic objectives to deliver ecosystem based management that are closely related to the good environmental status objectives of the EU Marine Strategy Framework Directive.</p> <p>The Strategy also includes strategic directions that the OSPAR Commission will take to support the implementation of the ecosystem approach. These include the development and application of regionally coordinated tools for the implementation of integrated management of human activities and ecosystems, such as marine spatial planning or ICZM.</p>

⁹³ Ministerial Declaration of the Fifth International Conference on the Protection of the North Sea (Bergen Declaration) 2002 in Bergen (Norway). Available at: https://www.ospar.org/site/assets/files/1232/jmm_annex05_ecosystem_approach_statement.pdf ; Statement towards an Ecosystem Approach to the Management of Human Activities, adopted at the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions in 2003, Bremen (Germany). Available at: https://www.ospar.org/site/assets/files/1239/5nsc-2002_bergen_declaration_english.pdf

⁹⁴ Ministerial Meeting of the OSPAR Commission (Bergen Statement) in 2010, Bergen (Norway). Available at: https://www.ospar.org/site/assets/files/1498/ospar_2010_bergen_statement.pdf

⁹⁵ OSPAR Commission (2010). The North-East Atlantic Environment Strategy. Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010–2020. OSPAR Agreement 2010-3. Available at: https://www.ospar.org/site/assets/files/1200/ospar_strategy.pdf

Helsinki Convention (HELCOM) Baltic Sea	Implementation of the ecosystem approach is monitored and assessed using the HELCOM indicator for maritime spatial planning: 'Number of countries having maritime spatial plans coherent across borders and applying the ecosystem approach'	<p>HELCOM is committed to implementing the ecosystem approach⁹⁶ and regards marine spatial planning as a tool for delivering ecosystem based management⁹⁷. The ecosystem approach is one of the Baltic Sea Broad-scale Maritime Spatial Planning Principles⁹⁸ that were adopted by HELCOM in 2010.</p> <p>The HELCOM indicator for maritime spatial planning was identified to be in line with the SDG 14.2 target⁹⁹. Other HELCOM indicators with relevance for SDG 14.2 are:</p> <ul style="list-style-type: none"> • Proportion of sea areas in a good environmental status (based on the integrated assessment of status of open sea and coastal areas with regard to eutrophication, hazardous substances and biodiversity, utilizing HELCOM quantitative core indicators) • Status of biodiversity (assessed using e.g. key coastal fish species and waterbirds in the breeding and wintering season, seal abundance and distribution) • Number of threatened species, habitats and biotopes in the Baltic Sea as baseline, the evaluation will be based on the outcome of the next HELCOM Red list assessments • Indicator on harbour porpoise distribution and abundance is under development • Status of implementation of individual commitments in the HELCOM Baltic Sea Action Plan (HELCOM Explorer) • Underwater noise: Indicators on anthropogenic continuous and impulsive sounds are under development
Barcelona Convention (UNEP/MAP) Mediterranean	Implementation of the ecosystem approach is monitored and assessed using UN Environment/MAP Common Indicators (ecological indicators)*	<p>Mediterranean Strategy for Sustainable Development 2016-2025: Strategic direction 1 'Ensuring sustainable development in marine and coastal areas'</p> <ul style="list-style-type: none"> - Action 1.1.2: Implement the Ecosystem Approach Roadmap to achieve healthy marine ecosystems and conserve marine biodiversity - Indicator: UNEP/MAP ecosystem approach indicators (p. 28)¹⁰⁰ <p>*The Common Indicators are described in the UN Environment/MAP Integrated Monitoring and Assessment Programme¹⁰¹. The list includes 23 established and four candidate indicators.</p>

⁹⁶ Statement towards an Ecosystem Approach to the Management of Human Activities, adopted at the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions in 2003, Bremen (Germany). Available at: https://www.ospar.org/site/assets/files/1239/5nsc-2002_bergen_declaration_english.pdf

⁹⁷ HELCOM/VASAB, OSPAR and ICES. 2012. Report of the Joint HELCOM/VASAB, OSPAR and ICES Workshop on Multi-Disciplinary Case Studies of MSP (WKMCMSP), 2-4 November 2011, Lisbon, Portugal. Administrator. 41 pp. Available at: <https://www.ospar.org/about/publications?q=maritime+spatial+planning&a=&y=&s=>

⁹⁸ HELCOM-VASAB (2010). Baltic Sea Broad-scale Maritime Spatial (MSP) Planning Principles. Adopted by HELCOM HOD 34-2010 and the 54th Meeting of VASAB CSPD/BSR. Available at: <http://www.helcom.fi/Documents/HELCOM%20at%20work/Groups/MSP/HELCOM-VASAB%20MSP%20Principles.pdf> ; also available at: <http://www.helcom.fi/action-areas/maritime-spatial-planning/msp-principles/>

⁹⁹ HELCOM (2017). HELCOM and Sustainable Development Goals. Measuring progress for the same targets in the Baltic Sea. Available at: <http://www.helcom.fi/Lists/Publications/BSEP150.pdf>

¹⁰⁰ UNEP/MAP (2016). Mediterranean Strategy for Sustainable Development 2016-2025. Valbonne. Plan Bleu, Regional Activity Centre. Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/17012/imap_2017_eng.pdf?sequence=5&isAllowed=y

¹⁰¹ UN Environment/MAP (2017). Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria. Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/17012/imap_2017_eng.pdf?sequence=5&isAllowed=y

		<p>UNEP/MAP adopted the ecosystem approach as guiding principle for the MAP Programme of Work and all policy implementation and development under the UNEP/MAP Barcelona Convention. http://www.unep.org/uneppmap/who-we-are/ecosystem-approach</p> <p>The Action Plan for the Implementation of the ICZM Protocol for the Mediterranean¹⁰² recognises ICZM as a key tool to deliver the ecosystem approach in coastal areas.</p>
Bucharest Convention Black Sea	No indicator for the implementation of ecosystem-based approaches found	
Nairobi Convention Eastern African/Western Indian Ocean Region	Target for ecosystem approach to fisheries and other resource extraction but no related indicator for the implementation of the ecosystem approach	<p>Strategic Action Plan¹⁰³: Management Target 3 ‘Critical habitat management strategies in place in all countries and contributing to ecologically sustainable ecosystem services and regional protection’ (p. 34)</p> <ul style="list-style-type: none"> - medium-term target ‘ecosystem approach to fisheries and other resource extraction implemented’ (p. 35); - associated strategic action: ‘develop and introduce ecosystem approaches to fishing and other extractive-use activities associated with critical habitats’ (p. 37) <p>Strategic Action Plan Annex 5: Result-based indicator framework 5a.A ‘Critical coastal habitats protected, restored and managed for sustainable use’; indicators include: ‘ICZM policies, plans and/or legislation in place in all countries’ (p. 95) Related target: ICZM legislation in place</p> <ul style="list-style-type: none"> - Baseline: ICZM fully implemented in South Africa; ICZM policy development and strategic planning ongoing in Comoros, Kenya, Madagascar, Mauritius and Tanzania - Short-term results (2015): ICZM status in region assessed; Technical support to develop and/or update ICZM legislation in selected countries provided; ICZM Protocol for the Nairobi Convention developed and adopted - Medium-term results (2025): Government development and enactment of ICZM policy and legislation in at least 5 countries; ICZM Protocol for the Nairobi Convention ratified by all countries - Long-term outcomes (2035): Coastal zones are sustainably managed in line with environmental and socio-economic objectives; All countries have ICZM legally in place - Risks and assumptions: Capacity to implement ICZM; Political will to implement ICZM; Adequate cooperation between Government institutions and other national stakeholders

¹⁰² UNEP/MAP (2011). Action Plan for the Implementation of the ICZM Protocol for the Mediterranean. Draft 2011, PAP/NFP/2011/2. Available at: http://www.pap-thecoastcentre.org/razno/action_plan_iczm_protocol_29_april_11_final.pdf

¹⁰³ UNEP/Nairobi Convention Secretariat, 2009. Strategic Action Programme for the Protection of the Coastal and Marine Environment of the Western Indian Ocean from Land-based Sources and Activities, Nairobi, Kenya, 140 pp. Available at: http://www.unep.org/nairobiconvention/sites/unep.org.nairobiconvention/files/strategic_action_programme_wio_region1.pdf

Abidjan Convention West, Central and Southern Africa	No indicator for the implementation of ecosystem-based approaches found	
East Asian Seas Action Plan (COBSEA, PEMSEA) East Asian Seas	No indicator for the implementation of ecosystem-based approaches found	
Northwest Pacific Action Plan (NOWPAP) Northwest Pacific	<p>MTS 2018-2023 Objective for priority area “Support integrated coastal and river basin planning and management” is <i>NOWPAP countries increasingly apply ecosystem-based approach to planning and management as a basis to achieve healthy and productive coastal and marine ecosystems.</i></p> <p>MTS 2018-2023 <i>Outcomes/ Expected Accomplishments</i> for this priority area are as follows:</p> <ul style="list-style-type: none"> - 1.1. NOWPAP member states are developing and applying ecosystem-based management policies, tools and practices to support sustainable development of coastal zones and the marine environment; - 1.2. Planning and decision-making processes for ICZM and MSP by NOWPAP member states recognize interconnectedness between the land and the sea and promote cross-sectoral cooperation; - 1.3. Planning mechanisms, including integrated water resources management, ICZM and MSP in NOWPAP member states contribute to reduced pressures on the coastal and marine environment. 	In line with SDG14.2
Noumea Convention/ Pacific Regional Environment Programme (SPREP) Pacific	No indicator for the implementation of ecosystem-based approaches found	
South Asian Seas Action Plan South Asian Seas	No indicator for the implementation of ecosystem-based approaches found	
Kuwait Convention and its Protocols ROPME Sea Area	No indicator for the implementation of ecosystem-based approaches found	

Teheran Convention Caspian Sea	No indicator for the implementation of ecosystem-based approaches found	
Jeddah Convention (PERSGA) Red Sea and Gulf of Aden	No indicator for the implementation of ecosystem-based approaches found	
Cartagena Convention Wider Caribbean	No indicator for the implementation of ecosystem-based approaches found	
Antigua Convention Northeast Pacific	No indicator for the implementation of ecosystem-based approaches found	
Lima Convention Permanent Commission of the South Pacific (CPPS) Southeast Pacific	No indicator for the implementation of ecosystem-based approaches found	
Hamilton Declaration Sargasso Sea	No indicator for the implementation of ecosystem-based approaches found	
Arctic Marine Strategic Plan Arctic	No indicator for the implementation of ecosystem-based approaches found	
Antarctic Treaty (CCAMLR) Southern Ocean	No indicator for the implementation of ecosystem-based approaches found	
Other		
European Union Marine Strategy Framework Directive (MSFD)	Implementation of the ecosystem approach is monitored and assessed using descriptors of good environmental standard (ecological indicators)*	The Marine Strategy Framework Directive (MSFD) ¹⁰⁴ provides a legal framework for the ecosystem approach in marine and coastal management within the European Union. The main goal of the MSFD is to achieve good environmental status of EU marine waters by 2020. *Annex I of the directive lists 11 Descriptors to measure achievement towards good environmental status. http://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm

¹⁰⁴ European Union (2008). Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Official Journal of the European Union. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0056&from=EN>

Indicator 14.5.1: Coverage of protected areas in relation to marine areas

Summary of existing indicators and methodologies for monitoring and assessing the coverage of marine protected areas used by Regional Seas Programmes and other key intergovernmental, international or regional bodies

Agency/Organisation/ Convention	Indicators for marine protected area coverage	Comments/Explanations
Regional Seas Programmes		
OSPAR Commission, Oslo-Paris Convention North East Atlantic	<p>'Madrid Criteria' for assessing the ecological coherence of the OSPAR MPA network¹⁰⁵:</p> <p>A: OSPAR MPAs are geographically well-distributed, with a maximum distance of up to 250km for nearshore/coastline, 500km for offshore and 1000km for the high seas areas between MPAs – links to OSPAR (2006) network principle of connectivity. (proximity analysis of MPAs)</p> <p>B: OSPAR MPAs, in combination with other relevant spatial measures as deemed appropriate, cover at least 10% in area of all Dinter biogeographic provinces – links to OSPAR (2006) network principle of representativity. (protected area km², total area km², MPA coverage %)</p> <p>C: OSPAR MPAs represent all EUNIS Level 3 habitat classes and OSPAR threatened and/or declining (OSPAR T&D) species and habitats for which MPAs are considered appropriate more than once in all relevant Dinter biogeographic provinces a given feature is present – links to OSPAR (2006) network principles of features and resilience. (protection of OSPAR threatened/declining species and habitats within MPAs; issue: deficient information)</p>	<p>OSPAR Recommendation 2003/3 on a network of marine protected areas (amended by OSPAR Recommendation 2010/2): establish an ecologically coherent, well managed network of MPAs in the North-East Atlantic by 2016.</p> <p>Objectives:</p> <p>a. by 2012 it is ecologically coherent, includes sites representative of all biogeographic regions in the OSPAR Maritime Area, and is consistent with the CBD target for effectively conserved marine and coastal ecological regions;</p> <p>b. by 2016 it is well managed (i.e. coherent management measures have been set up and are being implemented for such MPAs that have been designated up to 2010).¹⁰⁶</p> <p>(see also OSPAR Marine Protected Areas website: https://www.ospar.org/work-areas/bdc/marine-protected-areas)</p> <p>OSPAR principles for assessing the ecological coherence of MPA networks¹⁰⁷</p> <p>Features – MPAs should be designated in areas that best represent the range of habitats, species and ecological processes in the OSPAR Maritime Area. Proportions of features that should be protected by the MPA network may be higher for particularly threatened and/or declining features.</p> <p>Representativity – MPAs should protect examples of the same features across their known biogeographical extent to reflect known sub-types. EUNIS Level 3 habitats are stated as a potentially useful way of characterising the OSPAR Maritime Area for the purposes of including biogeographic variation in the network.</p> <p>Connectivity – In the absence of dispersal data, connectivity may be approximated by ensuring the MPA network is well distributed geographically. Where scientific understanding is further developed, the MPA network should reflect locations where a</p>

¹⁰⁵ OSPAR Commission (2017). 2016 Status Report on the OSPAR Network of Marine Protected Areas. Available from: <https://www.ospar.org/documents?v=37521>

¹⁰⁶ OSPAR Recommendation 2003/3 on a network of marine protected areas (amended by OSPAR Recommendation 2010/2). Available at: www.ospar.org/documents?d=32867

¹⁰⁷ OSPAR (2006). Guidance on developing an ecologically coherent network of OSPAR marine protected areas. Reference number 2006-3. Available at: http://jncc.defra.gov.uk/pdf/06-03e_Guidance%20ecol%20coherence%20MPA%20network.pdf

		<p>specific path between identified places is known (e.g. critical areas of a life cycle for a given species).</p> <p>Resilience – Replication of features in separate MPAs in each biogeographic area is desirable where possible. The appropriate size of a site should be determined by the purpose of the site and be sufficiently large enough to maintain the integrity of the feature(s) for which it is selected.</p> <p>Management – OSPAR MPAs should be managed to ensure the protection of the features for which they were selected and to support the functioning of an ecologically coherent network.</p> <p>OSPAR MPA Management: 4 questions to assess if MPAs are ‘well managed’: 1) management documented?; 2) measures to achieve conservation objectives being implemented?; 3) monitoring in place to assess if measures are working?; and 4) MPA moving towards/has reached its conservation objectives? (yes/partially/no/unknown/no response) (see OSPAR 2017)</p> <p>OSPAR MPA database¹⁰⁸: spatial and non-spatial data from OSPAR Contracting Parties on OSPAR MPAs to undertake regular assessments of the status of the network</p> <p>OSPAR MPA maps:</p> <ul style="list-style-type: none"> - OSPAR MPAs https://odims.ospar.org/maps/297 - OSPAR Threatened or declining habitats https://odims.ospar.org/maps/298
Helsinki Convention (HELCOM) Baltic Sea	<p>HELCOM indicators in line with SDG target 14.5 and indicator 14.5.1¹⁰⁹:</p> <ul style="list-style-type: none"> • Coverage of protected areas in relation to marine areas, including in individual sub-basins of the Baltic Sea and EEZ • Percentage of HELCOM MPAs having management plans or measures in place 	<p>The Initial Holistic Assessment of the Baltic Sea 2003-2007¹¹⁰ reported number and % of Baltic Sea marine area covered by marine protected areas (including Baltic Sea Protected Areas and EU Natura 2000 sites).</p>
Barcelona Convention (UNEP/MAP) Mediterranean	No indicator on MPA coverage found	

¹⁰⁸ OSPAR MPA database. Online: http://mpa.ospar.org/home_ospar

¹⁰⁹ HELCOM (2017). HELCOM and Sustainable Development Goals. Measuring progress for the same targets in the Baltic Sea. Available at: <http://www.helcom.fi/Lists/Publications/BSEP150.pdf>

¹¹⁰ HELCOM (2010). Ecosystem Health of the Baltic Sea 2003–2007: HELCOM Initial Holistic Assessment. Balt. Sea Environ. Proc. No. 122. Available at: <http://www.helcom.fi/Lists/Publications/BSEP122.pdf>

Bucharest Convention Black Sea	Strategic Action Plan ¹¹¹ : Ecological Quality Objective 2: Conservation of Black Sea biodiversity and habitats EcoQO 2b: Conserve coastal and marine habitats and landscapes Indicators include: Number and total area of marine and coastal PAs increased	Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea
Nairobi Convention Eastern African/ Western Indian Ocean Region	No indicator on MPA coverage found	
Abidjan Convention West, Central and Southern Africa	No indicator on MPA coverage found	
East Asian Seas Action Plan (COBSEA, PEMSEA) East Asian Seas	No indicator on MPA coverage found	
Northwest Pacific Action Plan (NOWPAP) Northwest Pacific	No explicit indicators on marine protected area coverage, but reporting on number and area (km ²) of MPAs in the NOWPAP region MTS 2018-2023: total regional coverage of MPAs 4% of total EEZ area *2014 NOWPAP supported identification of EBSAs in the North Pacific <i>SDG 14.2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant impacts, including by strengthening their resilience, and taking action for their restoration in order to achieve healthy and productive oceans;</i> <i>SDG 14.5: By 2020, conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information;</i> <i>NOWPAP EcoQO 1: Biological and habitat diversity are not changed significantly due to anthropogenic pressure;</i> <i>and</i> <i>NOWPAP EcoQO 2: Alien species are at levels that do not adversely alter the ecosystems.</i>	The 2013 NOWPAP CEARAC Report on Monitoring and management of Marine Protected Areas in the NOWPAP region ¹¹² reports number and area (km ²) of MPAs in the NOWPAP region.

¹¹¹ Bucharest Convention (2009). Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea. Online: <http://www.blacksea-commission.org/bssap2009.asp#Toc222222293>

¹¹² NOWPAP CEARAC (2013). Monitoring and management of Marine Protected Areas in the NOWPAP region. Available at: http://www.cearac-project.org/cearac-project/integrated-report/MPA_2013.pdf

	<p>MTS 2018-2023 Objective for priority area “Conserve marine and coastal biodiversity” is <i>NOWPAP countries are provided with reliable information and analysis of the status of biodiversity and conservation measures and recommendations for action as expressed in a Regional Action Plan for Marine and Coastal Biodiversity Conservation.</i></p> <p>MTS 2018-2023 <i>Outcomes/ Expected Accomplishments</i> for this priority area are as follows:</p> <ul style="list-style-type: none"> - 4.1. NOWPAP member states are provided with information and data, including on the status and major threats to Red List species and invasive alien species and sensitive habitat mapping in the region; - 4.2. NOWPAP member states effectively address marine and coastal biodiversity conservation through planning and application of area-based management tools, including marine protected areas (MPAs) and Ecologically or Biologically Significant Marine Areas (EBSAs); 4.3. NOWPAP member states adopt Regional Action Plan for Marine and Coastal Biodiversity Conservation. 	
Noumea Convention/ Pacific Regional Environment Programme (SPREP) Pacific	No indicator on MPA coverage found	
South Asian Seas Action Plan South Asian Seas	No indicator on MPA coverage found	
Kuwait Convention and its Protocols ROPME Sea Area	No indicator on MPA coverage found	
Teheran Convention Caspian Sea	No indicator on MPA coverage found	
Jeddah Convention (PERSGA) Red Sea and Gulf of Aden	No indicator on MPA coverage found	
Cartagena Convention Wider Caribbean	No indicator on MPA coverage found	
Antigua Convention Northeast Pacific	No indicator on MPA coverage found	

Lima Convention Permanent Commission of the South Pacific (CPPS) Southeast Pacific	<p>Coastal and Marine Indicators of the Southeast Pacific¹¹³:</p> <p>Indicator 1: Marine and Coastal Protected Areas, reported as:</p> <ul style="list-style-type: none"> • Number of marine and coastal protected areas per IUCN category • Total surface of marine and coastal protected areas per IUCN category (km²) • Marine and coastal surface area by country • Marine and coastal protected areas in the Southeast Pacific • Increase in surface area of marine and coastal protected areas by country 2004–2015 (km²) • Percentage of marine and coastal protected areas in relation with the Aichi Target 11 on Biological Diversity 	<p>More information on MPAs: http://cpps.dyndns.info/sibimap/areas.html http://cpps-int.org/cpps-docs/pda/areas/docs/Red.regional.AMCP.PSE.2010.pdf</p>
Hamilton Declaration Sargasso Sea	No indicator on MPA coverage found	
Arctic Marine Strategic Plan Arctic	<p>MPA coverage is reported in the 2017 Protected Areas Indicator Report¹¹⁴ in terms of:</p> <ul style="list-style-type: none"> • Number and area covered (% and km² of Arctic marine area), based on clear definitions of Arctic marine area boundaries (CAFF) and of MPAs; • Trends in marine protected area coverage within the CAFF boundary 1900-2016 (in % of area covered) • Distribution of MPAs across each of the six IUCN Management Categories (in % of area covered) <p>Also reported is number and area covered (% and km²) of other area-based measures of importance for Arctic marine biodiversity, including % within MPAs:</p> <ul style="list-style-type: none"> • Areas of heightened ecological and cultural significance • Ecologically and Biologically Significant Areas (EBSAs – CBD) • Particularly Sensitive Sea Areas (PSSAs – IMO) 	<p>2017 Protected Areas Indicator Report: “It catalogues the extent of protected areas across the Arctic and the trends regarding protected area establishment. It helps track progress towards meeting the objectives of PAME and CAFF and supporting Aichi Biodiversity Targets 1 and 11 adopted in 2010 by Parties to the United Nations Convention on Biological Diversity (CBD). These Targets in turn contribute towards achieving relevant targets within the Sustainable Development Goals (UNEP-WCMC and IUCN 2016).” (CAFF and PAME, 2017, p. 5)</p>
Antarctic Treaty (CCAMLR) Southern Ocean	No indicator on MPA coverage found	

¹¹³ UNESCO (2015). Coastal and Marine Indicators of the Southeast Pacific. Intergovernmental Oceanographic Commission of UNESCO, Marine Policy and Regional Coordination Section, Permanent Commission for the South Pacific. IOC Technical Series 124, ICAM Dossier 9. Available at : <http://unesdoc.unesco.org/images/0024/002430/243002m.pdf>

¹¹⁴ CAFF and PAME (2017). Arctic Protected Areas: Indicator Report, 2017: Conservation of Arctic Flora and Fauna and Protection of the Arctic Marine Environment, Akureyri, Iceland. Available at: https://pame.is/images/03_Projects/MPA/Indicator/Indicator_Report_on_Protected_Areas_.pdf

Other policies		
UN Environment (through UNEP-WCMC, BirdLife International and IUCN)	SDG Indicator 14.5.1: Coverage of protected areas in relation to marine areas	<p>Definition: The indicator ‘Coverage of protected areas in relation to marine areas’ shows temporal trends in the percentage of important sites for marine biodiversity (i.e., those that contribute significantly to the global persistence of biodiversity) that are wholly covered by designated protected areas.</p> <p>This indicator is calculated from data derived from a spatial overlap between digital polygons for protected areas from the World Database on Protected Areas (IUCN & UNEP-WCMC 2017) and digital polygons for marine Key Biodiversity Areas (from the World Database of Key Biodiversity Areas, including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and other Key Biodiversity Areas; available through the Integrated Biodiversity Assessment Tool). The value of the indicator at a given point in time, based on data on the year of protected area establishment recorded in the World Database on Protected Areas, is computed as the mean percentage of each Key Biodiversity Area currently recognised that is covered by protected areas.</p> <p>(UNEP-WCMC/BLI/IUCN Metadata 2017) https://unstats.un.org/sdgs/metadata/files/Metadata-14-05-01.pdf</p>
Transboundary Waters Assessment Programme (TWAP)	<p>Volume 4: Large Marine Ecosystems¹¹⁵</p> <p>Indicator: Change in protected area coverage within large marine ecosystems</p> <ul style="list-style-type: none"> • Number • Total area • Geographic extent • Index of percentage change (1982-2014) in total area covered by MPAs per LME • Cumulative area of MPAs in all LMEs <p>Based on: WDPA (UNEP-WCMC)</p> <p>Also used as indicator: Ocean Health Index</p>	<p>“Based on the percentage change in total area covered by MPAs between 1982 and 2014, LMEs were assigned to five categories (Table 7.12) and mapped in Figure 7.26. LMEs with progressively higher coverage by MPAs were inferred to face progressively lower levels of threats, under the assumption that MPA implementation is effective in reducing threats to marine biodiversity.” (IOC-UNESCO and UNEP, 2016, p. 219)</p> <p><i>There are also various biodiversity indices, plus most vulnerable areas based on number of threatened marine species.</i></p>
Databases/data sets		
European Commission Joint Research Centre	Digital Observatory for Protected Areas ¹¹⁶	<p>The Digital Observatory for Protected Areas (DOPA) is a set of web services and applications that can be used primarily to assess, monitor, report and possibly forecast the state of, and the pressure on, protected areas at multiple scales.</p> <p>It also includes Maps on protection levels for the marine ecoregions of the world.</p>

¹¹⁵ IOC-UNESCO and UNEP (2016). Large Marine Ecosystems: Status and Trends. United Nations Environment Programme, Nairobi, pp 239–249. Available at: <http://www.geftwap.org/publications/lmes-technical-report>

¹¹⁶ European Commission Joint Research Centre. Digital Observatory for Protected Areas. Online: <http://dopa.jrc.ec.europa.eu/en/mapsanddatasets>

UN Environment World Conservation Monitoring Centre	World Database on Protected Areas ¹¹⁷	Guidance on using the WDPA to calculate PA coverage ¹¹⁸ : 1) What is a protected area? 2) What protected areas data is used? 3) Which base map layer is used? 4) Which method should I follow?
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Final draft

¹¹⁷ UNEP-WCMC. World Database on Protected Areas. Online: <https://www.protectedplanet.net/>

¹¹⁸ UNEP-WCMC. Protected Planet. Calculating protected area coverage. Online: <https://www.protectedplanet.net/c/calculating-protected-area-coverage>