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Agenda Item 6: IMAP Pilot Info System and Related Quality Assurance Issues; Data Standards and Data Dictionaries; MAP Data Management Policy

Data Standards and Data Dictionaries for Common Indicators related to Coast and Hydrography

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UNEP/MAP
Athens, 2019

Note by the Secretariat

In the framework of the Programme of Work and Budget for 2018–2019 of UN Environment/MAP (Decision IG.23/14), INFO/RAC is leading the work on the development of the “*Info/MAP platform and platform for the implementation of IMAP fully operative and further developed, connected to MAP components' information systems and other relevant regional knowledge platforms, to facilitate access to knowledge for managers and decision-makers, as well as stakeholders and the general public*” (output 1.5.1).

The EU funded EcAp-MED II Project has contributed to the delivery of this output by developing a Pilot IMAP Compatible Data and Information System (IMAP (Pilot) Info System), that would enable the Contracting Parties to start reporting data as of mid-2019 for selected 11 IMAP Common Indicators (1, 2, 6, 13 ,14, 15, 16,17,21, 22,23). The IMAP (Pilot) Info System lay down the basis for building a fully operational IMAP Info System, by the end of the initial phase of IMAP, as provided for by Decision IG.22/7.

The criteria used for selecting the 11 Common Indicators as part of the IMAP (Pilot) Info System are: a) maturity of Common Indicators as of 2017, in terms of monitoring experiences and best practices; b) existing data collection and availability representing all IMAP clusters; c) availability of Common Indicators Guidance Factsheets and/or metadata templates.

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The preparation process of Data Standards and Data Dictionaries for Common Indicators related to Coast and Hydrography has followed a close consultation process between INFO RAC and SPA RAC. As well as with the Contracting Parties.

The Regional Meeting on IMAP Implementation (Best Practices, Gaps and Common Challenges (IMAP Best Practices Meeting), Rome, Italy, 10-12 July 2018) reviewed the first drafts of Data Standards and Data Dictionaries for the selected IMAP Common Indicators. Following its outcome and the bilateral consultations between INFO/RAC and PAP/RAC, the revised version of DSs and DDs for CI 15 and 16 has been presented to the CorMon Coast and Hydrography (Rome, 21-22 May 2019) for review and feedback.

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I. IMAP (Pilot) Info System, Data standards and Data dictionaries

5. The draft **IMAP (Pilot) Info System** has been developed by INFO/RAC in close consultations with UN Environment/MAP Components. The IMAP (Pilot) Info System will be able to receive and process data according to the proposed Data Standards and Data Dictionaries (DSs and DDs) that set the basic information on data reporting within IMAP.

6. It should be noted that proposed DSs and DDs also build on the respective relevant experience of INFO/RAC, as well as the experience gained in building other relevant databases such as EMODnet Chemistry platform, SeaDataNet and WISE Data Dictionary maintained by EEA and available in EIONET. In such a way the IMAP (Pilot) Info System is interrelated with other regional marine databases (e.g. SeaDataNet, SeaDataCloud, EMODNET, etc.), essential to avoid duplication of data transmissions for the Contracting Parties.

7. **Data Standards (DSs)** are prepared in the form of Excel spreadsheets in which every column indicates a field to be filled by the data providers. **Data Dictionaries (DDs)** are prepared in the form of Excel spreadsheets in which every row provides information to guide the data provider. DSs & DDs are spreadsheets included in the **same Excel file**, downloadable from the IMAP (Pilot) Info System. The data uploaded using the Data Standards will be suitable for the inclusion in the database.

8. The Regional Meeting on IMAP Implementation (**Best Practices, Gaps and Common Challenges (IMAP Best Practices Meeting), Rome, Italy, 10-12 July 2018**) reviewed the first drafts of Data Standards and Data Dictionaries for the selected IMAP Common Indicators. Following its outcome and the bilateral consultations between INFO/RAC and PAP/RAC, the revised version of DSs and DDs for CI 15 and 16 has been presented to the **CorMon Coast and Hydrography (Rome, 21-22 May 2019)** for review and feedback.

9. Starting from the middle of 2019, after the conclusion of the EcAp MED II Project, further modules will be discussed and agreed with the thematic MAP Components for each already selected Common Indicator and for the remaining ones in view of the completion of the IMAP 27 Common Indicator set, according to the available resources specifically allocated.

10. Apart from the 17 remaining Common Indicators, the selected 11 will also go through a process of enlargement and development. INFO/RAC, is currently proposing a series of modules for each Common Indicator covering the main monitoring issues but in the next period they will be integrated with **new modules** that are in discussion or in development.

11. The aim of the current document is to present the “final” version of DSs & DDs relative to the phase I of development of the IMAP (pilot) Info System, available for data collection since the end of June 2019 (Conclusion of EcAp MED II project).

12. Contracting Parties are requested to provide **guidance, inputs and further reflections** on the “final” DSs & DDs for the selected common indicators. On this basis, a continuous process of harmonization with IMAP guidance factsheets and common indicators monitoring protocols will be assured for next future (Phase II) starting from July 2019. Consequently, also the structure of the Data Standards and Data Dictionaries could be revised and harmonized based on the final result of the IMAP developing process.

13. The “final” DSs & DDs have to be intended as first agreed version useful to allow the starting of the pilot phase of the information system. Interactive work will be needed to refine these Data Standards and Data Dictionaries gradually.

14. INFO/RAC recalls that the present document is provided as update of DSs & DDs and considers the inputs received by Contracting Parties during the CorMon meeting organised during the biennial exercise of 2018-2019.

II. Information Standards for the Common Indicator 15

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Location and extend of coastal or offshore infrastructures
Attribute table	Specify the following information in the attribute table associated with the GIS information layer: <ul style="list-style-type: none"> · CPCODE: Two-letter code of Country · ASDES: Description of coastal or offshore infrastructure · EXT: In case the coastal or offshore infrastructure is an extension of a pre-existing one, it is necessary to specify if the polyline corresponds to such extension - Use the following codes: 1=Yes, it is the extension; 0=No, it is part of the pre-existing infrastructure
Variables	Border on the sea side of the coastal or offshore infrastructure
Spatial resolution	5 mt or higher as produced by CAD (Computer Aided Design) software
Vertical coverage	At least 2 levels, one at sea surface and one at the sea bottom
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 6 years
Data format	GIS Layer: polyline or polygons

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Location and extend of hydrographical changes
Attribute table	<p>Specify the following information in the attribute table associated with the GIS information layer:</p> <ul style="list-style-type: none"> · CPCODE: Two-letter code of Country · PAR: Parameter that is significantly and permanently changed due to coastal or offshore infrastructure. Choose one from the following list: <ul style="list-style-type: none"> ○ current velocity ○ temperature ○ salinity ○ sea surface height ○ turbidity ○ wave ○ other · PAR_OTH: In case the PAR field is 'other' specify the hydrographical parameter
Variables	Border on the sea side of the area where the specified hydrographical parameter is significantly and permanently changed due to coastal or offshore infrastructure
Spatial resolution	25 mt or higher as produced by numerical model assimilated and validated with in-situ monitoring data and preferably nested in Copernicus CMEMS products for boundary conditions (0.063degree x 0.063degree)
Vertical coverage	At least 2 levels, one at sea surface and one at the sea bottom
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 6 years
Data format	GIS Layer: polygons

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Current Velocity
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Numerical model assimilated and validated with in-situ monitoring data and preferably nested in Copernicus CMEMS current velocity products for boundary conditions (0.063degree x 0.063degree)
Data assimilation	In-situ monitored data provided by acoustic or mechanical current meter
Variables	Eastward sea water velocity (UV) Northward sea water velocity (UV)
Spatial resolution	25 mt or higher nested in Copernicus CMEMS current velocity grids products (0.063degree x 0.063degree)
Vertical coverage	10 or more levels from surface to sea floor. Copernicus CMEMS current velocity product provide 72 levels
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	Monthly mean
Data format	NetCDF or raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Temperature
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Numerical model assimilated and validated with satellite and in-situ monitoring data and preferably nested in Copernicus CMEMS temperature products for boundary conditions (0.063degree x 0.063degree)
Data assimilation	In-situ monitored data provided by CTD probe and satellite sea surface temperature (SST)
Variables	Sea water potential temperature. Potential temperature is the temperature a parcel of water would have if it were moved adiabatically (i.e. without loss of heat) to a reference pressure. The reference pressure used for the ocean is the ocean surface (water pressure = 0 dbar).
Spatial resolution	25 mt or higher nested in Copernicus CMEMS temperature grids products (0.063degree x 0.063degree)
Vertical coverage	10 or more levels from surface to sea floor. Copernicus CMEMS temperature product provide 72 levels
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	Monthly mean and daily mean
Data format	NetCDF or raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Salinity
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Numerical model assimilated and validated with in-situ monitoring data and preferably nested in Copernicus CMEMS salinity products for boundary conditions (0.063degree x 0.063degree)
Data assimilation	In-situ monitored data provided by CTD probe
Variables	Sea water salinity
Spatial resolution	25 mt or higher nested in Copernicus CMEMS salinity grids products (0.063degree x 0.063degree)
Vertical coverage	10 or more levels from surface to sea floor. Copernicus CMEMS salinity product provide 72 levels
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	Monthly mean and daily mean
Data format	NetCDF or raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Sea Surface Height
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Numerical model assimilated and validated with satellite and in-situ monitoring data and preferably nested in Copernicus CMEMS Sea Surface Height products for boundary conditions (0.063degree x 0.063degree)
Data assimilation	Satellite and In-situ monitored data provided by tide gauge observations
Variables	Sea surface height above sea level
Spatial resolution	25 mt or higher nested in Copernicus CMEMS Sea Surface Height grids products (0.063degree x 0.063degree)
Vertical coverage	1 level
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	Monthly mean and daily mean
Data format	NetCDF or raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Turbidity
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Satellite or in-situ observations
Data assimilation	
Variables	Satellite: <ul style="list-style-type: none"> · Surface ratio of upwelling radiance emerging from sea water to downwelling radiative flux in air (RRS) · Volume attenuation coefficient of downwelling radiative flux in sea water (KD) · Volume absorption coefficient of radiative flux in sea water due to dissolved organic matter and non algal particles (CDM) · Volume absorption coefficient of radiative flux in sea water due to phytoplankton (APHY) · Volume backwards scattering coefficient of radiative flux in sea water due to particles (BBP) In-situ observations: <ul style="list-style-type: none"> · Turbidity sensor probe · Secchi disk
Spatial resolution	25 mt or higher
Vertical coverage	Satellite: 1 level; In-situ observations turbidity sensor probe: 3 or more levels, at least one on the sea floor, one on sea subsurface (1mt depth) and one in the middle
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	Satellite: Daily mean; In-situ observations: at least monthly
Data format	NetCDF or raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Bathymetry
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Digital Terrain Model from in-situ observations by multibeam
Data assimilation	
Variables	Digital Terrain Model elaborated from multibeam survey
Spatial resolution	25 mt or higher resolution
Vertical coverage	1 level
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 5 years or more
Temporal resolution	
Data format	raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Wave
Geographical coverage	Specify the geographical bounding box that includes the sea area that is covered by the data representation. Such area should be large enough to capture permanent and significant hydrographical changes due to coastal or offshore infrastructures. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	Numerical model assimilated and validated with in-situ monitoring data and preferably nested in Copernicus CMEMS wave products for boundary conditions (0.042degree x 0.042degree)
Data assimilation	In-situ monitored data provided by accelerometer mounted on buoy
Variables	Sea surface wave significant height (SWH) Sea surface wave mean period from variance spectral density inverse frequency moment (MWP) Sea surface wave mean period from variance spectral density second frequency moment (MWP) Sea surface wave from direction (VMDR) Sea surface wave stokes drift x velocity (VSDXY) Sea surface wave stokes drift y velocity (VSDXY) Sea surface wind wave significant height (WW) Sea surface wind wave mean period (WW) Sea surface wind wave from direction (WW) Sea surface primary swell wave significant height (SW1) Sea surface primary swell wave mean period (SW1) Sea surface primary swell wave from direction (SW1) Sea surface secondary swell wave significant height (SW2) Sea surface secondary swell wave mean period (SW2) Sea surface secondary swell wave from direction (SW2) Sea surface wave period at variance spectral density maximum () Sea surface wave from direction at variance spectral density maximum ()
Spatial resolution	25 mt or higher nested in Copernicus CMEMS wave grids products (0.042degree x 0.042degree)
Vertical coverage	1 level
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	hourly-instantaneous
Data format	NetCDF or raster grid

Content	Description
Ecological Objective	EO7. Alteration of hydrographical conditions
IMAP Common Indicator	CI15. Location and extent of the habitats impacted directly by hydrographic alterations
Parameter	Benthic habitat
Geographical coverage	Specify the geographical bounding box that is covered by the data representation. The bounding box shall be expressed with westbound and eastbound longitudes, and southbound and northbound latitudes in decimal degrees, with a precision of at least two decimals in WGS 84 or ETRS 89 geographical reference systems. The four data to provide are: <ul style="list-style-type: none"> · North Bound Latitude · East Bound Longitude · South Bound Latitude · West Bound Longitude
Observations/ Models	In-situ monitoring observations
Data assimilation	
Variables	Type of habitat according to the ‘Reference List of Marine and Coastal Habitat Types in the Mediterranean’ – Annex I of the CI15 Guidance Fact Sheet. Use the highest level of identification, for example ‘MA1.531 Association with encrusting Corallinales creating belts (e.g. Lithophyllum bissoides, Neogoniolithon spp.)’ for Littoral rock/Upper mediolittoral rock.
Spatial resolution	100 mt or higher for separation length between in-situ monitoring sampling station
Vertical coverage	1 level
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	5 years or more
Temporal resolution	Every 3 years
Data format	GIS polygon with attribute table with the following fields beyond unique identifier of the GIS polygon: <ul style="list-style-type: none"> · MHT-MED – code of habitat type as reported in Annex I of the CI15 Guidance Fact Sheet. For example, ‘MA1.531’. If not present in the list use the code ‘9999’ · DESC – Description of the habitat as reported in Annex I of the CI15 Guidance Fact Sheet. For example, ‘Association with encrusting Corallinales creating belts (e.g. Lithophyllum bissoides, Neogoniolithon spp.)’ · DESC_OTH – Description of the habitat if not present in Annex I of the CI15 Guidance Fact Sheet.

III. Information standards for the Common Indicator 16

GIS information standards:

- Artificial structures
- Coastline artificial/natural

Name of GIS layer: Artificial_structures

Type of GIS Layer: polyline

Geographical Reference Systems: WGS 84 decimal degree

Attribute table:

Content	Description
Ecological Objective	EO8. Coastal ecosystem and landscape
IMAP Common Indicator	CI16. Length of coastline subject to physical disturbance due to the influence of manmade structures
Parameter	Location and extend of artificial structures
Attribute table	<p>Specify the following information in the attribute table associated with the GIS information layer:</p> <ul style="list-style-type: none"> • CPCODE: Two-letter code of Country • ASCODE: Mandatory. Integer. Code of type of artificial structure. The following code list should be used: <ul style="list-style-type: none"> ○ 1 Breakwaters ○ 2 Seawater/Revetments/Sea dike ○ 3 Groins ○ 4 Jetties ○ 5 River mouth structures ○ 12 Port and marinas • ASDES: Optional. Text. Description of type of artificial structures • Municipal: Optional. Text. Name of municipality or local administrative region where the polygon of artificial structure is located • Year: Mandatory. Text. Year of production of the information layer
Variables	Border on the sea side of coastal artificial structures
Spatial resolution	10 m or higher as produced by photo digitalization or CAD (Computer Aided Design) software
Vertical coverage	1 level at sea surface
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 6 years
Data format	GIS Layer: polyline or polygon

Name of GIS layer: Coastline_AN

Type of GIS Layer: polyline

Geographical Reference Systems: WGS 84 decimal degree

Attribute table:

Content	Description
Ecological Objective	EO8. Coastal ecosystem and landscape
IMAP Common Indicator	CI16. Length of coastline subject to physical disturbance due to the influence of manmade structures
Parameter	Artificial/Natural coastline
Attribute table	<p>Specify the following information in the attribute table associated with the GIS information layer:</p> <ul style="list-style-type: none"> • CPCODE: Two-letter code of Country • ART_NAT: Mandatory. Integer. Code for type of segment of coastline. Use the following code list: <ul style="list-style-type: none"> ○ 0 Natural coastline ○ 1 Artificial coastline • Municipal: Optional. Text. Name of municipality or local administrative region where the polygon/polyline of segment of coastline is located • Year: Mandatory. Text. Year of production of the information layer • Ref_Year: Mandatory. Year of the reference coastline used to represent natural and artificial segments
Variables	Segment of artificial/natural of coastline
Spatial resolution	10 m or higher as produced by photo digitalization and interpretation
Vertical coverage	1 level at sea surface
Coordinate Reference System	WGS 84 or ETRS 89 decimal degrees
Temporal coverage	Every 6 years
Data format	GIS Layer: polyline