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Videoconference, 9 September 2021

Agenda Item 6: Technical Guiding Elements on IMAP Implementation: Assessment Criteria and Scales, Thresholds, Baseline Values

Data Standards and Data Dictionaries for IMAP Common Indicator 18: Level of pollution effects

1. **Introduction**

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.

The proposal of DSs and DDs provides broader data sets and associated dictionaries than requested as mandatory by related IMAP Guidance Factsheets and Metadata Templates. In the Data Standards the **mandatory** data are represented in **black** and the **non-mandatory** ones in **red color**. The possibility to fill in also non-mandatory fields is given to allow the Contracting Parties that already have monitoring systems collecting a wider set of data to also report them as the additional data. Although it is at the discretion of the Contracting Parties to decide, reporting on non-mandatory data sets is **strongly encouraged** to avoid knowledge gaps between IMAP and other national data flows.

Following the outcome of respective CORMONs, the finalized DSs and DDs related to the 11 Common Indicators have been uploaded in the IMAP (Pilot) Info System and the consequent changes to the data base structure have been provided. Therefore, once all the parameters and measurement units have been defined, the correspondent data flow have been activated. Following a testing phase of the IMAP (Pilot) Info System realized with the voluntary participation of interested countries, the **phase I** of the system implementation is officially concluded in June 2020.

Starting from the middle of 2019, after the closure of the EcAp MED II Project, discussion about further modules has been started with the MAP Components for Common Indicators selected to deal with during phase I and for the remaining ones in view of ensuring data reporting for all IMAP Common Indicators according to the available resources.

The aim of the current document is to present the "draft" DSs & DDs related to **Common Indicator 18**. By reviewing this document, the present meeting is expected to provide **guidance, inputs and further reflections** on the draft DSs &DDs for Common Indicators 18 and 20. On this basis, a continuous process of harmonization with IMAP guidance factsheets and common indicators monitoring protocols is supported during the **phase II**.

As stated by previous **CORMON Meetings for Pollution and Marine Litter,** monitoring protocols should guide data standards development that is carried out in parallel with discussions on the agreed common monitoring methodologies. Information systems are a major tool to collect and transfer data.

2. **Data Standards and Data Dictionaries for IMAP Contaminants (EO9): Common Indicators 18**

1.   The present document provides the proposal of the Data Standards (DSs) and Data Dictionaries (DDs) for IMAP Common Indicator 18 to support data reporting regarding evaluation of the biomarkers in the Mediterranean Sea. It includes data related to three mandatory biomarkers i) Acetylcholinesterase activity (AChE); ii) Lysosomal membrane stability (LMS); iii) Micronuclei frequencies (MN); as well as data related to not mandatory biomarker iv) Stress on Stress (SoS) and other alternative-not mandatory indicators subject of voluntary reporting from the CPs.

2.   The present proposal of the Data Standards (DSs) and Data Dictionaries (DDs) for IMAP Common Indicator 18 builds on the documents that have been previously agreed: i)IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21 (UNEP/MED WG.467/5) and ii) IMAP Monitoring Guideline for Reporting Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20 (UNEP/MED WG.492/8).

3. **Module PMO1 - Level of pollution effects –IMAP CI 18**
3.   Similarly, to procedure established for CIs 13, 14 and 17, the following two procedures on reporting monitoring data related to IMAP CI18 are provided in the present proposal of DSs and DDs

for IMAP CI 18: a) reporting data related to sampling stations and b) reporting data related to biomarkers. Namely, the Module PA1 includes the data both on stations and biomarkers, as well as the list of reference species and mandatory biomarkers. The two species Mytilus sp. and Mullus barbatus are considered mandatory in line with IMAP.

4. The present proposal builds on the initial proposal of DDs and DSs for IMAP CI 18, as provided in the document UNEP/MED WG. 492/8 that was discussed at the Meeting of CorMon on Pollution Monitoring (26-28) and further revised in line with the comments of CPs received during the Meeting. However, it includes the changes introduced to address the comments provided from the participants of the Meeting of CorMon Pollution Monitoring, as well additional fields added to allow the correct functioning of the data flow and analogy with DDs and DSs for other CIs.

5. The list of reference species provided in Table 3represents the list of species approved for the IMAP CI 17 by the 7th Meeting of the Ecosystem Approach Coordination Groupand consequently made operational for data reporting for DSs & DDs for EO9 within IMAP Info System.

Table 1: DSs & DDs **Module PMO1** (Level of pollution effects**)** for IMAP CI 18: **Stations**

Field	Description	List of value
CountryCode	Enter member country code as ISO two digits, for example "IT" for Italy.	
NationalStationID	Station code	
NationalStationName	Station name	
*Region	Administrative subdivision of the first level where the station belongs to (according to the country subdivision)	
Latitude	Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx).	
Longitude	Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893).	
*ClosestCoast	Station distance from the coast in km	
TCMMatrix	Environmental matrix measured in the station, enter one of the values in the list.	B = Biota
SeaDepth	Sea depth in meters	
AreaTypology	Indicate the typology of the monitored area, enter one of the values in the list	R = Reference sites C = Coastal HS = Hot spot O = Others
Pressure Type	If the monitoring station is dedicated to monitoring of pressure, indicate the typology of pressure monitored, enter one of the values in the list	AG = Agriculture and livestock IP = Industrial Plants MN = Mining MT = Maritime Traffic
Remarks	Notes	

* non-mandatory under IMAP Guidance Factsheets

Table 2: DSs & DDs **Module PMO1** (Level of pollution effects**)** for IMAP CI 18 –**Biomarkers**

Field	Description	List of value

CountryCode	Member country code as ISO two digits, for example "IT" for Italy.	
NationalStationID	Station code.	
Year	Year of sampling in YYYY format	
Month	Month of sampling in 1-12 format	
Day	Day of sampling in 1-31 format	
Time	Hours-minutes-seconds of sampling in HH:MM:SS format	
SampleID	Sample Code if multiple replies are made with the same value as Year, Month, Day and Time"	
SampleType	Wild/Caged (add information about the collection site)	
Matrix	Sample matrix, enter one value of the list	B = Biota
SampleDepth	Sampling depth in meters	
* Salinity	Salinity (psu)	
* Temperature	Temperature (°C)	
* DissolveOxygen	Dissolved oxygen (μmol O_2/l)	
SpeciesID	Monitored species. Enter one value of the column 'ID_Species' of the list 'List_species'	
SpeciesName	Monitored species. Enter one value of the column 'Label' of the list 'List_species'	
SpeciesNameOther	Name of the species, if not included in the list 'List_species'	
*SpeciesGender	Gender of the species. Enter one value of the List of values.	M = male F = female U = undefined
MaturationKey	Maturation degree of the gonads for demersal species according to the Workshop on Sexual Maturity Sampling (ICES WKMAT 2007). Enter one value of the List of values.	I= Inactive II = Maturing III= Spawning IV= Post-spawning
Specimen_lenght	Lenght of specimen in cm. In case of pooling, indicate mean lenght. (precision at 0,1 cm). In the case of fish, this value refers to the total length; for mussels it refers to the length of the valve; for crustaceans it refers to the length of the carapace.	
Specimen_length_SD_SE	Standard deviation/standard error of average length of	

	specimens in a pool in cm. The standard deviation (SD) is a measure of variability. The standard error of the sample depends on both the standard deviation and the sample size.	
Specimen_weight	Weight of specimen in g. In case of pooling, indicate mean weight. (precision at 0,1 g)	
Specimen_weight_SD_SE	Standard deviation/standard error of average weightof specimens in a pool in g.	
Pooling	In case of pooling, describe the contentof pooling andother methodological issues	
Pooling_N	Specify the number of specimens pooled	
Pooling_SD_SE	Specify which statistical measure is provided. Enter one value of the List of values.	**SD** = Standard Deviation **SE** = Standard Error
*Liver_weight	Weight of liver in grammes (precision at 0,01 g) to define hepatosomatic index (HSI)	
*Gonad_weight	Weight of Gonad in grammes (precision at 0,01 g) to define gonadosomatic index (GSI)	
Tissue	Tissue element of the monitored species, enter one of the values in the list.	**BL** = Fluids - Blood. Includes erythrocytes, haemocytes, serum (blood component without cells and clotting factors) and plasma (serum including clotting factors) EG = Eggs. Includes bird eggs and fish eggs (roe). Use the remarks field to provide additional information, if necessary. **GO** = Organs - Gonads. Includes female gonads (ovaries) and male gonads (testes). Use the remarks field to provide additional information, if necessary. **LI** = Organs - Liver. Includes hepatopancreas. Use the remarks field to provide additional information, if necessary. **MU** = Tissues - Muscle. Any type of muscle tissue or organ. Includes the former code TM for "Tail muscle". **ST** = Tissues - Soft tissue. Includes any body tissue except mineralised tissue (hard tissue) **GI** = Organs - Gills **OT** = Other. Use the remarks field to provide additional information, if necessary.
Tissue_weight	Weight of tissue in g. In case of pooling, indicate mean weight.	

Tissue_weight_SD_SE	Standard deviation/standard error of average weight of specimens in a pool in g.	
AnalyticalMethod	Analytical method used. Reference methodological protocol used for analysis – indicate method elaborated in Monitoring Guideline/Protocols for Biomarker Analysis (UNEP/MED WG. 492/4-5); Add any other methods different from these by specifying name of scientific paper	
Biomarker_Name	Name of biomarker. Enter one value of the column 'Biomarkers' of the list 'List_Biomarkers'	
Biomarker_Name_NM	Specify the name of biomarker if the 'Biomarker_Name' field has been filled in with 'NM'	
Biomarker_Value	Value of each biomarker. Precision to the second decimal place (ex.:0,01), except for MN where the precision is to the first decimal place (e.g.:: 1) and for LMS-HEXO and for LMS-NRRT where the precision is to the integer number (ex.:1).	
Biomarker_Unit	Unit of measure (different for each biomarker). Enter one of the values in the List of Values. For the 'LMS biomarker' the unit of measure is 'min' both in the case of LMS-HEXO and LMS-NRRT but, in the first case it refers to 'labilization time' in the second case it refers to 'retention time'. If the CP wishes to report data on Additional – not Mandatory Biomarkers, other than mandatory biomarkers insert 'NM' and specify unit of measure in the 'Biomarker_Unit_NM' field.	min = Lysosomal Membrane Stability (LMS) (labilization /retention minutes) nmol/min/mg protein = Acetylcholinesterase (AChE) activity (nmol/min/mg protein in gills (bivalves)) % = Mean percentage lysosomal membrane stability in mussel (%LMS) number of cases /1000 cells = Micronucleus test (MN)(frequency) μg/g = Metallothioneins level (MT) (μg/g digestive gland) LT50 (days) = Stress on Stress (SoS) NM = unit for additional not mandatory biomarker
Biomarker_Unit_NM	Unit of measure for 'Biomarker_Name_NM'. Fill in this field if the 'Biomarker_Unit' field has been filled in with 'NM'	
Remarks	Notes	

* non-mandatory under IMAP Guidance Factsheets

Table 3: DSs&DDs **Module PMO1** (Level of pollution effects**)** for IMAP CI 18 – **List of species** [1]

ID_Species	Label
8006460	*Anarhichas lupus*
2392194	*Anarhichas minor*
5212973	*Anguilla anguilla*
2389391	*Aphanopus carbo*
2440728	*Balaenoptera acutorostrata*
2420330	*Bathyraja brachyurops*
2401415	*Bathysaurus ferox*
5210955	*Boops boops*
2415752	*Boreogadus saida*
2415505	*Brosme brosme*
2481312	*Cepphus grylle*
2286583	*Cerastoderma edule*
2336668	*Chelidonichthys kumu*
2417343	*Chimaera monstrosa*
8351946	*Clupea harengus*
2403490	*Conger conger*
5215150	*Coryphaenoides rupestris*
2222188	*Crangon crangon*
8534921	*Crassostrea angulata*
2286069	*Crassostrea gigas*
5220003	*Delphinapterus leucas*
8324617	*Delphinus delphis*
5729032	*Donax trunculus*
2287072	*Dreissena polymorpha*
2287250	*Ensis siliqua*
2336597	*Eutrigla gurnardus*
7832266	*Fucus*
3196291	*Fucus ceranoides*
3196437	*Fucus serratus*
8222574	*Fucus vesiculosus*
2481433	*Fulmarus glacialis*
8084280	*Gadus morhua*
2415827	*Gadus ogac*
2440596	*Globicephala melas*
5213996	*Glyptocephalus cynoglossus*
2376483	*Gobius*
7788295	*Haematopus ostralegus*
2434806	*Halichoerus grypus*
2293076	*Haliotis tuberculata*
2409108	*Hippoglossoides platessoides*
2279156	*Holothuria tubulosa*

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[1] List of available reference species (Code list) for EO9.

2357093	*Hoplostethus atlanticus*
2481126	*Larus*
2481156	*Larus glaucoides*
2481127	*Larus hyperboreus*
2409391	*Lepidorhombus whiffiagonis*
2419875	*Leucoraja naevus*
5213960	*Limanda limanda*
2301117	*Littorina littorea*
2415070	*Lophius budegassa*
2415075	*Lophius piscatorius*
2291262	*Lymnaea palustris*
2286995	*Macoma balthica*
5214420	*Mallotus villosus*
2415822	*Melanogrammus aeglefinus*
2415788	*Merlangius merlangus*
2415643	*Merluccius merluccius*
2415777	*Micromesistius poutassou*
5214022	*Microstomus kitt*
5214883	*Molva dypterygia*
5214880	*Molva molva*
5220008	*Monodon monoceros*
4284897	*Mullus barbatus*
7791733	*Mya arenaria*
7865139	*Mya truncata*
2333785	*Myoxocephalus scorpius*
841	*Mysida*
2285679	*Mytilus*
8288896	*Mytilus edulis*
2285683	*Mytilus galloprovincialis*
2303019	*Nassarius reticulatus*
2226962	*Nephrops norvegicus*
5193449	*Nucella lapillus*
2286060	*Ostrea edulis*
2224987	*Palaemon serratus*
2222355	*Pandalus borealis*
2285980	*Pecten maximus*
2409966	*Pegusa lascaris*
8140485	*Perca fluviatilis*
2434773	*Phoca hispida*
2434793	*Phoca vitulina*
2440669	*Phocoena phocoena*
2409330	*Platichthys flesus*
7700106	*Pleuronectes platessa*
2415872	*Pollachius pollachius*
2415861	*Pollachius virens*
2409416	*Psetta maxima*

5216024	*Raja clavata*
5216014	*Raja montagui*
5216208	*Raja radiata*
2409383	*Reinhardtius hippoglossoides*
2481205	*Rissa tridactyla*
5175681	*Saduria entomon*
7595433	*Salmo salar*
8215487	*Salmo trutta*
4284021	*Salvelinus alpinus*
2413224	*Sardina pilchardus*
2374149	*Scomber scombrus*
2409403	*Scophthalmus rhombus*
2418684	*Scyliorhinus canicula*
2335392	*Sebastes marinus*
2335427	*Sebastes mentella*
5214139	*Solea solea*
2498352	*Somateria mollissima*
2413452	*Sprattus sprattus*
5216368	*Squalus acanthias*
5229227	*Sterna hirundo*
2373946	*Thunnus alalunga*
2373980	*Thunnus thynnus*
8635	*Triglidae*
2481342	*Uria aalge*
2481339	*Uria lomvia*
2433451	*Ursus maritimus*
2287751	*Venerupis decussata*
2287753	*Venerupis philippinarum*
7744449	*Zeus faber*
2381013	*Zoarces viviparus*

Table 4: DSs&DDs **Module PMO1** (Level of pollution effects) for IMAP C.I. 18 – **List of Biomarkers**

Biomarker	Description (EN)	Organism	Tissue	Mandatory	Additional (Not-mandatory)
LMS-HEXO	Lysosomal membrane stability on cryostat sections - enzymatic determination	Fish/Mussel	Liver/Digestive gland	Y	
LMS-NRRT	Lysosomal membrane stability in mussel haemocytes - in vivo determination (neutral red retention time (NRRT) assay)	Mussel	Haemocytes (in vivo)	Y	

MN_F	Micronuclei frequency in fish blood cells	Fish	Erythrocytes	Y	
MN_MH	Micronuclei (MNi) frequency in mussel gill cells and haemocytes	Mussel	Gill cells, Haemocytes	Y	
AChE	Acetylcholinesterase activity - enzymatic determination	Mussel / Fish	Gills / Muscle	Y	
% LMS	% LMS Mean percentage of Lysosomal membrane stability in mussel	Mussel	Haemocytes		Y
MT	Metallothioneins	Fish	Digestive gland		Y
SoS	Stress on stress	Mussel			Y
NM	Other: not mandatory biomarker	Specify	Specify	-	Y