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Agenda item 5: Marine Pollution Monitoring Regional Data Base and Related Quality Assurance Issues; Data Standards and Data Dictionaries

Report on the Review of New and Existing Monitoring Data Uploaded in MEDPOL Database (Draft)

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Note by the Secretariat

The MED POL monitoring database and the MAP/Barcelona Convention Secretariat is hosting monitoring data of 17 Mediterranean countries at the moment. Although the content is highly variable and the portion of data for each component and country is uneven, it constitutes a relevant source of information.

During the period between 2016 and the beginning of 2019, the MED POL programme has received new datasets that are related to eutrophication, namely, Egypt (2012, 2015), France (2013-2016), Israel (2013, 2015, 2017¹), Montenegro (2016-2017), Morocco (2013-2015), Tunisia (2015) and Turkey (2014-2015), as well as contaminants, namely, France (2015- 2016), Israel (2015, 2017²), Morocco (2016-2018), Montenegro (2016-2017), Slovenia (2016), Turkey (2014, 2015), which sums to the existing datasets as presented in the Table in this document. These recent datasets will be uploaded into MEDPOL on line database upon being quality checked, as appropriate, and therefore prepared for transfer along with present MEDPOL online database to IMAP (Pilot) Info System.

The MED POL online database has required some revision to ensure easy accessibility and uploading of some of existing and new data that are expected to be reported by the Contracting Parties in the near future before the IMAP (Pilot) Info System is completed. To that effect, a testing phase of present MED POL online database was launched over last quarter of 2018 with participation of Croatia and Montenegro. However, several problems have been recorded indicating MED POL on line database still may not be used for on-line upload of monitoring data. Considering the problems occurred in the course of MED POL online database testing, a new call will be sent out to the Contracting Parties over the second quarter of 2019 for an offline reporting of all pending and 2018 monitoring data sets in present Metadata Templates, as approved by the Meeting of the MED POL Focal Points, Rome, Italy, 29-31 May 2017 (UNEP(DEPI)/MED WG.439/20).

The latest revised table in this document (March 2019) presents the current status of the new and existing datasets by highlighting troubleshooting found with some of them after being submitted to the MAP/Barcelona Convention Secretariat which will be addressed over the second quarter of 2019.

¹ Due to the recent submission of monitoring data from Israel, data for 2017 have been included in present document unlike document UNEP/MED WG.463/3

² Due to the recent submission of monitoring data from Israel, data for 2017 have been included in present document unlike document UNEP/MED WG.463/3

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List of Abbreviations / Acronyms

CORMON	Correspondence Group on Monitoring
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria
INFO/RAC	Regional Activity Centre for Information and Communication
MAP	Mediterranean Action Plan
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
QA	Quality Assurance
QC	Quality Control

1. Background

After nearly 20 years of its development the MED POL Database stores around 40,000 individual data entries (for almost all the Contracting Parties of the Barcelona Convention) and has helped to identify and guide the necessary monitoring and policy developments in the Mediterranean Sea, despite some drawback experiences have also been gained. To mention a few, the late lack of the continuous data submissions led to a lack of awareness on reporting formats and database requirements which generated different types of data errors (identified in the majority of the cases), as well as database gaps. On the other hand, the Quality Assurance (QA) process has not been fully implemented for the datasets by using the QA templates created for this purpose or by the flagging functions (the five categories initially created). In 2017, the MED POL metadata templates were revised and presented at the Meeting of the MED POL Focal Points, held on 29-31 May 2017, in Rome, Italy (UNEP(DEPI)/MED WG.439/14) as a step towards improvement of MED POL database.

The 19th Meeting of the Contracting Parties (COP 19), held in February 2016, in Athens, Greece, adopted the Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (Decision IG. 22/7). This increased a need for even higher number of datasets which will be generated within the IMAP context from now onward. For this reason, and due to the fast developments in information systems and technologies, the Secretariat commissioned the creation of a new database to the INFO /RAC, currently under the development within IMAP (Pilot) Info System. The online version is provided as to expand the capabilities of the MED POL Database that will be transferred to the new IMAP (Pilot) Info System. Furthermore, it will facilitate the submission of monitoring datasets under IMAP.

To that end, the review of existing and new datasets provided within MED POL Monitoring Programme will be revised, along with the development of Quality Assurance Schemes.

2. Brief description of the MED POL Database

The MED POL Database was developed at the Institute of Marine Sciences, Middle East Technical University, Turkey, for UNEP/MAP Coordination Unit (Athens, Greece) during 2002-2003. The construction of the structure, data analysis and administration tools have been considered by several technical meetings, involving scientific experts, programmers and database managers and MED POL. The final version was compiled with MS Office 2003 (relational database software Access 32-bit version) including mapping modules and an internet module as complementary functions. A database manual was written and revised in 2007. The delivery of the database to the Secretariat, as well as the training to the Contracting Parties on data submission templates, marked the beginning of the MED POL Database establishment which was fully functioning by MED POL Phase IV (2006).

In the Figures 1 and 2 below, the administration tools (Visual Basic Code) associated to the Access database are shown as an example of the functionalities originally conceived.

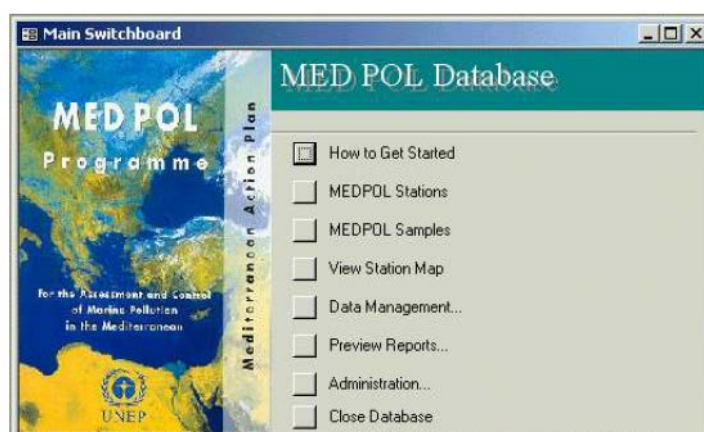


Figure 1. Main Switchboard of the MED POL Database.

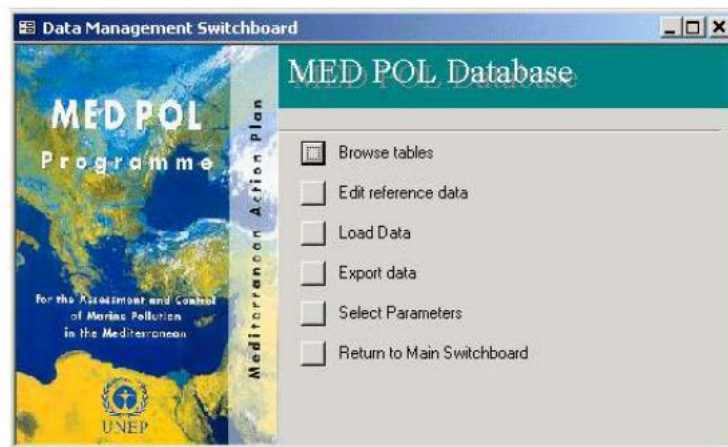


Figure 2. Data Management Tools.

The database is an excellently designed database to assimilate the MED POL datasets from the monitoring activities performed by the Contracting Parties under MED POL Programme. Unfortunately, as it will be discussed in the next sections, the disruptions in terms of database updates, as well as the quality issues aroused from datasets submitted by the Contracting Parties linked to a data quality management which depends on administrative procedures reduce its functionality.

The shifting to an on-line reporting of monitoring data is still progressing in close cooperation with INFO/RAC. The Contracting Parties were supplied with a set of data templates (Excel files) which would then be loaded into the Access database (SQL). Furthermore, these templates are correlated between them in a hierarchical structure which permit later on the functionalities of the database (ca. usefulness) as shown in Figure 3. This combination is still being used for small databases, therefore, it is a powerful software tool (MS Office), despite the huge changes in information technologies today, which include other types of information storage and more versatile management options, as well as programming languages (e.g. XML). It is worth to mention here, that the building of the MED POL Database was a joint effort between programmers, scientists and managers. The original MED POL Database included a mapping tool (see Figure 4 below). However, the exponential changes in mapping and analysis of software that occurred since then, as well as inexact sampling locations in some occasions, made it difficult to be used for end-users.

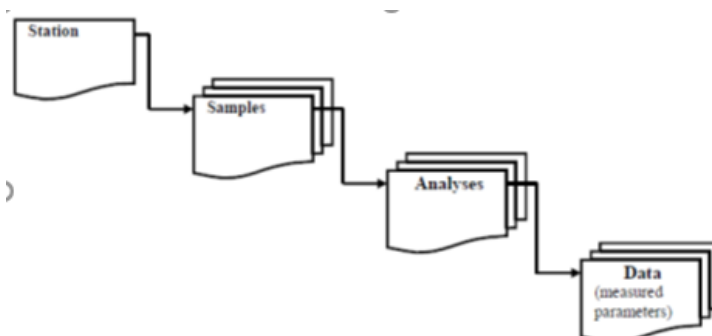


Figure 3. Hierarchical structure of monitoring data

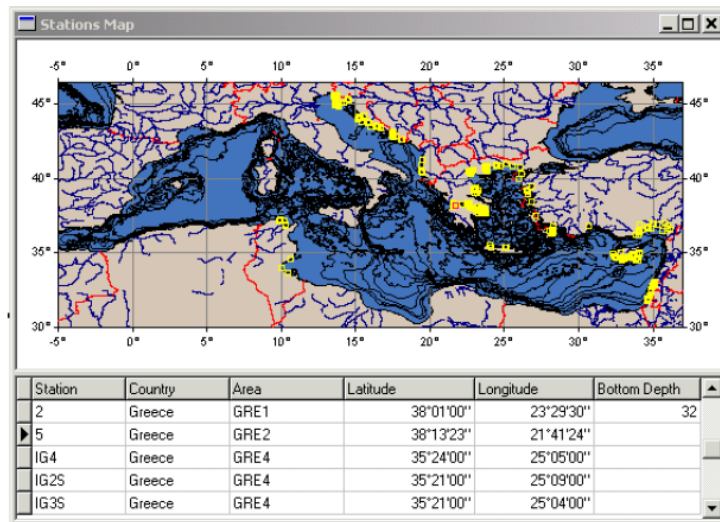


Figure 4. Example of the Stations Map function

The quality control of the MED POL Database was originally designed to be performed in a variety of ways, such as QA/QC methods control, laboratory accreditations, use of Certified Reference Materials, as well as by manual QA control during the load of the datasets into the MED POL Database and reporting submission issues by the Contracting Parties to the Secretariat. For the 3 first options mentioned above, the country has the responsibility to provide data with the maximum quality, and therefore, to submit both the data templates (by parameter and matrix), as well as the associated QA templates. Furthermore, the level of uncertainty in the MED POL datasets loaded in the database could be decreased if the flagging function for the datasets would be used routinely (see Figure 5 for the original flag categories) and then datasets loaded in the database.

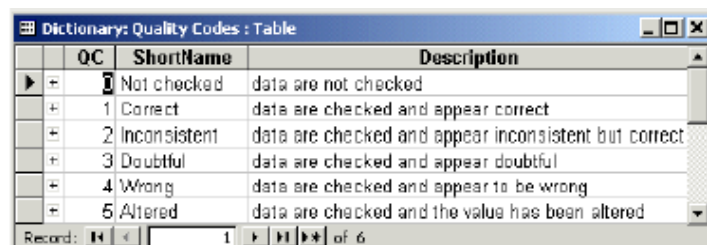


Figure 5. Five categories to flag the quality level of monitoring data.

3. Quality of the MED POL Database content

The overall 'data quality' protocol finalizes with the internal procedures in place at the Secretariat. Briefly, once the dataset files are received from the Contracting Parties the officer in charge send the files to the database managers to perform the automatic load of the data into the database. If problems are encountered during the loading of the data (automatically detected), a report is produced and sent back to the Contracting Parties for review and to officially resubmit the corrected data.

Although this the most logical procedure it did not work during the latest years, among others for different technical reasons, such as, i) the data sent back to the Contracting Parties can be delayed or new problems are found; ii) the flagging function from the database could be used only by experts; iii) minor errors detected (by experts) cannot be sorted out easily (e.g. sometimes a digit or a different 'parameter name' invalidates the automatic loading); to mention a few. To this aim it has been decided to shift to an on-line system since 2007-2008 which is not yet fully operational. It is envisaged that the new IMAP (Pilot) Info System platform will facilitate these procedures when data quality algorithms will be included, and data loading will be performed directly by the Contracting Parties.

On the other hand, it should be said that the majority of the laboratories had not submitted the QA information to the Secretariat. It should also be mentioned that some impossible data (e.g. values out of range for analytical instruments) have been also uploaded in the MED POL Database, rather some than fewer.

Further, there are duplicates, triplicates in parameters and parameter codes (which come from the incorrect submitted by the Contracting Parties). Clearly, these errors have an impact when data is requested and exported from the database. In any case, the values out of range are the main cause of the limited database direct applicability to perform regional marine assessments. Sometimes, higher values are just impossible values and lower values are just undetectable values even by modern instruments disregarding the methodology employed.

To cope with a high quality of data reporting, there is a need for the capacity building, resources in place and better coordination at national level. However, in despite the gaps and errors in submitted data, MED POL with the support of the regional experts have managed to take them into account to the extent possible for assessment purposes.

4. Main findings

Some main points should be summarized to depict the way forward:

- The correction of errors of existing data submitted by the Contracting Parties to the MED POL Database is a necessary step to outline the ways of improving the quality of monitoring data, as well as their assimilation into new IMAP (Pilot) Info System. The final object of this improvement is the correctness of the transfer of the MED POL Database to the IMAP (Pilot) Info System, as well as to avoid carrying over known quality issues.
- The existing mechanisms (e.g. quality templates and QA flagging categories) have been only achieved partially over these years and a full new Quality Assurance Scheme should be implemented by the Contracting Parties.

5. Tabular overview of the status of MED POL monitoring data

To consider the status of the existing and new datasets submission related to marine pollution monitoring by the Contracting Parties in line with Article 12 of the Barcelona Convention, Articles 8 and 13 of the LBS Protocol and IMAP Decision IG 22/7, that is presented in Table 1, the following explanations should be noted:

- **xxxx** Data years highlighted in green have been included in the MED POL Database, as well as on-line version of MED POL Database.
- **xxxx** Data years highlighted in yellow in bold have not been uploaded to the MED POL Database due to format issues (data fails in some important parameters, coordinates, units, etc.), despite have been used, as possible and appropriate.
- *xxxx* Data years highlighted in blue in cursive and bold reflects datasets that have not been yet included in on-line MED POL Database (without or with minimal issues) and have been used as appropriate.

Table 1. Status of data submission related to marine pollution monitoring by the Contracting Parties in line with Article 12 of the Barcelona Convention, Articles 8 and 13 of the LBS Protocol and IMAP Decision IG 22/7.

<i>Country</i>	<i>Nutrients</i>	<i>Chl-a</i>	<i>Biota - TM</i>	<i>Biota - OC</i>	<i>Sediment TM</i>	<i>Sediments OC</i>	<i>Rivers - Nutrients</i>	<i>Oceanographic parameters (Temp., etc.)</i>
Albania	2005 2006		2001 2002 2003 2004 2005 2006 2007	2003 2004				
Algeria	2012	2012	2012	2012	2012	2012		
Bosnia and Herzegovina	2006 2007 2008	2006 2007 2008					2006 2007 2008 2009 2010	
Croatia	2009 2011 2012 2013 2014	2009 2011 2012 2013 2014	2009 2011 2012 2013 2014	1999 2000 2003 2004 2005 2006 2009 2011 2012 2013 2014	2002 2003 2004 2005 2009 2011 2013	2009	2000 2001 2002 2003 2004 2005 2009	

Country	Nutrients	Chl-a	Biota - TM	Biota - OC	Sediment TM	Sediments OC	Rivers - Nutrients	Oceanographic parameters (Temp., etc.)
Cyprus	2001 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016	2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016	1999 2001 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2011 2012 2013 2014 2015 2016				2001 2002 2003 2004 2005 2006 2007
Egypt	2009 2010 2012 2014 2015	2009 2010 2012 2014 2015	2006 2009 2010 2012	2006 2009 2010 2012	2006 2009 2010	2006 2009 2010		
France			1997 1998 1999 2000 2001	1997 1999 2000 2001				

Country	Nutrients	Chl-a	Biota - TM	Biota - OC	Sediment TM	Sediments OC	Rivers - Nutrients	Oceanographic parameters (Temp., etc.)
			2002 2003 2004 2005 2006 2009	2002 2003 2004 2005 2006 2009		2006 2009 2010 2011		
	2009	2009						
	2012	2012	2012	2012				
		2013						
		2014						
		2015	2015	2015				
					2016	2016		
Greece	1999 2000 (few) 2004 2005	1999 2000 (few) 2004 2005	1999 2004 2005	1999 2004 2005	1999 2000 (few) 2004 2005			
Israel			1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009		1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009			2003 2004 2005 2006 2007

Country	Nutrients	Chl-a	Biota - TM	Biota - OC	Sediment TM	Sediments OC	Rivers - Nutrients	Oceanographic parameters (Temp., etc.)
	2010 2011 2012 2013 2015 2017	2010 2011 2012 2013 2015 2017	2010 2011 2012 2013 2015 2017		2010 2011 2012 2013 2015 2017			2010 2011 2012 2013 2015 2017
Italy			2001 2002 2003 2004 2005 2006 2009	2001 2002 2003 2004 2005 2006 2009	2001 2002 2003 2004 2005 2006 2009	2001 2002 2003 2004 2005 2006 2009		
Lebanon								
Libya								
Malta								
Monaco								
Montenegro	2008 2009 2010 2011	2008 2009 2010 2011	2008 2009 2010 2011	2008 2009 2010 2011	2008 2009 2010 2011	2008 2009 2010 2011		
Montenegro	2012 2014 2015 2016 2017	2012 2014 2015 2016 2017			2014 2016 2017	 2016 2017		
Morocco			1998 2000 2001					

Country	Nutrients	Chl-a	Biota - TM	Biota - OC	Sediment TM	Sediments OC	Rivers - Nutrients	Oceanographic parameters (Temp., etc.)
			2002 2003 2004 2005 2006 2006 2007 2008 2009 2011 2012 2013 2014 2015 2016 2017 2018					2006 2006 2007 2009
	2006 2006 2007 2008			2006 2006 2007 2009 2011 2012	2006 2006 2007			
	2013 2014 2015	2013 2014 2015		2013 2014 2015 2016 2017 2018	2013 2014 2015 2016 2017 2018			
Slovenia	1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009	1999 2000 2001 2002 2003 2004 2005	1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009		2000 2001 2002 2003 2004 2005 2006 2007 2008 2009			1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
							2003 2004 2005 2007 2008 2009	

Country	Nutrients	Chl-a	Biota - TM	Biota - OC	Sediment TM	Sediments OC	Rivers - Nutrients	Oceanographic parameters (Temp., etc.)
	2010 2011 2012 2013 2014 2015 2016	2010 2011 2012 2013 2014 2015 2016	2010 2011 2012 2013 2014 2015 2016	2010 2011 2012 2013 2014 2015 2016		2010 2011 2012 2013 2014 2015 2016	2010 2011 2012 2013 2014 2015 2016	2012
Syria	2007		2007		2007	2007		
Tunisia	2002 2003 2004 2005 2006 2007 2008 2009 2010 2013 2014	2002 2003 2004 2005 2006 2007 2008 2009 2010	2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2013 2014	2007 2008 2009 2010	2001 2003 2004 2005 2006 2007 2008 2009 2010 2012 2013 2014	2001 2002 2004 2005 2006 2007 2008 2009 2010 2012 2013 2014		2005 2006 2007 2008 2009 2010 2011 2012
Spain			2004 2005 2006 2007 2008 2009	2004 2005 2006 2007 2008 2009	2007 2008	2007 2008		

