Harmonization and Networking for contaminant assessment in the Ionian and Adriatic Seas

Deliverable T2.2.2 – Operational GIS layers of sampling sites for contaminant monitoring

Work Package T2 - Data collection and definition of common data outputs focused on contamination

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1. Introduction

Environmental assessment needs information about monitoring protocols applied in the station network of the different countries to evaluate the comparability of the data that are actually being collected.

Visualizations allow to provide quick and clear information about the parameters measured in the monitoring stations.

Based on the results of the previously developed tasks T.2.1.1 and T.2.1.2, a series of maps have been developed to visualise the information about the sampling stations of the Adriatic-Ionian subregion.

2. Objective

The objective of this task is to produce a methodology to gather as much information as possible about the sampling stations and implement a series of operational GIS layers related to the sampling sites with useful information for users and stakeholders.

The metadata to be included for every station were previously discussed and agreed (del. T.2.1.1) and are the following:

Metadata field:	metadata options	SeaDataNet vocabulary
ORIGINATOR OF THE DATASET (EDMO Code)		
Station ID		
Station type	hotspot (H) reference (R) coastal (C) unknown (U)	
Latitude		
Longitude		
Country		
StartDate		
EndDate		
Duration		
Sampling interval	Occasional (project driven) Regular/continuous	L03 (SEADATANET MEASUREMENT PERIODICITY CATEGORIES)
Bottom depth		
Sampling depths		
Matrix		
Species (if biota)		
Parameter (P02)		P02

Purpose of monitoring	Research WFD monitoring MSFD monitoring Impact assessment specific monitoring IMAP (Integrated Monitoring and Assessment Program) Other /national monitoring	C36 (MONITORING ACTIVITY LEGISLATIVE DRIVERS)
Water type	transitional waters coastal waters open waters	
Name of water body and ID of water body		

3. Methodology

The QA/QC controlled dataset from T.2.1.2 has been further processed and analysed to get as much information as possible to implement the operational GIS layer of the sampling sites, as previously discussed and agreed (del. T.2.1.1).

The format of the initial QA/QC controlled dataset was ODV transposed, decomposed spreadsheet file. One file for each matrix (water, sediment and biota) was composed using the profile and timeseries files, in order to have only one file for each matrix.

The applied processing tasks are the following:

- Select all different substances in each file
- Create groups of substances and assign one group to each of the chemical substance (Antifoulants, Halocarbons, Halophenols, Hydrocarbons non-PAHs, Metals and metalloids, Other organic contaminants, PAHs, Pesticides and biocides, Polybrominated diphenyl ethers (PBDEs), Polychlorinated biphenyls, Radionuclides, Other)
- Harmonise the files in terms of time and depth. Time series have time as primary variable and eventually depth as data in rows. Profiles have depth as primary variable and the timestamp is the one indicated for the station. The objective is to have one single column with the depth of the measurement and one with the time. Additionally, this will allow to know which percentage of data has both information available.
- Harmonise the files in the information related to the bottom depth. Bottom depth and seafloor depth can contain this

information. The values in both fields are usually the same. If zero-value is found, it is changed to empty.

Once data are imported into QGIS software, additional processing is performed to obtain a layer with sampling stations:

- Aggregation of the measured groups of substances for each station (= long, lat; point geometry).
- Aggregation of the sampled depths on station level (= long, lat; point geometry). For water and biota stations sampled depth is the water depth. Instead, for sediment stations sampled depth is referred to depth below the seabed.
- For biota stations, aggregation of the sampled species on station level (= long, lat; point geometry). Column with species information (S25_preflabel) is splitted, extracting species and tissue information.
- For sediment stations, aggregation of the analysed matrix (sediment specifications if available) on station level (= long, lat; point geometry).
- Inclusion of additional metadata fields from the data access portal (http://harmonia.maris2.nl/search): Data Set name, Start date, End date, Country and Station name.
- Search for monitoring indications within the metadata through the key words: monitoring, MSFD and WFD in the fields: Cruise, Station, Station name, LOCAL_CDI_ID, Project name, EDMED references, Data Set name and the description of the project. The consideration of being a monitoring station or not cannot be obtained in this way because there are monitoring data from platforms that are in the system but the query with keywords return "false".
- Minimum start date and maximum end date on a station level (= long, lat; point geometry) calculation to further calculate the duration of monitoring activities for each station. The data format is flexible in this sense and does not allow to know exactly the number of years of monitoring in a certain station.

Additional sources of data used to produce the layers are:

- WISE WFD reference spatial datasets (https://www.eea.europa.eu/data-and-maps/data/wise-wfd-spatial-2#tab-derived-datasets) have been filtered and processed to produce the layers of the water body types

(transitional, coastal and territorial) in Italy, Slovenia, Croatia and Greece. Information is not available for non-EU countries.

- Layers related to territorial waters and Exclusive Economic Zones (EEZ) from Maritime Boundaries Geodatabase (Flanders Marine Institute (2019). Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at http://www.marineregions.org/. https://doi.org/10.14284/386) has been processed to complete the information about water bodies. There are some misalignments between both sources and some information is still missing.

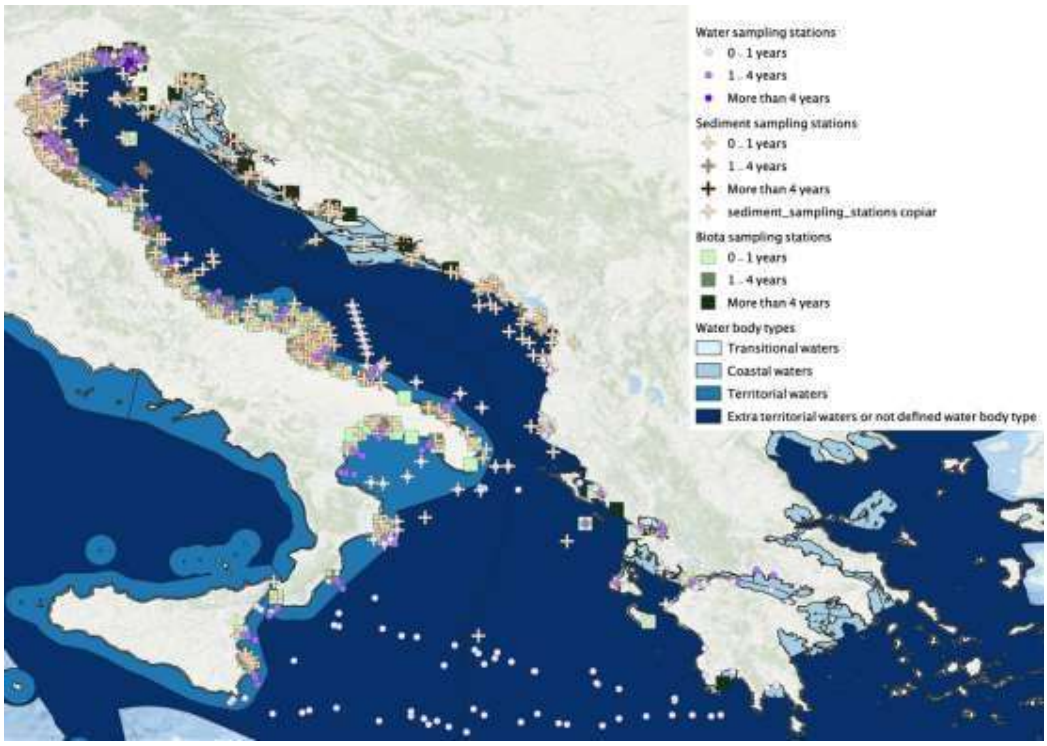
These layers were used to obtain the information related to water body types. They were previously processed to circumscribe the spatial domain to the Adriatic and Ionian seas.

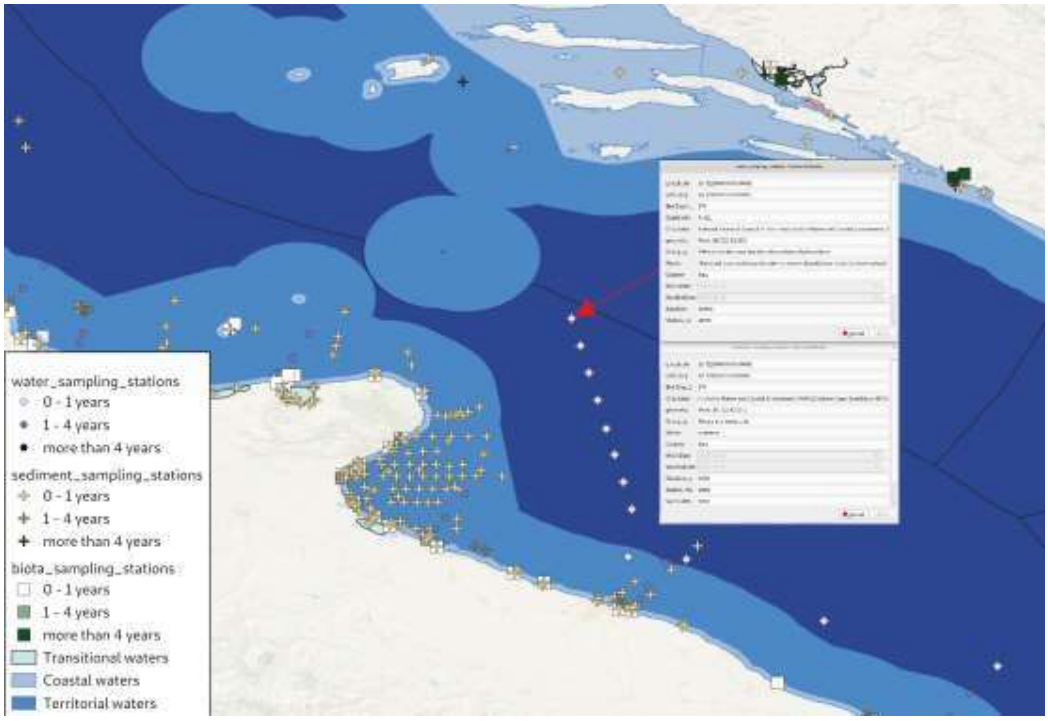
Once data processing has been performed, information has been aggregated for each station. The concept of station has been based on: position coordinates, station name, data originator, sampled species (for biota), analysed sediment granularities (for sediment) chemical substances measured and sampled depths.

4. Result

A detailed methodology for the production of the maps has been developed.

A specific styling has been developed to visualise the stations taking into account the matrix (one different symbol for each matrix) and the time span of the sampling activities in the stations (graduated symbology with 3 classes in a color scale). A series of layers in shapefile format have been produced to visualize the information related to the sampling sites, considered relevant within HarmoNIA partnership (Fig. 3):





The definition of the prototype was based on the contribution from HarmoNIA partnership about the needs of information about monitoring stations. The work to produce the operational layers has shown that the information about station type, monitoring purpose and sampling interval are, at the moment, not easy to include in the

layers as they are currently not included as extended metadata and they are not findable through additional sources.

The operational layers are available through WMS/WFS services (https://nodc.inogs.it/geoserver/HarmoNIA/wms?) visible through HarmoNIA geoportal.