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Background

This document is intended to provide material for discussion on the possible end-products for external users (outside HELCOM such as EEA or the EC) provided from the HELCOM assessment database under construction in the EUTRO-OPER project. In the HELCOM eutrophication data flow structure agreed in EUTRO-OPER 2/2014 the end-products for external users are identified (Fig. 1. lower left block in green). In this document selected examples of end-products for external users outside HELCOM are presented and principles and preliminary technical possibilities for their generation discussed.

This document is a contribution to of subask 1d.i in the EUTRO-OPER roadmap.

Action required

The meeting is invited to take note of the document and discuss the possible products to be drawn from the HELCOM eutrophication assessment database for external users

Introduction

The document is produced by the EU commission-funded project “Development of a shared data and information system between the EU and the Regional Sea Conventions (phase 1)” under the “Framework contract for services related to development of methodological standards in relation to good environmental status of the seas under MSFD”. The project contains a separate task led by Finnish Environment Institute SYKE to support HELCOM work, especially development of biodiversity data and EUTRO-OPER project. The project has supported EUTRO-OPER work during the year 2014 by e.g. contributing to the development of the EUTRO-OPER data flow model, ship observation data availability, development of remote sensing chl-a data and will also provide HELCOM with automated scripts for generation of INSPIRE-compliant metadata in the HELCOM Map and Data Service. As the project task dedicated to support HELCOM work is led by SYKE, this document is presented by Finland.

The recent developments in the field European marine environmental data are aiming at open data, utilization of distributed data sources and creation of shared and common data standards. Marine data infrastructures as WISE marine, EmodNet and SeaDataNet, a primary marine data provider for EmodNet Biology, are being built. Also HELCOM and its data consultant ICES are closely following or participating these developments. The role of regional seas conventions as originators, developers and managers of marine environmental data in Europe is increasing and their important contribution acknowledged at a pan-European level.

HELCOM assessment database opportunities

HELCOM assessment database employs a concept between fully distributed and centralized system designed to provide assessment products in through standardized and largely automated process while retaining the close connection between data provision and usage. It also creates novel opportunities to generate and share external data products based on commonly agreed data that contains versatile data types and is updated more frequently than many of the conventional data sources. Delineated data acceptance procedure (Fig. 1, blue arrows in the middle) gives additional quality control step and thus increases the data reliability for generation of various external products. Given the typically long assessment/reporting cycles and variable timing of assessments (e.g. HELCOM, MSFD, EEA assessments) the acceptance process and real-time data flow can be advantageous as a background/validation data for various purposes.

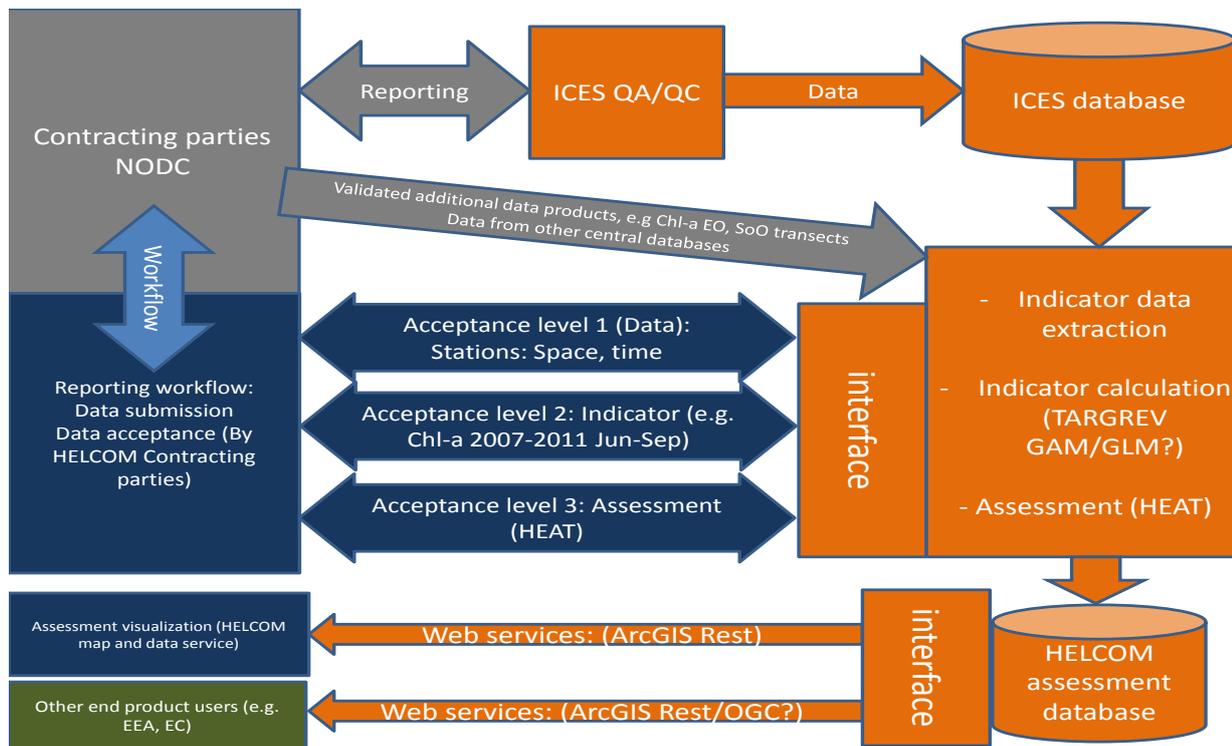


Figure 1. HELCOM operational eutrophication data flow

The HELCOM assessment database structure is planned to enable, along with generation of data level, indicator and assessment products, also flexible generation of Web services. These services have been agreed to be divided into visualization of the assessment products in the HELCOM map and data service and web services into external users.

Principles for defining end-products

Thus, HELCOM assessment database could provide a validated, reliable source of eutrophication information and data products for external users. The built-in acceptance and quality control process would ensure that products are based on best available updated data delivered by the contracting parties. Generation of data products directly from the validated source would streamline data usage and remove duplicate work. It can also be envisioned HELCOM eutrophication database to serve as a primary source of HELCOM eutrophication data towards pan-european marine data infrastructures in the future.

The principles and practical details of the content and form of end-products can be agreed as a part of the EUTRO-OPER process and subsequent development and acceptance of the HELCOM eutrophication database. The principles of providing end-products to external users could at the minimum include:

- 1) Exclusive use of data passed the Acceptance Level 1 or 2 (Fig. 1)
- 2) Agreement of technical details e.g. level of aggregation in various products.
- 3) Agreement of products provided through web services by the CPs before publication of these services.

Possible technical solutions

Once published the web services would automatically generate the agreed products from the database either per request or at agreed intervals.

The data flow model (Fig. 1) identifies end products provided to the external users be generated from database as web services through web interface. In practice these services could be implemented in two different ways:

- 1) in the form of Web Map service (WMS) which allows retrieval of map with possibility to include “queryable” layers. This option typically produces a visualisation of a given feature in map format. If querying option is included user can point selected areas on the map and get further information e.g. data values behind them one at the time.
- 2) As an INSPIRE-compliant web service where selected data sets/calculated products drawn from the database are placed on a standardized interface. The web service would allow querying certain subset of the database directly and retrieval of data.

As final assessment products (acceptance level 3) are published through HELCOM Map and Data service, it is anticipated that products for other end-users would mostly concern acceptance levels 1 and 2 (Data and Indicators, respectively). Products could also include other components of the database, e.g. indicator target values for assessment areas. To illustrate possible data products two possible end-user examples are presented below: 1) EEA eutrophication indicators 2) implementation of EU.

Example products

EEA indicators

European Environment Agency (EEA) maintains and updates two eutrophication indicators at a pan-European scale and produces regular assessments based on them. The indicators are CSI021 (Nutrients in transitional, coastal and marine waters) and CSI023 (Chlorophyll in transitional, coastal and marine waters). The two indicators are based on data delivered by member states into WISE SoE TCM dataset. Data is either reported directly to EEA through Eionet reporting or through regional seas conventions reporting through data manager (ICES). The methodology of these indicators is currently uniform across Europe but methodological development towards greater utilization of RSCs work in the indicator application in regional seas has been brought forward.

CSI021 currently contains oxidized nitrogen (nitrite + nitrate) and orthophosphate winter concentrations. The analysis is done station-wise and contains concentration analysis, classified as Low, Moderate or High based on the data structure (percentiles). In addition, a trend analysis is carried out for each station having 4/5 years of data since 2007/1985. Use of DIN (nitrite + nitrate+ ammonium) and use of regional seas conventions and WFD boundary values and RSC methodology in the assessment has been suggested as an improvement to the indicator.

CSI023 is considered as the mean summer concentration of chlorophyll-a in the uppermost 10 m of the water column. In the Baltic Sea summer is defined as June to September North of 59 latitude and May to September for all other stations. As for CSI021, the indicator consists of a concentration analysis and a trend analysis with an analogous methodology. As for the CSI021 greater utilization of RSC and WFD boundaries in classification has been recently proposed.

Currently significant amount of data utilized in compiling the two EEA marine eutrophication indicators is flowing through RSCs. If also methodology is developed to accommodate RSC boundaries and areas it would be obvious to produce indicator products directly from the HELCOM eutrophication database in the Baltic Sea. These products could ideally be used directly in the indicator production by the EEA or, at minimum, for validation of the actual indicator products. Depending on desired usage, the products could be published as WMS or web services. Multiple products can be envisioned:

- 1) Products required for indicator methodology, e.g. targets/boundaries for open sea HELCOM assessment areas and possibly also coastal WFD water bodies.
- 2) Calculated data products (concentration, trend) for indicator components (DIN, orthophosphate, chlorophyll-a) aggregated by HELCOM assessment areas/WFD water bodies. Alternatively the same products by station aggregated at a temporally appropriate scale. It must be noted that inclusion of EO chlorophyll-a data in the eutrophication database would greatly augment the available data for CSI023 compared to current situation.
- 3) Calculated assessment products for indicators aggregated by HELCOM assessment areas/WFD water bodies. Alternatively the same products by station aggregated at a temporally appropriate scale.

The desired products are naturally dependent on database capabilities, end-user needs and the future development of EEA indicators.

Implementation of EU environmental policies

Another potential category of end-products could be related to implementation of EU environmental legislation (WFD, MSFD, UWWT). It is anticipated that the development in HELCOM is towards use of commonly agreed core indicators in MSFD reporting. Also, WFD methodology has been intercalibrated in the Baltic Sea area. Integration and development of European marine data infrastructures requires information not only on data level but also on various levels of methodology, indicator construction and assessment results. HELCOM assessment database could provide products on these various levels as they are part of the database structure unlike in conventional databases mainly designed to hold observational data. These products could be supplied as WMS, web service or both, depending on usage. However, automated delivery of HELCOM products from the database for e.g. member states or EU commission would enable use of up-to date controlled and approved source of information. As the database is administered and managed by HELCOM, automated delivery of approved assessment products would also be possible.

Reporting cycle of the central EU marine directives is six years and HELCOM eutrophication database could provide visualization products relevant to implementation on the data and indicator level between the reporting cycles on demand. This would allow provision of timely information e.g. on development of indicator status or trends in visual format. A distinction could be made between preliminary and fully approved results used in official reporting or in HELCOM assessments.

Conclusion

In conclusion, HELCOM assessment database offers a variety of novel possibilities for producing end-products for external users that would be relevant for the large-scale development of marine data infrastructures at European scale. The advantages of utilizing the database for the provision of end-products are obvious: data, indicator and quality control at data originator level, release after common acceptance process, regular updates, documentation of changes and traceability. In addition, end-products feeding data infrastructures (e.g. WISE Marine) at European level could be used to pilot development in other data types and focus areas, e.g. hazardous substances.