GROWTH AND INNOVATION IN OCEAN ECONOMY

GAPS AND PRIORITIES IN SEA BASIN OBSERVATION AND DATA

D8.3.5 MedSea Checkpoint Challenge 7 (River Inputs): Description of Targeted Products, the methodology and the expert evaluation of fitness for purpose

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Author(s):	Nikos Skoulikidis	HCMR
	Dora Kouvarda	HCMR
	Nektarios Kalaitzakis	HCMR
	Federico Falcini	CNR
	Simona Simoncelli	INGV

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Glossary

TSM: Total Suspended Matter
TN: Total Nitrogen
TP: Total Phosphorous
GRDC: Global Runoff Data Centre
RIVDIS: Global River Discharge
SESAME: Southern European Seas: Assessing and Modelling Environmental Changes
PERSEUS: Policy-oriented Marine Environmental Research in the Southern European Seas
CISL: Computational and Information Systems Laboratory
FAO: Food and Agriculture Organization

Executive Summary

This report provides an updated overview of the targeted products of WP8-Challenge 7-River Inputs, and describes the method applied to produce them. It also attempts to answer some primary questions about the "adequacy" of the inputs.
After some necessary inputs and modifications to the initial list, the final output contains nine challenge products, as follows:

MEDSEA_CH7_Product_1
Title: Annual time series of Water Discharge (Q_w) [m^3/s]
Component **MEDSEA_CH7_Product_1_1**→ Annual time series of Q_w from in situ data
Component **MEDSEA_CH7_Product_1_2**→Annual time series of Q_w from model data

MEDSEA_CH7_Product_2
Title: Monthly time series of Water Discharge (Q_w) [m^3/s]
Component **MEDSEA_CH7_Product_2_1**→ Monthly time series of Q_w from in situ data
Component **MEDSEA_CH7_Product_2_2**→ Monthly time series of Q_w from model data

MEDSEA_CH7_Product_3
Title: Annual time series of Total Suspended Matter (TSM) from satellite data [mg/l]

MEDSEA_CH7_Product_4
Title: Monthly time series of Total Suspended Matter (TSM) from satellite data [mg/l]

MEDSEA_CH7_Product_5
Title: Annual time series of Total Nitrogen [mg/l]
Component **MEDSEA_CH7_Product_5_1**→ Annual time series of Total Nitrogen from in situ data
Component **MEDSEA_CH7_Product_5_2**→ Annual time series of Total Nitrogen from model data

MEDSEA_CH7_Product_6
Title: Monthly time series of Total Nitrogen from model data [mg/l]

MEDSEA_CH7_Product_7
Title: Annual time series of Total Phosphorous [mg/l]
Component **MEDSEA_CH7_Product_7_1**→ Annual time series of Total Phosphorous from in situ data
Component **MEDSEA_CH7_Product_7_2**→ Annual time series of Total Phosphorous from model data

MEDSEA_CH7_Product_8
Title: Monthly time series of Total Phosphorous from model data [mg/l]

MEDSEA_CH7_Product_9
Title: Annual time series of Eels Production per country [tons]

General scope of the Targeted Products

Rivers are the major pathways for material fluxes from land to sea. They supply nutrients and sediments (e.g., nitrogen, phosphorus, silica) to marine ecosystems, thus contributing to the maintenance of biological productivity in coastal waters and hence to the renewal of live resources available for exploitation by local populations. In some cases, such as eels, rivers directly contribute to the recruitment of stocks in the marine environment. Riverine sediments are the principal source for the edification and maintenance of beaches and hence are crucial in the prevention of coastal erosion, whereas riverine freshwater supplies largely affect the coastal and offshore circulation of oceanic systems.

The Targeted Products of this challenge were developed to provide an overview of the temporal and spatial variability of riverine material and eels fluxes to the Mediterranean Sea. This will allow for a better understanding of the peculiarities of the Mediterranean ecosystems in terms of the climatic, geomorphological and cultural differences that characterise the Mediterranean drainage basins. Furthermore, it will help to identify the major trends that could threat these ecosystems in the near future because of climate change and socio-economic development. Comparison of different modelling approaches and their results will also facilitate the assessment of uncertainty in these scenarios, as their reliability can be examined in the light of knowledge limitations on current modelling algorithms and input data sets that naturally impact the resulting river scenarios. Finally, it will allow identification of the major data and knowledge gaps that need to be addressed to assess the potential impact of global change in the Mediterranean region via the riverine link between land and sea.

Targeted Products catalogue for this Challenge

Name of Targeted product	Short description	Format
MEDSEA_CH7_Product_1	Annual time series of Water Discharge (Qw) [m^3/s] from in situ and model data	.xls file
MEDSEA_CH7_Product_2	Monthly time series of Water Discharge (Qw) [m^3/s] from in situ and model data	.xls file
MEDSEA_CH7_Product_3	Annual time series of Total Suspended Matter (TSM) [mg/l] from satellite data	.xls file
MEDSEA_CH7_Product_4	Monthly time series of Total Suspended Matter (TSM) [mg/l] from satellite data	.xls file
MEDSEA_CH7_Product_5	Annual time series of Total Nitrogen/Nitrates [mg/l] from in situ and model data	.xls file
MEDSEA_CH7_Product_6	Monthly time series of Total Nitrogen [mg/l] from model data	.xls file
MEDSEA_CH7_Product_7	Annual time series of Total Phosphorous/Phosphates [mg/l] from in situ and model data	.xls file
MEDSEA_CH7_Product_8	Monthly time series of Total Phosphorous [mg/l] from model data	.xls file
MEDSEA_CH7_Product_9	Annual time series of Eel capture production [tons] per country	.xls file

Table 1 Targeted Products for Challenge 7

Description of Characteristics and Data sources used by Targeted Products

The following tables present the characteristic name (according to P02 nomenclature), the environmental matrix and the relevant data sources for each targeted product. The tables are based on information from the Sextant Metadatabase. Where possible, the visualization of the products is also displayed; however visualization was not feasible for targeted products 6, 8 and 9 due to the lack of spatial reference.

MEDSEA_CH7_Product_1

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	River flow and discharge*	Fresh Waters	https://daac.ornl.gov/get_data.shtml
2	River flow and discharge	Fresh Waters	http://rda.ucar.edu/datasets/ds552.1/
3	River flow and discharge	Fresh Waters	http://isramar.ocean.org.il/perseus_data/CastMap.aspx
4	River flow and discharge	Fresh Waters	http://hypeweb.smhi.se/europehype/time-series/

*P02 code: RVDS

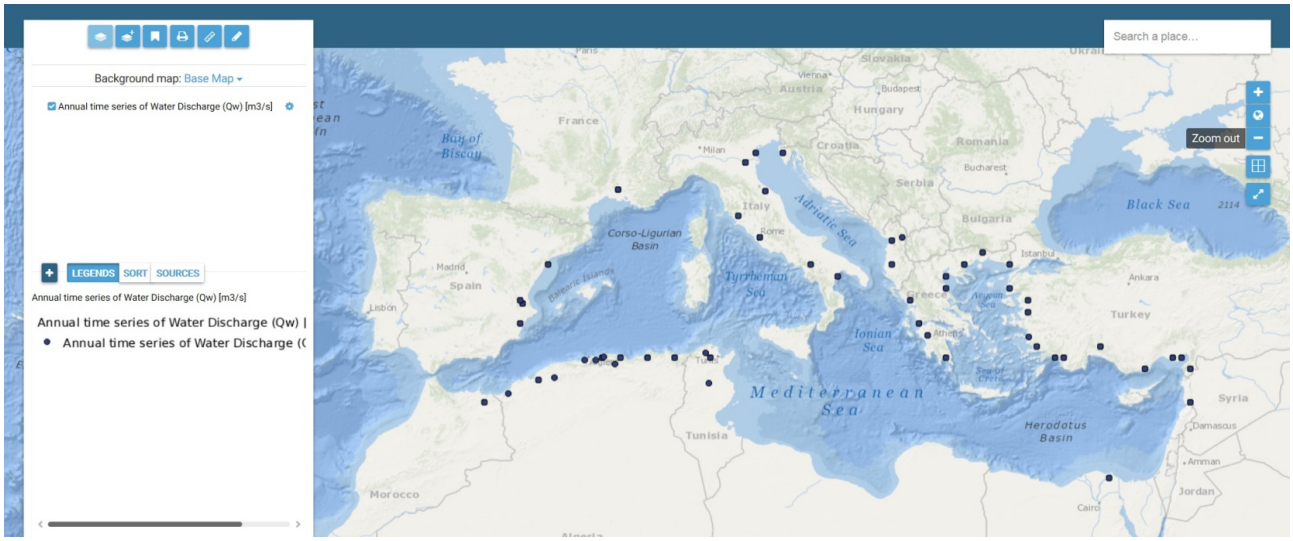

Figure 1. Visualization of MEDSEA_CH7_Product_1: Annual time series of Water Discharge http://www.emodnet-mediterranean.eu/medsea-challenge-7-product-1/

MEDSEA_CH7_Product_2

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	River flow and discharge	Fresh Waters	https://daac.ornl.gov/get_data.shtml

2	River flow and discharge	Fresh Waters	http://rda.ucar.edu/datasets/ds552.1/
3	River flow and discharge	Fresh Waters	http://israMar.ocean.org.il/perseus_data/CastMap.aspx
4	River flow and discharge	Fresh Waters	http://hypeweb.smhi.se/europehype/time-series/

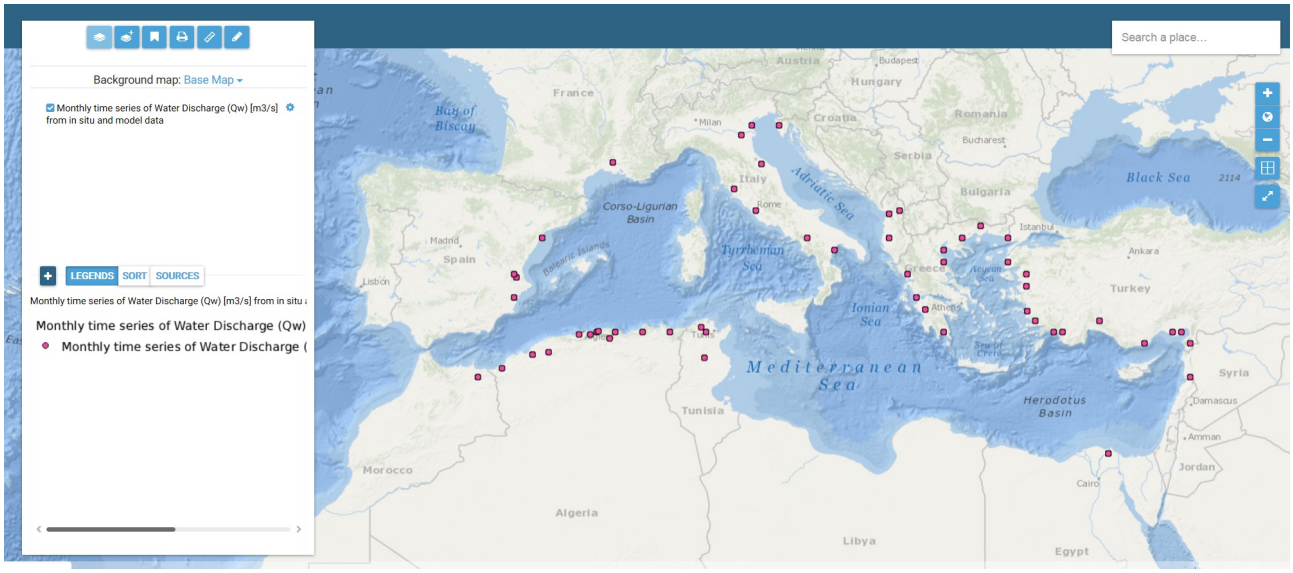

Figure 2. Visualization of MEDSEA_CH7_Product_2: Monthly time series of Water Discharge http://www.emodnet-mediterranean.eu/medsea-challenge-7-product-2/

MEDSEA_CH7_Product_3

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Concentration of suspended particulate material in the water column*	Fresh Waters	http://www.coastcolour.org/ccprocessing/calvalus.jsp

*P02 code: TSED

MEDSEA_CH7_Product_4

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Concentration of suspended particulate material in the water column	Fresh Waters	http://www.coastcolour.org/ccprocessing/calvalus.jsp

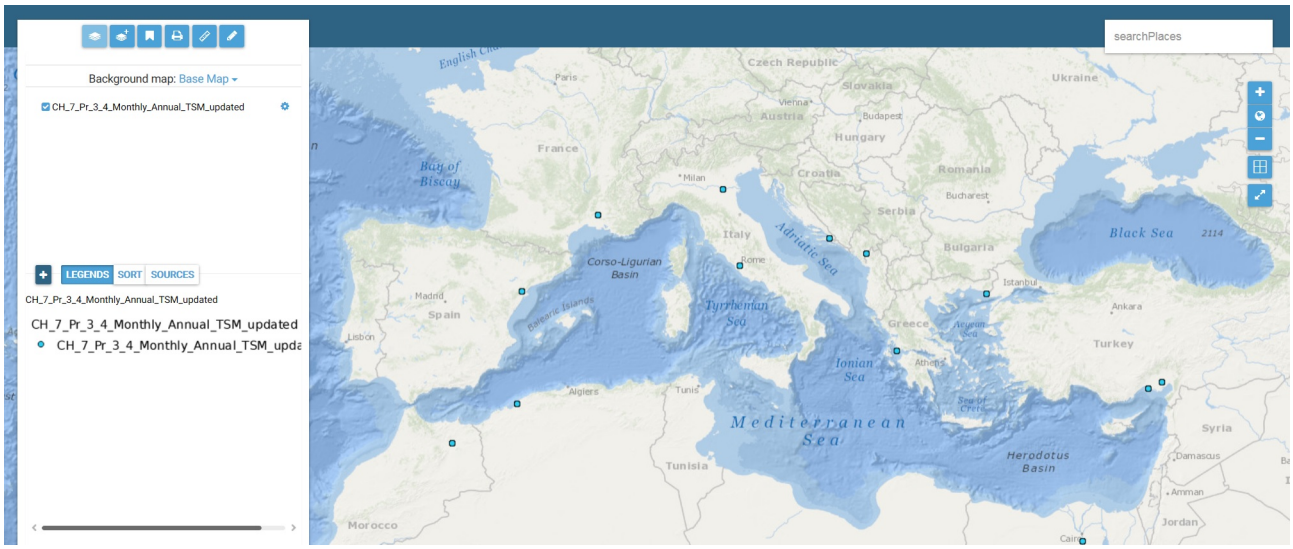

Figure 3. Visualization of MEDSEA_CH7_Product_3 and 4: Annual/Monthly time series of TSM concentration http://www.emodnet-mediterranean.eu/medsea-challenge-7-product-3-4/

MEDSEA_CH7_Product_5

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Dissolved total (& organic) nitrogen concentrations in the water column*	Fresh Waters	http://hypeweb.smhi.se/europehype/time-series/
2	Nitrate concentration parameters in the water column**	Fresh Waters	http://isramar.ocean.org.il/perseus_data/CastMap.aspx

*P02 code: TDNT
**P02 code: NTRA

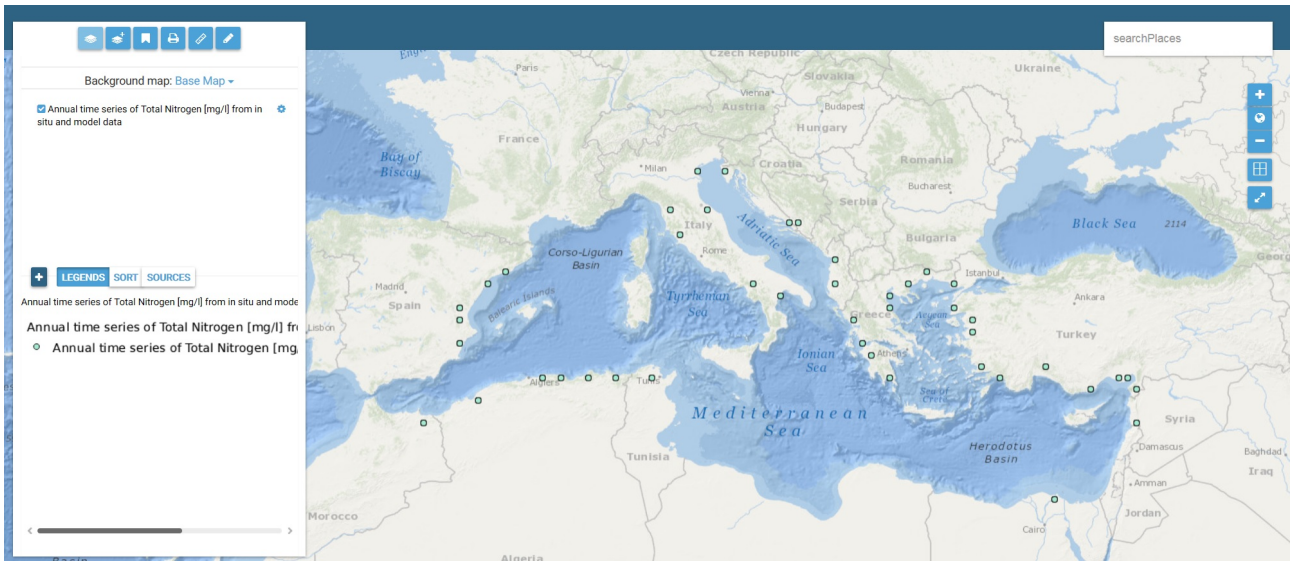

Figure 4. Visualization of MEDSEA_CH7_Product_5: Annual time series of Total Nitrogen http://www.emodnet-mediterranean.eu/medsea-challenge-7-product-5/

MEDSEA_CH7_Product_6

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Dissolved total (& organic) nitrogen concentrations in the water column	Fresh Waters	http://hypeweb.smhi.se/europehype/time-series/

MEDSEA_CH7_Product_7

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Dissolved total (or organic) phosphorus concentration in the water column*	Fresh Waters	http://hypeweb.smhi.se/europehype/time-series/
2	Phosphate concentration parameters in the water column**	Fresh Waters	http://israMar.ocean.org.il/perseus_data/CastMap.aspx

*P02 code: TDPX
**P02 code: PHOS

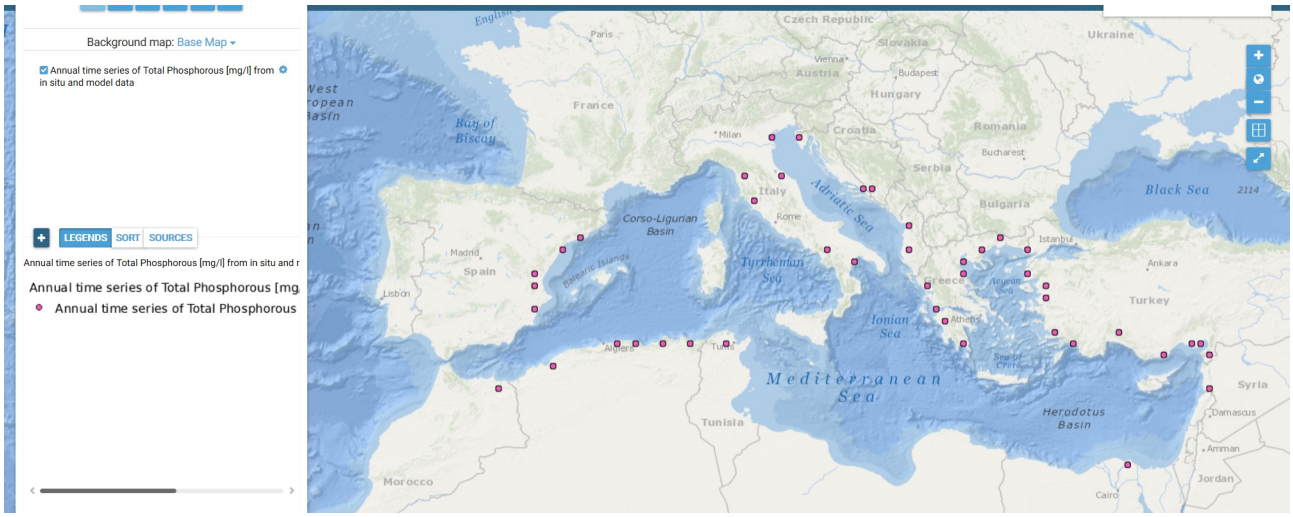

Figure 5. Visualization of MEDSEA_CH7_Product_7: Annual time series of Total Phosphorous http://www.emodnet-mediterranean.eu/medsea-challenge-7-product-7/

MEDSEA_CH7_Product_8

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Dissolved total (or organic) phosphorus concentration in the water column	Fresh Waters	http://hypeweb.smhi.se/europehype/time-series/

Targeted product MEDSEA_ CH7_product_9

Nb	Characteristic name (P02)	Environmental Matrix	Data source (URL)
1	Eel production*	Biota/Biology	http://www.fao.org/fishery/statistics/collections/en

*No P02 code and name available

Description of methodology to produce the Targeted Products

The same method was applied to produce the water discharge and nutrient load Targeted Products for this challenge. The selection of stations from which to obtain the water discharge and nutrient time series from in-situ and model data was based on the following criteria:

1. Station distance from the coast less than 100 km.
2. River runoff greater than 10 m^3/sec.
3. No stations influenced by sea water were included because they are not representative for water discharge, TSM and nutrient concentrations and fluxes.

Regarding the discharge criteria, we disregarded all rivers with a water discharge volume lower than 10 m^3/s (or 0.315 km^3/y) because they are usually inadequately monitored. Due to the scarcity of river flows and lack of data availability for North African rivers, most of the representative stations were included in the dataset, regardless of their discharge volume. These specific stations will be revaluated in upcoming data cleaning sessions.

A buffer zone of 100 km from the Mediterranean coast was created to define the distance threshold for the stations to be considered as representative. Furthermore, the marine stations were not included in the final products because they are not representative for river inputs.

Due to the temporal heterogeneity among several sources of in-situ data, it was difficult to define a “common period” for all river basins; therefore, all available years were included to allow for revaluation in future sessions.

Because the data originated from widely diverse research programs, each with its own purpose and data collection design, a common reference dataset for all basins was needed to guide the selection process and to help avoid the bias introduced by the spatial and temporal heterogeneity. Thus, the E-Hype’s basin classification by mean annual discharge was used to determine which basins met our 10 m^3/s threshold regardless of the station’s position or data collection period. This comparison of the in-situ data with the model data can be seen as a preliminary validation process for our results.

The E-Hype model database provided two data sets of discharge values, one independent and one associated with the nutrient data. The production of the initial model time series was based on the independent discharge data set. However, while attempting to combine the discharge and nutrient values to convert nutrient units from kg to mg/Lt, we noticed that the position, shape and extent of the drainage basins did not always match between the two datasets. Therefore, the

initial discharge datasets were replaced by updated ones, using the discharge values derived from the nutrient dataset only.

Correspondingly, all of the nutrient data sets were also replaced. Conversion of the units from kg to mg/Lt was achieved using the above-mentioned discharge values. We also noted that the discharge data related to the 1980-2009 period, whereas the nutrient values related to the 1980-2012 period. Rather than discard the extra nutrient data, we decided not to perform the unit conversion (kg to mg/Lt) but to provide only the raw values in kg for 2010-2012. In addition, because no river or basin names were provided, the downloaded data had to be combined with other sources to retrieve the names. In cases where this was not possible, "NA" was entered in the river and country columns.

TSM time series were retrieved from remote sensing because homogeneous in situ datasets with appropriate temporal coverage were unavailable. For each river mouth we set a box ~ 20 x 20 km^2 (i.e., 2-3 times the river-induced Rossby radius of deformation) and extracted daily TSM concentration data from the CoastClour Project database (Figure 6). For each box we selected the daily mean TSM within the range 0.001-1000 mg/l to avoid underestimated values and spikes. This technique is intended to simulate a TSM station (i.e., a single station) at the mouth of each river and allows for homogeneous and synoptic data collection. We reconstructed the TSM concentrations at 13 river mouths from May 2002 to April 2012: the Nile (Egypt), Ceyhan and Seyhan (Turkey), Evros and Acheloos (Greece), Drin (Albania), Neretva (Croatia), Po and Tiber (Italy), Rhone (France), Ebro (Spain), Moulouya (Morocco), and Shellif (Algeria); nationalities refer to the river mouths.

Figure 6. TrueColor image of the Mediterranean Sea showing the river mouths we considered for the targeted products MEDSEA_ CH7_product_3 & 4. Each yellow box represents the geographic region for which we extracted the daily TSM concentration from the CoastColour project.

A schematic demonstration of the method applied to produce the Targeted Products for this challenge is presented in Figure 7.

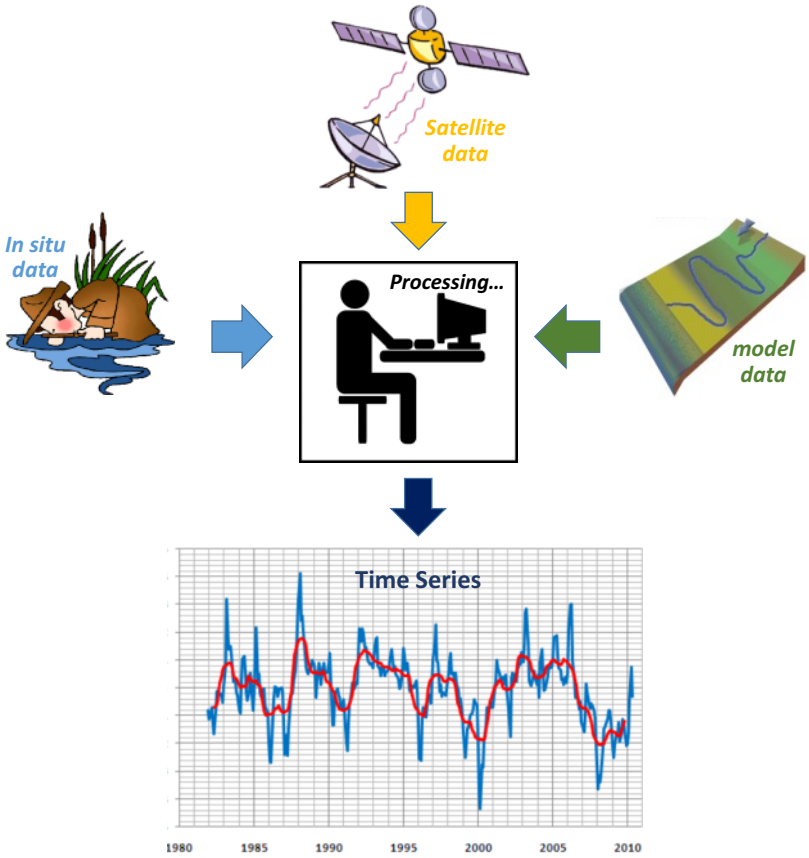

Figure 7. Method used for producing the challenge 7 Targeted Products.

Expert evaluation of Targeted Product quality

The objective is to provide an expert evaluation of the "fitness for purpose and use" for each Targeted Product. The coordinator asked the challenge teams to answer the following points:

1. Assign an overall product quality score with respect to scope (fitness for purpose) and explain why, according to the scale in Table 1.
2. Explain what is (are) the most important characteristic(s) for the Targeted Product quality (if all characteristics are important please say so);
3. Explain what is (are) the quality element(s) (see Annex 1) of the most important characteristic(s) that affects the Targeted Product quality;
4. Explain the limitations on the quality of Targeted products due to the input data set used;
5. Explain which characteristics "fails the most" to meet the scope of the Targeted Product;

SCORE	MEANING
1	EXCELLENT → it meets completely the scope of the Targeted Product
2	VERY GOOD → it meets more than 70% of the scope of the Targeted Product
3	GOOD → it meets less than 50% of the scope of the Targeted Product
4	SUFFICIENT → it does not really meet the scope but it is a starting point
5	INADEQUATE → it does not really fulfil the scope, not usable

Table 1 Targeted Products quality scores and their meaning.

MEDSEA_CH7_Product_1

1) The overall product quality score with respect to fitness for purpose is **very good** (2). The updated model component (MEDSEA_CH_7_Product_1_2) incorporates quite complete river discharge time series for 138 rivers from the E-hype model data set for the 1980-2009 period; however, North African rivers are not included. The component MEDSEA_CH_7_Product_1_1 includes annual discharge measurements from in situ data from 55 rivers that contain mainly SESAME time-series for the 1960-2000 period, whereas CISL and RIVDIS usually include previous years but end earlier than 2000.
2) The most important characteristic for this product is the River Discharge.
3) **Usability is the major issue** for this Targeted Product. The SMHI-Hypeweb-Europe is not a user-friendly and intuitive web interface for obtaining the model times series (see point 4 of MEDSEA_CH_7_Product_6). The **spatial accuracy** of the CISL Research Data Archive may also be an issue because the station co-ordinates were only given to one or two decimal places.
4) Regarding in situ data, the GRDC was expected to be one of the most important input data bases related to river discharge. However, there was a lack of raw data and only aggregated min, max and average values were provided. Therefore, data from this source were not incorporated in the final targeted products. However, the mean annual discharge values might be included in an updated version.
   The CISL Research Data Archive and RIVDIS databases contained largely the same measurement values for the same periods. This might indicate duplication; however, on a very

few occasions the data values differed for the same period, and both datasets provided some additional measurements before or after the period in common.

5) Overall, the data source that most failed to meet the scope of the discharge targeted products was the GRDC.

MEDSEA_CH7_Product_2

See MEDSEA_CH7_product_1 for the assessment of the "fitness for purpose and use". No data from the GRDC were used or this product because the dataset does not provide monthly data.

MEDSEA_CH7_Product_3

1) The overall quality score for this product, with respect to fitness for purpose, is **very good** (2). The synopticity of satellite-based data allowed the complete (daily and monthly) retrieval of TSM concentrations at the mouths of the 13 rivers we considered. However, the CoastColour TSM satellite product is strictly related to the MERIS instrument (8 years in space) and thus time series are restricted to this period only.
2) The most important characteristic for this product is the TSM concentration.
3) The **usability** of the TSM concentration can be an issue for users who are unfamiliar with satellite data analysis. Production of the targeted product required some **data pre-processing** to i) read the main characteristic above a given geographic box, ii) average it over the box and iii) write a monthly and annual mean time series. Moreover, the **spatial resolution** of this product is relatively low (i.e., 6 km for L3 products) for simulating a fixed station at a river mouth, which may lead to underestimation of TSM concentrations.
4) The CoastColour Project was the most important dataset we could find that fully satisfied the necessary requirements to build this targeted product. The spatial resolution of the product can be increased by developing an ad hoc algorithm for retrieving TSM concentrations starting from either the CoastColour L1 reflectance (300 m) or the L1 products from other sensors.
5) Overall, due to the synopticity of satellite-based data, the CoastColour Project provided the best characteristics to build our targeted product.

MEDSEA_CH7_Product_4

See MEDSEA_CH7_product_3 for the assessment of the "fitness for purpose and use".

MEDSEA_CH7_Product_5

1) The first component of the product (MEDSEA_CH_7_Product_5_1) includes 44 rivers. The score for this component is **5 (inadequate)**, because there were several availability, accessibility and usability issues (see points 3, 4, and 5) regarding the in situ nutrient parameters from the EUROWATERNET and SESAME databases. However, SESAME includes nitrate data for the 1960-2000 period. The second component of the product (MEDSEA_CH_7_Product_5_2) incorporates a relatively complete TN time series of 138 rivers from the E-hype model data set, although North African rivers are not included. In the updated version of the product we used the discharge file connected to TN (where discharge and TN

were modelled for the same catchment area) for 1980-2012. Therefore, **it scores 2 (very good)** with respect to fitness for purpose.

2) The most important characteristic for this product is the Total Nitrogen parameter for the model component, and either the Total Nitrogen or the Nitrates parameter for the in situ component.
3) The elements that most affect the quality of this product are the **availability** and **usability** of the Total Nitrogen and nitrate data sources.
4) EUROWATERNET and SESAME seemed to be the most comprehensive of the investigated data sources for the in situ nitrogen product components; some of the well-known useful databases such as MedHycos are no longer operating.
   In the case of EUROWATERNET, most of the stations were offshore and therefore not applicable for river inputs. In addition, it was not possible to relate a station's spatial information to the time series of nutrient data provided by the same database.
   Regarding SESAME, it was not possible to locate the nutrient data because, as was confirmed by the scientific coordinator of the project, use of the data is still restricted. Therefore, despite the fact that we could actually obtain the SESAME data set through the PERSEUS project, we were not allowed to use it.
5) Both the EUROWATERNET and SESAME databases failed to meet the scope of this targeted product. In the first case, no targeted product was produced from a EUROWATERNET dataset. SESAME was used as a data source for the production of the in situ nutrient product components, even though SESAME data is not officially available.

MEDSEA_CH7_Product_6

1) The overall product quality score with respect to fitness for purpose is **very good (2)** because the total nitrogen time series from the E-hype model data set do not include the North African rivers.
2) For this product, the most important characteristic is the Total Nitrogen parameter.
3) The most important elements that affect the quality of this product are the **usability** and **spatial resolution**.
4) The SMHI-Hypeweb-Europe used for the model time series is not a user friendly and intuitive web interface. Even if visualized versions of several parameters were available for downloading the data, the user would have to visit several pages to locate the download link. Nor is there a multi-basin selection option. Finally, the spatial resolution of the model could be characterized as poor, resulting in rather coarsely defined river basin limits that in many cases do not even form a normal or expected river basin shape.
5) The SMHI-Hypeweb-Europe data source was used to produce the model time series for the relevant components of all of the targeted products. It did not fail to meet the scope of the targeted products, despite the encountered difficulties.

MEDSEA_CH7_Product_7

1) As for MEDSEA_CH7_Product_5, the score for the model component MEDSEA_CH7_Product_7_2 is **very good** (2), while the score for the in-situ component MEDSEA_CH7_Product_7_1 is **inadequate** (5).

2) The most important characteristic for this product is the Total Phosphorous parameter for the model component, whereas for the in-situ component it is either Total Phosphorous or the Phosphates parameter.
3) The elements that most affect the quality of this product are the **availability** and **usability** of the total phosphorous and phosphate data sources.
4) See MEDSEA_CH7_Product_5 evaluation.
5) See MEDSEA_CH7_Product_5 evaluation.

MEDSEA_CH7_Product_8

1) The quality score with respect to fitness for purpose is very good (2), for the same reasons as for MEDSEA_CH7_product_6.
2) The most important characteristic for this product is the Total Phosphorous parameter.
3) See MEDSEA_CH_7_Product_6 evaluation.
4) See MEDSEA_CH_7_Product_6 evaluation.
5) See MEDSEA_CH_7_Product_6 evaluation.

MEDSEA_CH7_Product_9

1) The quality score with respect to fitness for purpose is sufficient (4), because there are many gaps in the time series.
2) The most important characteristic is the eel capture production.
3) The element that most affects the quality of this product is the **completeness** because there is a large amount of missing data in the corresponding dataset. **Thematic accuracy** is also an issue because each country has developed a different system for recording eels, and in some cases this has only very recently been implemented. According to COUNCIL REGULATION (EC) No 1100/2007, "Establishing measures for the recovery of the stock of European eel", there has been a unified effort to develop an official system of recording eels measurements. EU countries with eel habitats in their territory have drawn up and are currently implementing national eel management plans at the river-basin level.
4) The majority of available data concerning eels are possibly related to lagoon catches because in the majority of Mediterranean countries there is no professional fishing activity in rivers and, if there is, eel catches are not officially recorded. The origin of the data is not clarified in the database, therefore there is no data reliability control.
5) There are some scattered data from small studies and reports related to eel production, mostly at a national level. The FAO database was used to produce the eel time series. Although it did not provide a complete dataset, it could be a starting point for the fitness of purpose of this Targeted Product.

Expert evaluation of gaps

The gaps in the input datasets can be summarized considering a) in-situ data and b) model data.

a) In some cases, river-basin to river-basin comparisons may fail to retrieve results appropriate for our fitness of purpose because not all monitoring programs were designed to record river inputs to the sea. Therefore, despite the great effort dedicated to selecting the most representative stations from each dataset during the data binding process, only considering those located within short distances from the estuaries or the river mouth, this

was not always possible. The decision to include long distance stations (within the 100 km threshold) was taken due to the limited data availability for some basins. Due to the heterogeneous nature of the data sources compiled, a data quality control procedure is strongly recommended before any further use of the data.

According to EU legislation No 1100/2007, EU countries need to take measures that allow 40% of adult eels to escape from inland waters to the sea, where they can spawn. To meet this 40% escapement target, EU countries with eel habitats in their territory have drawn up and are currently implementing national eel management plans at the river-basin level. This could be a starting point for the recording and reporting of realistic eel data.

b) The spatial resolution of the SMHI-Hypeweb-Europe data source could be characterized as poor because river-basin boundaries were rather coarsely defined and in many cases did not even form a normal or expected river basin shape. In addition, no river or basin names were provided, so the downloaded data had to be combined with other sources to retrieve each river's name. Therefore, some "NA" values were recorded in the river and country columns because each basin only had a basin identification code and no other coding or spatial coordinates were included. In cases were the basin's identification code was not included in the GIS (shape) file on the E-HYPE webpage, “NA” was entered for that specific discharge basin’s name and country fields.

At the same time, there were no unique identification codes for the different characteristics (e.g. discharge and nutrients) of each basin. Specifically, there was a different code and a different discharge value in the discharge tub, compared to the corresponding discharge value given by the nutrient (TN, TP) pages, thus making the data comparison and unification an extremely difficult task.

TP	CH7	
1	2	
2	2	
3	2	
4	2	
5	5	2
6	2	
7	5	2
8	2	
9	4	

Table 2 Summary of the quality scores associated with each Targeted Product according to the experts’ evaluations and the evaluation scheme presented in Table 1.

Annex 1

From the MedSea Literature Survey we have extracted the following definitions:

Characteristic

In this document, a "characteristic" is a distinguishing feature which refers:

1. either to a variable derived from the observation, the measurement or the numerical model output of a phenomenon or of an object property in the environment
2. or to the geographical representation of an object on a map (i.e. a layer such as a protected area, a coastline or wrecks) by a set of vectors (polygon, curve, point) or a raster (a spatial data model that defines space as an array of equally sized cells such as a grid or an image).

Environmental matrices

This concept is introduced to avoid ambiguities when using a characteristic name such as "temperature".
The environment matrix is the environment to which a characteristic is related and we define them to be:

1. Air,
2. Marine Waters,
3. Fresh Waters,
4. Biota/Biology,
5. Seabed,
6. Human activities.

Quality principles

- ✓ ***Spatial extent***
  Box or geographic region bounding the datasets
- ✓ ***Spatial resolution*** :
  Size of the smallest object that can be resolved on the ground. In a raster dataset, the resolution is limited by the cell size.
- ✓ ***Spatial Accuracy***
  Requested closeness of coordinate values to values accepted as or being true e.g. on the base of instrumentation used
- ✓ ***Time extent***
  Time interval represented by the dataset or by the collection.
- ✓ ***Time resolution***
  Size of the smallest interval of time that can be resolved.
- ✓ ***Time Accuracy***
  Requested closeness of temporal values to values accepted as or being true.
- ✓ ***Usability***
  The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.
- ✓ ***Completeness***
  Degree of absence of data in a dataset
- ✓ ***Logical Consistency***
  Degree of adherence to format required
- ✓ ***Thematic Accuracy***
  Requested closeness of characteristic values to values accepted as or being true (the so called attribute of a data entity e.g. "wave height"). It includes the correctness of the classification of features or of their associations...