

# MACISTE-PS: a web-based information system to manage environmental data from the dredging of the Port of Genoa (Italy)

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## Introduction:

MACISTE-PS (MARine Coastal Information SysTEM – Port Section) is an advanced information system addressed to manage environmental data collected during the dredging monitoring of a Port. In particular you can insert, analyze and manage all the environmental information through a WEB Portal, interfaced with a geodatabase with spatial extension, and a WebGIS viewer (Fig. 1).

MACISTE-PS can acquire data using real-time instruments connection (buoy or ship mounted).

MACISTE-PS can be used to display data or maps and it can work as a spatial Decision Support System (DSS): in fact it allows making complex researches of heterogeneous data, aggregating results and sharing data through the web using OGC<sup>®</sup> standard protocol Web Map or Web Feature Services (WMS/WFS).

## Methods:

The data model has been developed using PostgreSQL with PostGIS spatial extension, which is dedicated to the modelling of marine coastal ecosystems. Data were inserted using automated procedures or dedicated input forms.

The web-portal can manage user-generated contents (e.g. documents, images, multimedia information) and it can provide the access to linked applications or external software component depending on the access rights.



Fig. 1: The architecture of the MACISTE [1]

MACISTE-PS works as a client in client/server model and permit the user to explore maps and associated data stored in database; moreover it offers through “GISClient” an advanced authoring tool to create thematic maps and to build complex and performing query. The query builder tool allows defining the fields for research, the formatting of data output, calculating values on the aggregated data and at last generating dynamic reports and charts.

MACISTE-PS can send alert messages about sensor warning and exceeding alert condition using a SMS and/or email alert service.

## Results:

Geodatabase contains all data and metadata relative to the samples since the beginning of the dredging (sampling station position, investigated variables, investigated compartments): presently it contains measures of ADCP and CTD collected from automated fixed stations every 15 minutes (Fig. 2). Moreover it contains the results of the physical, chemical and biological analyses on water and sediment samples, which were conducted in more than 200 sampling sites by the components of the monitoring groups, DIPTERIS (University of Genoa), ARPAL (Ligurian Environmental Protection Agency) and ISPRA (Institute for Environmental Protection and Research).



Fig. 2: Authoring tool: real-time visualization of the current flow obtained from acoustic measurements through ADCP mounted on the dam at the port of Genoa.

## Conclusion:

MACISTE-PS offers the ability to perform advanced queries on the database and to download data using a user-friendly reports. It is useful to manage such a high amount of data. It also enables to create enhanced charts of evolution of one or more investigated variables or to visualize real-time data on the web.

MACISTE-PS uses data of current flow and turbidity values to define alert condition and to generate station depending warning messages.

MACISTE-PS provides functionality that enable a continuous and detailed monitoring of the dredging area also by decision makers not used to GIS or environmental monitoring.

## References:

[1] Massa F. et al.,(2009) - Marine Coastal Information System (MACISTE): sistema integrato per la gestione ambientale di aree marine costiere - GFOSS-Day, 12 novembre 2009.