HarmoNIA project: web application for data visualisation

Damir Ivanković, Institute of Oceanography and Fisheries (Croatia)*,* ivankovic@izor.hr
Dalibor Jelavić, Instititute of Oceanography and Fisheries (Croatia), jelavic@izor.hr
Maria Eugenia Molina Jack, OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (Italy), mmolinajack@inogs.it
Marina Lipizer, OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (Italy), mlipizer@inogs.it

HarmoNIA project

Countries sharing a marine region or sub-region should adopt a common approach to environmental monitoring, good environmental status definition and assessment. In the Adriatic – Ionian marine sub-regions, the level of coherence and consistency of several EU and regional environmental policies, particularly in the assessment of contamination from hazardous substances, needs a common implementation. In the framework of enhancing the capacity to tackle environmental vulnerability and safeguard ecosystem services at transnational scale, the objective of HarmoNIA is twofold:

 - to share best practices to support the harmonized implementation of marine environmental directives in the ADRION region

 - to strengthen the network of data infrastructures to facilitate access and re-use of marine data among countries bordering the Adriatic – Ionian Seas.

In this framework, the Interreg project HarmoNIA has focused on improving available information related to pollution by hazardous substances in the ADRION area and on implementing tools to support pollution assessment and response.

Introduction

Data-sets about hazardous substances in sediment, biota and water column were prepared using the EU initiative EMODnet for the management and supply of fragmented marine data, and in the framework of HarmoNIA project. Data was extracted from EMODNet, validated and transform into csv tables. After that data was loaded into database and additional validated for duplicates and invalid values (metadata with no data, only bottom depth present). Data-sets cover Adriatic – Ionian Seas and the time frame is 1980-2017. These data derive from 10 different institutions. Data were collected in 2152 stations, sampled over 4282 times producing a final number of 95231 data values which are referred to 510 different parameters divided into 22 groups. All data are quality flagged according to a shared approach and quality flags can be used to filter data to visualise. Data-sets contain some data with access restrictions (by negotiation or academic - 6010 out of 101953). Those data are not shown as single values but are used for statistics calculations.

A dedicated web application (https://vrtlac.izor.hr/ords/harmonia/) developed in the framework of the project HarmoNIA shows station locations and graphical representations of data. Users can filter data by: year, project, institution, cruise, parameter group and specific parameter. Data filter is adoptive, that means that changing each category, values in all other categories are re-calculated with values according to the new criteria. For example if user choose particular years, all other categories are restricted according to data available in those years (cruises from that year, parameters...). This approach helps users to quickly gain insight into which data are available.

After setting filters and defining data subset, graphical data visualisation helps to understand the spatial/temporal distribution of contaminant concentration. In addition, basic statistics for selected

subset of data are available: number of stations and values, minimun and maximum values and stations where these values are present, average, standard deviation and variance.

Methodology

Relational database used for web application is Oracle 19.3 standard edition 2 database. As application server Tomcat 9 is used. Oracle locator is used for storage of spatial data. Various JavaScript frameworks are used for advanced browser side data manipulations and visualisations (JQuery, BackGrid, Highcharts and Google Maps API v3). JavaScript is used to pair graph elements and station markers (Figure 1). Column graph is used when visualised subset contain only one value per station, and lines with negative y axis (depth), when there are values from different depths.
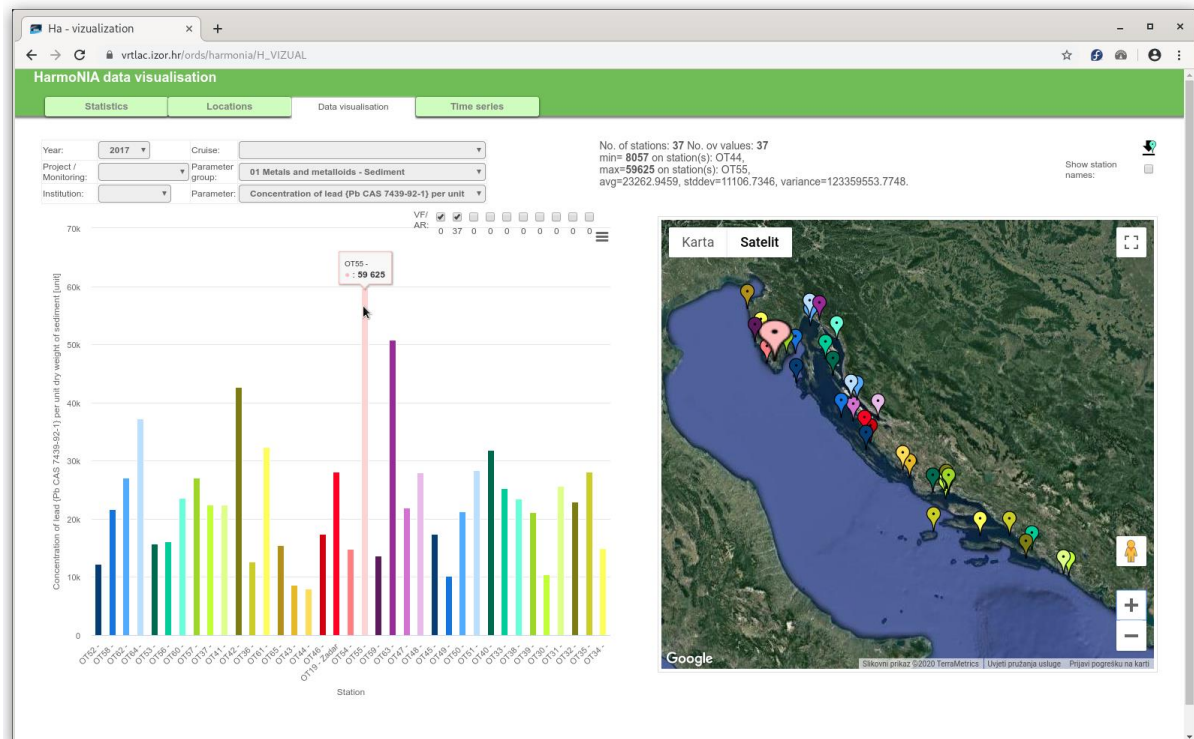

Figure 1: Application interface with highlighted paired elements for data visualisation (column and enlarged station marker)

Conclusion

Oceanographic research and monitoring are very relevant and expensive. It is important that data produced by research are used more than once, and in the proper way. Good visualizations help to better evaluate the state of marine environment. One of the tasks of HarmoNIA project was to harmonize methodologies used by different institutions. Additionally, this web application shows data heterogeneity, and lack of constant and coordinated monitoring efforts of hazardous substances in the Adriatic-Ionian region. Together with other project outputs, web application will help to address the needs of future research and monitoring.

Acknowledgment