UPGRADE BLACK SEA SCENE: DEVELOPING A RESEARCH INFRASTRUCTURE FOR THE BLACK SEA

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ABSTRACT

The Upgrade Black Sea SCENE (2009-2011) is an international research project supported by the 7th Framework Programme of European Commission. The basis of the project is formed by the FP6 Research Infrastructure "Black Sea SCENE" (Black Sea Scientific Network) which started 1st December 2005 and ended 30th November 2008. The later project established a scientific network of leading environmental and socio-economic research institutes, universities and NGO's from the countries around the Black Sea. It was launched a first version of a distributed virtual data and information infrastructure for the Black Sea. The infrastructure is populated and maintained by the organizations and aims at improving the identification, access, exchange, quality indication and use of their data and information about the Black Sea. The present project expands the existing Black Sea Scientific Network with 19 additional marine environmental institutes and universities from the six countries around the Black Sea coastal state. The new partners will become well acquainted with European guidelines and directives, such as European Water Framework Directive. Finally existing national Data Quality Control methods of all data centres will be analyzed and compared with European quality methods, guidelines and practices.

KEY WORDS: present and future tendencies, Black Sea Scientific Network, marine environmental data, marine data quality control/assessment procedures

INTRODUCTION

The EU member States and New Independent States of the former Soviet Union around the Black Sea including the Black Sea regional institutes are becoming an axis of increasing geo-political importance for Europe. Nowhere is regional environmental cooperation busier, as necessary and more diverse - unique eco-systems and interests ranging from shipping to tourism, fisheries to oil pipelines. Ranked among the most threatened basins in the World Ocean, the Black Sea ecosystem has undergone dramatic alterations that had severe impact on biological diversity and the goods and services it could provide.

Marine environmental and socio-economic management and assessment on regional scale normally require multinational effort by the states bordering the sea area in question, and can only be effective if there is an appropriate overview of the availability, as well as a high degree of compatibility, accessibility and inter-changeability of scientific knowledge and expertise, quality controlled marine environmental and socio-economic data and information and availability of an operational data and information exchange infrastructure. Within the Black Sea region, the environmental and socio-economic policy, management and administration are not appropriately coordinated.

Upgrade Black Sea SCENE represents an important step in improving this situation. The existing Black Sea Scientific Network mobilized a large number of leading environmental and socio-economic research institutes and universities from the countries around the Black Sea (http://www.blackseascene.net). This will result in a research infrastructure with an improved regional coverage and broader inclusion of marine disciplines, bringing together and supporting 51 partners from Bulgaria (7), Georgia (6), Romania (3), Russian Federation (8), Turkey (7), Ukraine (10) together with 7 partners from EU member states, one associated state and two international associations/bodies.

Up-grade Black Sea SCENE Partners:

The consortium of UPGRADE BLACK SEA SCENE is the following: Marine Informatic Service MARIS BV (NL) as coordinator, and International Bureau For Environmental Studies IBES (BE), Institut Meteorologii I Gospodarki Wodnej (PL), Marine Sampling (NL), Fieldfare International Ecological Development Plc (UK), Marine Hydrophysical Institute - Ukrainian National Academy of Sciences (UA), Ukrainian Scientific and Research Institute of Ecological Problems (UA), Odessa National I.I. Mechnikov University (UA), M.V.Lomonosov Moscow State University (RU), P.P. Shirshov Institute of Oceanology of Russian Academy of Sciences (RU), Institute of Limnology - Russian Academy of Sciences (RU), Space Research Institute of Russian Academy of Sciences (RU), All-Russian Research Institute of Hydrometeorological Information-World Data Centre (RU), Middle East Technical University (TR), Sinop University Sinop Fisheries Faculty Snu Ff (TR), Karadeniz Teknik Universitesi (TR), Institute of Oceanology - Bulgarian Academy of Sciences (BG), Technical University of Varna (BG), Institute of Fishing Resources (BG), National Institute for Marine Research and Development "Grigore Antipa" (RO), National Institute of Marine Geology and Geoecology (RO), Ivane Javakhishvili Tbilisi State University(GE), The Centre for Monitoring and Prognostication of The Ministry of Environment Protection and Natural Resources of Georgia (GE), Mikheil Nodia Institute of Geophysics (GE), Black Sea NGO Network (BG), A.O. Kovalevskiy Institute of Biology of Southern Seas (UA), Hellenic Centre for Marine Research (GR), Gosudarstvennoe Uchrezhdenie Gosudarstvenniy Okeanograficheskiy Institut-State Oceanographic Institute (RU), Institute of Hydrometeorology (GE), Gamma Ltd (GE), Institute of Water Management (GE), Taurida V.I. Vernadsky National University (UA), Institute of Geological Sciences National Academy of Sciences of Ukraine (UA), Ukrainian Scientific Research Hydrometeorological Institute - Marine Branch (UA), Southern Scientific Research Institute of Marine Fisheries And Oceanography (UA), Institut Geoekologii Rossiyskoy Akademii Nauk (RU), Research Centre Dynamics of the Nearshore Zone (RU), University of Mining and Geology "Saint Ivan Rilski"(BG), Central Laboratory of General Ecology – Zentralna Laboratoriya Po Obschta Ekologiya (BG), National Institute of Meteorology and Hydrology of the Bulgarian Academy of Sciences (BG), Danube Delta Biosphere Reserve Authority (RO), Dokuz Eylul Universitesi (TR), Istanbul University (TR), Ankara Universitesi (TR), Balkan Environmental Association (GR), Permanent Secretariat of the Commission on the Protection of the Black Sea Against Pollution (TR), United Nations Educational, Scientific and Cultural Organization – UNESCO (BE), Ukrainian

Scientific Centre of Ecology of the Sea (UA), Danube Hydro-Meteorological Observatory (UA), University of Cyprus (CY).

EU Consult (NL) and MT Consultancy (BG) are subcontractors of MARIS.

The Black Sea SCENE research infrastructure is stimulating the scientific cooperation, exchange of knowledge and expertise, and strengthen the regional capacity and performance of marine environmental data & information management, underpin harmonization with European marine data quality control/assessment procedures and adoption of international meta-data standards and data-management practices, providing improved data and information delivery services for the Black Sea region at a European level.

The main objectives are:

- To extend the existing research infrastructure with 19 additional marine environmental institutes/organizations from the six Black Sea countries, bringing the total to 51 partners;
- To achieve interoperability between the 41 data centers in the network by adopting and implementing the standards and software tools as developed and implemented in the SeaDataNet infrastructure project;
- To populate the Black Sea SCENE data and information infrastructure providing on-line access to marine data, meta-data and data products of the Black Sea;
- To adopt standardized methodologies for data quality checking to ensure the quality, compatibility and coherence of the data issuing from so many sources.

METADATA SERVICES

In the frame of Upgrade Black Sea SCENE are so-called Version 1 (V1) services, a number of metadata services, mainly catalogues, which have been developed to support the research in and around the Black Sea. The services are closely related to the services developed within SeaDataNet, but their interface is developed by the BlackSeaSCENE partners specifically for BlackSeaSCENE purposes.

The metadata services are aimed to make Black Sea scientific information and data easier traceable by scientists and the general public and can be divided in:

- EDMED - European Directory of Marine Environmental Dataset

- EDMERP - European Directory of Marine Environmental Research Projects
- EDMO - European Directory of Marine Organisations active in Black Sea region
- CSR - Directory of Cruise Summary Reports in the Black Sea
- Scientists - Directory of Marine Scientists active in Black Sea region
- Black Sea Bibliography
- Black Sea Socio-Economic Data
- Black Sea data products - An overview of specific data products developed under SeaDataNet by Black Sea partners
- Marine Biology
- Data quality control

1. European Directory of Marine Environmental Dataset (EDMED) is a comprehensive reference to the marine data sets and collections held within European research laboratories. EDMED covers datasets from a wide range of disciplines including: marine meteorology; physical, chemical and biological oceanography; sedimentology; marine biology and fisheries; environmental quality; coastal and estuarine studies; marine geology and geophysics, etc.

Data sets are described in EDMED factsheets irrespective of their format (e.g. digital databases or files, analogue records, paper charts, hard-copy tabulations, photographs and videos, geological samples, biological specimens etc). Currently, full EDMED describes more than 3,500 data sets, held at over 700 Data Holding Centres across Europe. Black Sea EDMED describes more than 470 datasets held at Black Sea organisations.

2. **European Directory of Marine Organisations** ***Marine Organizations (EDMO)***. The Black Sea directory of Marine Organisations is based on EDMO - European Directory of Marine Organisations. EDMO contains up-to-date addresses and activity profiles of research institutes, data holding centres, monitoring agencies, governmental and private organisations, that are in one way or another engaged in oceanographic and marine research activities, data and information management and/or data acquisition activities. Currently, full EDMO lists and describes more than 1,500 organisations. Black Sea EDMO contains around 170 organisations.

3. Directory of Cruise Summary Reports (CSR) are the usual means for reporting on cruises or field experiments at sea. Traditionally, it is the Chief Scientist's obligation to submit a CSR to his/her National Oceanographic Data Centre (NODC) not later than two weeks after the cruise. This provides a

first level inventory of measurements and samples collected at sea. Currently, the CSR directory covers cruises from 1873 till today from more than 2,000 research vessels: a total of nearly 40,000 cruises, in all European waters and global oceans. This also includes historic CSRs from European countries, that have been loaded from the ICES database from 1960 onwards. It contains information on research cruises made by the Black Sea institutes and have been upgraded and added under the Black Sea SCENE project.

4. Directory of Black Sea Scientists **-** an important part of the work during the Black Sea SCENE I project has been to collect information about active scientists in the Black Sea region. This information supports science and the Black Sea SCENE network, and can also be used by the public and institutes from outside the EU to learn more about the capacities of the Black Sea researchers. This Directory of Marine Scientists, active in the Black Sea region, is a specific Black Sea SCENE development and supplies contact information of scientists for companies and other scientists willing to undertake research in the Black Sea region. The database, content management system and user interface has been created by All-Russia Research Institute of Hydro-meteorological Information - World Data Centre (RIHMI-WDC) and has been fully filled, checked and updated by all BlackSeaSCENE partners.

5. Black Sea Bibliography **-** includes available Black Sea marine research literature (reports/articles, etc.) This information supports science and the Black Sea SCENE network, and can also be used by the public and institutes from outside the EU to learn more about the available results of Black Sea research. The database, content management system and user interface has been created by RIHMI-WDC and has been fully filled, checked and updated by all Black Sea SCENE partners.

6. Black Sea Socio-economic data – Black Sea socio-economic data an overview of available has been initiated and collected by the partners. This information supports marine environmental science and the Black Sea SCENE network, and can also be used by the public and institutes from outside the EU to learn more about the Black Sea threats, conditions, etc.

7. Data products **-** this section presents a number of Black Sea Products developed under the framework of the Joint Research Activity (JRA) 6 of the SeaDataNet Project. The products are: Black Sea climatic maps and fields prepared for *in situ* physical parameters and characteristics of O_2-H_2S interaction zone; averaged maps and fields of sea surface parameters obtained from satellite data. The goal of the this action is preparation and dissemination of regional products like statistical mean, seasonal and monthly climatological fields and trends from all available historical and recent data collected over the Black Sea.

8. Marine Biology – Beside physical oceanographic data and data quality procedures, also marine biology plays an important role. This has two main reasons: The Black Sea is a unique ecosystem and is therefore a very interesting area. But it is also a much threatened region with high ecological pressure from the surrounding countries and exotic species. During the project a start has been made on three catalogues informing users about important biological issues:

- Mnemiopsis leidyi Database - A database of a small but harmful type of jellyfish, abundant in the Black Sea. This species created the tremendous ecosystem damage and big economic losses in the region in the late ‘80ies, ‘90ies. It was recognized as one of the main ecological threats for the Black Sea ecosystem.
- Black Sea Zooplankton Checklist - The Black Sea zooplankton checklist is being created for marine biologists working with Black Sea plankton. The aims of Black Sea plankton checklists are to be the source of reliable species information, to fill the gaps within global checklists and to serve as the quality control tool for Black Sea plankton data.
- Black Sea Phytoplankton Checklist - A species list and identification checklist (in Wiki-form) of phytoplankton in the Black Sea. Identical to the Zooplankton list wiki pages about phytoplankton have been developed.
- Marine Protected Areas - According to the UNEP-World Conservation Monitoring Centre (World Protected Areas Data Base, 2008), some 125 protected areas have been designated bordering the Black Sea coast.

DATA ACCESS SERVICES

The Black Sea SCENE data and information infrastructure gives unified online access to marine data managed by the 41 Black Sea data centres via the Common Data Index (CDI) service. It gives users a highly detailed insight in the geograpghical coverage, other metadata features and access conditions of marine data across the different data centres. Users can request access to identified datasets in a harmonised way, using a shopping basket. Users can follow the processing of their requests via an on-line transaction register and can download datasets in standard formats (Fig. 1).

PROMOTION AND DISSEMINATION

The Upgrade Black Sea SCENE partners are proactive addressing the end-users community to promote and disseminate the project’s activities and results by direct links and formal/informal consultation platforms with regional, national and international governments, marine

research and educational institutes, marine industries (pipelines, offshore, shipping, fishery, telecommunication, land reclamation, marine infrastructural works) and private companies using environmental and socio-economic data and information.

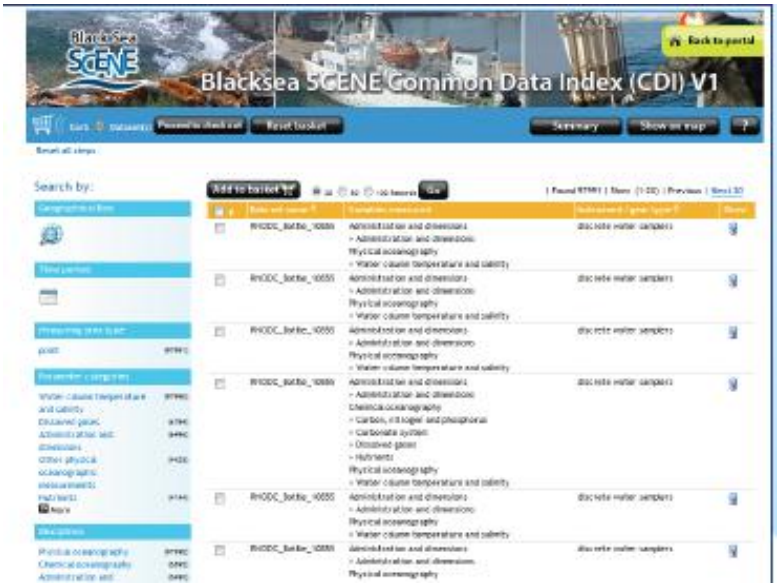

Fig. 1 - Data access service – Black Sea Common Data Index (CDI)

Dissemination is taking through:

1. Balkan Environmental Association (BENA) - Task leader (http://www.gen.teithe.gr/~bena),
2. Centre of Excellence for Sustainable Development and Management of the Black Sea Region, located at Institute of Oceanography – Bulgarian Academy of Science (CESUM) (http://www.io-bas.bg/cesum-bs),
3. Black Sea NGO Network (BSNN) (http://www.bsnn.org),
4. Permanent Secretariat of the Commission on the Protection of the Black Sea against Pollution - Black Sea Commission Secretariat (BSCS) (http://www.blacksea-commission.org),
5. Subcontractor MT Consultancy.

CONCLUSIONS

Black Sea SCENE Network underlines the importance of the collaboration due to the European research community by providing an overview and accessibility of quality controlled, quality comparable and interchangeable marine environmental and socio-economic Black Sea data by integrating scattered marine databases and collections. These types of information are fundamental to many researchers working within the framework of the global change and ecosystems sub-priority, as well as to sustainable development and management of European marine ecosystems.

Upgrade Black Sea SCENE will strengthen the contribution to necessary data and information logistics for research on the sustainable development and rehabilitation of the Black Sea ecosystem, and its sustainable policy making, management and administration.

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