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The Black Sea Environment Project (enviroGRIDS)  
Report

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## The Black Sea Environment Project (enviroGRIDS) Report

The enviroGRIDS project in the Black Sea catchment is bringing together several emerging information technologies that are revolutionizing the way we are able to observe our planet. Building a data-driven view of Black Sea catchment that feeds into models and scenarios to explore its past, present and future. The outputs of the project will provide spatially explicit data and knowledge as contributions to the Global Earth Observation System of Systems (GEOSS).

As the principal aim of the enviroGRIDS project is to build capacity in new Earth Observation systems in the Black Sea region, a specific strategy was developed, operating at three levels: human, institutional and infrastructure. At the human level, the main objectives are to inform policy and decision makers about GEOSS and INSPIRE capacities, to teach scientists how to install SDI nodes, and to teach the project partners to become trainers themselves. At the institutional level, we are targeting the needs of three main end users: the Commission on the Protection of the Black Sea Against Pollution (BSC PS), the International Commission for the Protection of the Danube River (ICPDR) and the United Nations Environment Program (UNEP). Their involvement as active end-users of the enviroGRIDS Observation System will help bridge the gap between science and policy, and prepare the way for many others by demonstrating good practices. At the infrastructure level, we are supporting the development of SDI nodes among our partners that will serve as the base for the BSC OS. We are also developing new ways of integrating a Spatial Data Infrastructure (SDI) with Grid computing infrastructures.

The results of this project will provide useful information of current and future status of water resources in Black Sea catchment to support the BSC PS and the ICPDR to meet the challenges posed by eutrophication, water scarcity and climate change across the region.

Selected outcomes of the project:

- a gap analysis of existing regional data and observation systems to prepare recommendations for improvement of networks for data acquisition in the region/country;
- an improved regional network to coordinate the efforts of partners active in observation systems;
- a spatial data infrastructure to link, gather, store, manage and distribute key environmental data;
- access to a grid computing backend infrastructure to allow computationally intensive calculations on high-resolution spatial datasets;
- real-time access to sensors and satellites data;
- spatially-explicit scenarios of key changes in land cover, climate and demography;
- a calibrated hydrological model for the entire Black Sea catchment;
- a streamlined production of indicators on sustainability and vulnerability in the Water Societal Benefit area;
- capacities developed in the implementation of many new Spatial Data Infrastructure (SDI) frameworks (GEOSS, INSPIRE, UNSDI).

## **1 KEY ACHIEVEMENTS IN 2010**

The second year of the project started with a very intense and successful General Assembly in Bucharest and Tulcea (Romania) in May 2010. This was an opportunity to organize for the first time two workshops addressing the needs of high-level decision makers on the one hand, and those of database managers willing to learn about solutions to bring GEOSS into practice on the other.

The first 18-month periodic report in September 2010 demonstrated how active the enviroGRIDS consortium is with participation in more than 50 conferences and meetings, 28 publications, and 25 deliverables.

## **2 HIGHLIGHTS FOR 2011**

In April 2011, we launched the new project website that is distributing the general information about the project and will serve as a one entry point to access the different web services components of the enviroGRIDS Observation System under construction. The enviroGRIDS system resources and functionalities are accessible to the large community of users through the portal that provides Web applications for data management, hydrologic models calibration and execution, satellite image processing, report generation and visualization, and virtual training centre. The portal publishes the geospatial functionality supported through Web technologies and the high power computation of the Grid infrastructure.

A gap analysis informed us about the availability of datasets and data services in the Black Sea catchment that resulted in the selection of two new partners from Russia and Turkey.

The first environmental datasets created by EnviroGRIDS are based on environmental scenarios for the Black Sea Catchment using an integrated modelling framework called METRONAMICA, which was developed by the RIKS firm in 2005. It is a spatially-dynamic land use model that is able to analyze the effects of alternative policy scenarios on the quality of the socio-economic and physical environment in cities, regions or countries. The system creates dynamic year-by-year land use maps as well as spatially explicit socio-economic and environmental indicators represented at high spatial resolution.

The second main data output of the project comes from the Soil Water Assessment Tool. SWAT is a hydrologic program used for large-scale simulations. The model is developed to quantify the impact of land management practices on water, sediment and agricultural chemical yields in large complex watersheds with varying soils, land uses and management conditions over long periods of time. This watershed-scale program performs simulations that integrate various processes such as hydrology, climate, nutrient cycling, soil temperature, sediment movement, crop growth, agricultural management and pesticide dynamics

Both scenarios and SWAT outputs will be loaded into the enviroGRIDS geoportal, and shared through web services registered in GEOSS. The enviroGRIDS geoportal will also welcome the web services illustrating different case studies on various societal benefit areas.

So far, the main concern has been the difficulty of accessing data from various institutions for the calibration of a key hydrological model. We therefore prepared a policy brief to help convincing data holders to release their data and metadata for the project and beyond. However, we are confident that satisfactory outcomes for the hydrological models are ensured even with the data currently at hand within the consortium.

### **3 NEXT PRIORITIES FOR 2012**

While the enviroGRIDS project is particularly targeting the needs of GEOSS, the importance of addressing as well the specific requirements of the European directive INSPIRE is becoming more and more an evidence as most of the countries belonging to the Black Sea catchment are now required to fulfil their obligations to share spatial information. Additionally, GEOSS and INSPIRE are clearly focusing on data sharing. EnviroGRIDS is already looking ahead by exploring how the increasing amount and quality of data being made available can be processed in an efficient manner. The main avenues being explored by the project are parallel computing on the largest scientific GRID infrastructure, and the development of web processing services that should allow us to process data on-the-fly in order to bring up-to-date information to targeted end-users (BSC PS, ICPDR and UNEP). The final conference of the project will be organized in October 2012 jointly with BSC PS in Istanbul during the Black Sea Day at the Istanbul Technical University (ITU).

Finally, probably one of the most successful achievements of this capacity building project so far is the course “Bringing GEOSS into practice” that was given already in 4 locations around the Black Sea. All the material of this course is available from the project web site (<http://www.envirogrids.net/>).