ADDRESSING SOCIETAL CHALLENGES IN THE BLACK SEA CATCHMENT THROUGH INNOVATIVE EARTH OBSERVATION SYSTEM OF SYSTEMS

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Key-words: GEOSS, Societal Benefit Areas, Black Sea, Danube, data sharing, spatial data infrastructure.

The Black Sea catchment is internationally known for its historical and cultural diversity and richness, but unfortunately also for its ecologically unsustainable development and inadequate resource management, which has led to severe environmental, social and economic problems. The EU FP7 enviroGRIDS project (Lehmann et al. 2014) addresses these issues by bringing several emerging information technologies that are revolutionizing the way we are able to observe our planet. The Global Earth Observation System of Systems (GEOSS: http://www.earthobservations.org) is building a data-driven view of our planet that feeds into models and scenarios to explore our past, present and future. EnviroGRIDS aims at building the capacity of scientist to assemble such a system in the Black Sea Catchment, the capacity of decision-makers to use it, and the capacity of the general public to understand the important environmental, social and economic issues at stake.

EnviroGRIDS is built around several pilot studies addressing several of the nine societal benefit areas proposed by GEOSS: water, weather, climate, ecosystem, biodiversity, agriculture, energy, health and disasters. The objective of this special is to show how current developments in environmental data sharing can help addressing new environmental and societal challenges. The outputs of these pilot studies were themselves made available as web services on the enviroGRIDS data portal (www.envirogrids.cz/pilots) through a dedicated spatial data infrastructure (SDI) (Giuliani et al. 2013).

In the first paper, Constantinescu et al. (this issue) are predicting the shift of Alpine grasslands according to climate changes by comparing two different methods to predict ecosystem distribution (MAXENT et BIOCLIM). The obtained distribution maps indicate vulnerability areas with higher biodiversity loss that are of particular interest and should be monitored. The output of the models are contributing to the Black Sea catchment Observation Systems to be further accessible to scientists, decision-makers and the general public.

The second paper by Gastescu et Grigoras (this issue) reviewed the morphological changes on the coast of the Danube Delta in Romania. To identify portions of advancement and retreat, and setting the corresponding annual rates, existing topographic map series for a period of over 150 years, hydrographic measurements for 30 years and series of satellite images starting from 1975 were used.

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In a very similar paper, Gazyetov et Sizo (this issue) followed the Ukrainian coastline dynamics of the Northern arm of the Danube. Long-term trends were assessed based on original Landsat remote sensing data with spatial resolution of 30 m and time interval of 4 to 7 years. The relevance of original information and advantages of modern GIS-technologies allowed obtaining new information about long-term delta processes that are useful for the management of the Delta.

Dumitraşcu et al. (this issue) are assessing the occurrence, development and spread the main Invasive Terrestrial Plant Species (ITPS) in the Romanian protected areas. They developed a model of ITPS potential distribution in protected areas within the different biogeographical regions of Romania. This approach should support measures to eradicate or prevent the introduction of invasive species and control their already existing habitats. It represents the most cost-effective means to avoid or reduce the risk of long-term ecological, economic and social costs of their invasion.

In a fifth paper, Gonca Bozkaya et al. (this issue) are monitoring land use change in the Igneada forest of Turkey from multitemporal Landsat images. As a result of the land use/cover change and human activities, environmental degradation affected especially the forest areas between 1984 and 2010. Therefore, in order for the Igneada region to keep the sustainability of natural life resources, effective management strategies should be followed. Especially human activities should be planned carefully.

The next paper by Makarovskiy and Zinych (this issue) is assessing wind energy potential over Ukraine. The proposed methodology has numerous advantages: a simple algorithm, a minimum set of input data, and highly reliable results. According to the obtained results, the southern and eastern parts of Ukraine have outstanding wind potential.

In Cheroy et al. (this issue), the results of field observations on the dynamics of the marine edge of the Danube Delta in 2011–2012 is described. The results describe the littering of the sea edge of the Danube Delta with plastic waste, the registration of the dead dolphins, as well as description of the vegetation changes. The greatest impacts are due to the reduction of the Danube sediment runoff, the redistribution of the water flow between the different Danube arms, as well as the rise of the Black Sea level.

Snigirov (this issue) present an ichtyological study of the Dniester Delta to assess its biodiversity and species rarity. Decrease in fish species composition has been shown, as well as the disappearance of some native reophilic and lithophilous fish species as the result of the Dniester River discharge regulation.

Finally, in Mitrică (this issue) a demographic study is presented on the changes of urban population in Romania during the post-communist period. The results show how during this period the demographic structures changed with an increase in female population, a decrease in the young population, and an increase again in mature and elderly people.

Two other special issues were published on the enviroGRIDS project. The first one was published in the International Journal of Advanced Computer Science and Applications (IJACSA) and is describing all the technical aspects developed to build the Black Sea catchment observation system (editorial: Giuliani et Gorgan, 2013). The second special issue was prepared for Environment Sciences and Policy (editorial: Lehmann et al. 2014) to present the main outcomes of the project such as climatic, demographic and land use scenarios, as well as hydrological modelling, sustainable energy potential, or coastal erosion.

This entire set of publications gathered in three special issue represent the main scientific outputs of the enviroGRIDS project. While some progresses were made in order to improve the use of Earth observation on different societal benefit areas in the Black Sea region, a lot of work is still needed to transform the mentality of scientists, decision makers, politicians and the general public. The necessity to better share the observation on our environment remains a prerequisite to any sustainable development.

Acknowledgements

The authors would like to acknowledge the European Commission "Seventh Framework Program" that funded the enviroGRIDS project (Grant Agreement no. 227640).

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Received October 20, 2014