

# **Міжнародна співпраця і управління транскордонним басейном для оздоровлення річки Дністер**

**Матеріали Міжнародної конференції  
Одеса, 30 Вересня-1 Жовтня 2009**



**Transboundary river basin management  
and International cooperation  
for healthy Dniester**

**Proceedings of the International Conference  
Odessa, September 30-October 1, 2009**

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Odessa Regional Water Management Department  
Odessa Regional State Department of Environmental Protection  
Odessa State Ecological University  
Women in Europe for a Common Future (WECF)  
Black Sea Women's Club

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## **Международное сотрудничество и управление трансграничным бассейном для оздоровления реки Днестр**

Материалы Международной конференции  
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лесного хозяйства. нами поставлена задача доработать существующие методики и коэффициенты перерасчёта в МДЖ, а также адаптировать существующие формулы и схемы расчёта для отрасли лесного хозяйства.

## INVESTIGATIONS IN THE FRAMEWORK OF FP7 ENVIROGRIDS@BLACK SEA CATCHMENT PROJECT

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It is known that the Dnister River basin including its delta is the unique area of the Black Sea catchment with its important natural resources and recreational potential. The Black Sea Catchment is internationally known as one of ecologically unsustainable development and inadequate resource management, which has led to severe environmental, social and economic problems. Last years in the Dnister basin as in the whole catchment of the Black Sea quality of Environment and quality of life are decreased. Negative impact of organic and biogenic pollutions to the Black Sea from the Dnister River increased.

Efforts of the Black Sea countries for protection, conservation and improvement of Environment of the Black Sea were finally realized in the Convention for Protection of the Black Sea Against Pollution signed by the Black Sea countries. Current process of Convention requirements implementation is very slowly because the real information about the state of Environment and economics in the Black Sea catchment and in the coastal and open waters of the Black Sea are insufficient and scanty, especially if we want to forecast long-term tendencies or to evaluate influence of climate change to sustainability of Ecosystems and economics of this region.

For development of the processes of collecting and processing huge volume of information about the state of environment, climate changes and economics of the Black Sea countries in the Black Sea catchment we need to have new methodology and approaches with introduction of new observation and information treatment technologies as old classic methods are very expensive and ineffective.

In the last years the Group on Earth Observation Systems of Systems (GEOSS) is building a data-driven view of our planet that feeds into models and scenarios to explore our past, present and future. The first step for the new systems and methodology for new regions development is the creation of new scientific background.

For development joint Environment observation system in the Black Sea catchment which will collect scientific and routine data for assessment, forecasting and sustainable planning Geneva University as the leading organisation created Consortium of 26 scientific organizations in 2008. In April 2009 the FP7 project "ENVIROGRIDS "Building Capacity for a Black Sea Catchment Observation and Assessment System supporting Sustainable Development" started (<http://www.envirogrids.net>). This project is coordinated by Dr. Anthony Lehmann. The project comprises 27 partners from 15 countries representing also several European (CERN, EEA) and United Nations organisations (UNEP, UNESCO) and the Black Sea Commission. 22 of them belong partially or entirely to the Black Sea Catchment (Russia, Turkey, Ukraine, Georgia, Romania, Bulgaria and others). 6 partners are from Ukraine. Partners were chosen for their expertise in several fields of environmental sciences and information technologies and because they are all dealing with spatial data handling. They have a very strong and direct interest in Observations Systems. Together they form a very strong consortium that will be able to raise significantly the public awareness in different Societal Benefits Areas, to build decision-makers capacity to use Observation Systems, and scientists capacity to construct them and feed them with quality information.

The EnviroGRIDS aims mainly 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 will particularly target the needs of the Black Sea Commission (BSC) and the International Commission for the Protection of the Danube River (ICPDR) in order to help bridging the gap between science and policy.

The scientific aim of the EnviroGRIDS project is to assemble an observation system of the Black Sea catchment that will address several GEO Societal Benefit Areas within a changing climate framework. This system will incorporate a shared information system that operates on the boundary of scientific/technical partners, stakeholders and the public. It will contain an early warning system able to inform in advance decision-makers and the public about risks to human health, biodiversity and ecosystems integrity, agriculture production or energy supply caused by climatic, demographic and land cover changes on a 50-year time horizon.

The technical objectives of the EnviroGRIDS project are to:

- run a gap analysis of existing regional observation systems to prepare recommendations for improvement of networks of data acquisition in each region/country,
- build capacity on observation systems in the Black Sea catchment,
- improve regional network to coordinate the efforts of partners active in observation systems,
- link, gather, store, manage and distribute key environmental data,
- develop the access to real time data from sensors and satellites,
- create spatially explicit scenarios of key changes in land cover, climate and demography,
- distribute large calculations and datasets on large computer clusters,
- streamline the production of indicators on sustainability and vulnerability of societal benefits,
- provide a standard for integrating data, models and information and communication tools,
- provide policy-makers and citizens with early warning and decision support tools at regional, national and local levels,
- produce innovative tools to visualize and interpret data and results of integrated models,
- alert citizens concerning exposure to environmental risks,
- build capacities in the implementation of many new European and World's standards and frameworks (INSPIRE, GEOSS, OGC,...).

EnviroGRIDS is clearly going beyond the state of the art in the Black Sea region by adopting a catchment approach and by tackling several societal benefits areas together. By using the most powerful computer network of the world it is clearly showing the direction on how to analyse the increasing amount of global data made available throughout the planet. It is bringing crucial information in a relatively data-poor region on future scenarios of expected climate, demographic and land cover changes. Based on the outputs of these scenarios it is building geoprocessing services in key societal benefits areas that will be connected back to the GEOSS.

The main innovations planned for the Black Sea basin communities are to:

- Contribute to free publicly-funded data through interoperable databases and services.
- Streamline data process from data warehouses, to scenarios, hydrological models, impacts assessments and finally to disseminations tools.
- Use grid-enabled computer technology to store and analyse environment data.
- Gridify the code of hydrological model calibration and validation.
- Create regional scenarios of development in function of expected climate, land cover and demographic changes.
- Build efficient virtual and life trainings on EnviroGRIDS main topics.
- Make available useful open source software and data on DVD and on Internet.
- Raise public and decision-makers awareness through innovative collaborative systems.



- Provide an early warning system to inform the citizens and decision-makers on environmental vulnerability and risks associated to selected Societal Benefit Areas.

EnviroGRIDS @ Black Sea Catchment aims at building capacities in the Black Sea region to use new international standards to gather, store, distribute, analyze, visualize and disseminate crucial information on past, present and future states of this region, in order to assess its sustainability and vulnerability. To achieve its objectives, EnviroGRIDS will build an ultra-modern Grid enabled Spatial Data Infrastructure (GSDI) that will become one component in the Global Earth Observation System of Systems (GEOSS), compatible with the new EU directive on Infrastructure for Spatial Information in the European Union (INSPIRE). EnviroGRIDS is indeed officially registered as a specific task in the GEO work plan 2009-2011.

For implementation of the project tasks the first step will be gap analysis to identify areas where most efforts are needed to reinforce existing observation systems in this region. Then, spatially explicit scenarios of key drivers of changes such as climate, demography and land cover will be created. These scenarios will feed into hydrological models calibrated and validated for the entire Black Sea Catchment. EnviroGRIDS will rely on the largest GRID computing infrastructure in the world (EGEE) that will transform elements of software underpinning scenarios and models onto a grid enabled system. The combined impacts of expected climatic, demographic, land cover and hydrological changes will be measured against GEO Societal Benefit Areas. Specific outcomes will be analyzed and made accessible to both the expert and non-expert public through a state-of-the-art web interface providing advance warning to target audiences about risks. The know-how and results of the project will be made available to countries within the Black Sea Catchment, and to the rest of the world, by providing a free and open source "do-it-yourself toolkit" downloadable from the Internet or provided on DVDs.

Based on the generated outputs, a Uniform Resource Management concept introduced by NaturNet-Redime project will be set up to support sharing of relevant knowledge and regional networking. Targeted workshops and course (both in-person and virtual) will be prepared on key domains. Through the combination of these activities, the consortium will greatly improve data access, use and utility in the Black Sea catchment. It will significantly build local, national and regional capacity on Observation Systems in order to better exchange knowledge and information and guide the region towards more sustainable development.

With its ambitious objectives, EnviroGRIDS will be able to become a contributor to the Global Earth Observation System of Systems (GEO 2005) to help addressing societal benefits such as reducing human exposure to disasters, understanding key environmental factors, improving management of energy resources, understanding, assessing, predicting, mitigating, and adapting to climatic change, improving water resource management and weather information, managing terrestrial, coastal, and marine ecosystems, supporting sustainable agriculture and combating desertification, and conserving biodiversity.

Regional organisations (such as the Black Sea International Commission, or International Commission for the Protection of the Danube River) and countries will be able to take advantage of EnviroGRIDS to analyse large environmental datasets in a harmonised way in order to support the conceptualization and implementation of environmental and relevant sustainable development policies.

Several of the environmental topics mentioned are clearly related and interdependent. As climatic change is becoming a worldwide concern that will affect many areas of human activities, the last report of the Intergovernmental Panel on Climate Change (IPCC 2007c, a, b) predicts important changes in the coming decades that will not only modify climate patterns in terms of temperature and rainfall, but will also drastically change freshwater resources qualitatively and quantitatively, leading to more floods or droughts in different regions, lower drinking water quality, increased risk of water-borne diseases, or irrigation problems. These changes may trigger socio-economic crises across the globe that need to be addressed well in advance of the events in order to reduce the associated risks.

Indeed, as documented by several assessments, humans are exerting significant impacts on the global water system (GWSP 2005) through activities such as the modification of the hydrological cycle, the accelerated melting of snow and ice in alpine zones, the removal of trees that lead to increased runoff, reduced transpiration, impacts on the water table and landscape salinity, the draining of wetlands, irrigation for agriculture, the alteration of flow through dams, the transfer of water between catchments, and pollution from industrial, agricultural and domestic sources.

The European Community is addressing the crucial problem of water quality and quantity by adopting the Water Framework Directive (CEC 2000) that promotes water management based on watersheds rather than administrative or political boundaries. The aim is to build river catchment management plans that define objectives based on ecological, hydrological and chemical values, as well as protected areas status. River catchment analysis will integrate the analysis of the economic value of water use for stakeholders in order to understand the cost effectiveness of alternative policy and technical measures.

The United Nations has followed a similar pathway and launched the UN Water Program aimed at bringing a greater focus on water-related issues at all levels and on the implementation of water-related programmes in order to achieve the water-related targets in Agenda 21, the Millennium Development Goals (MDGs) and the Johannesburg Plan of Implementation (JPOI).

Given the predominant international concern on water issues related to climate change and the vulnerability of the Black Sea catchment, the EnviroGRIDS project will contribute to build capacity on Observation Systems in this specific region by looking at the impacts of these changes on selected GEO societal benefit areas. It will also provide direct scientific and technological support to the European Water Framework and INSPIRE directives. The methodology that will be developed through EnviroGRIDS will be fully transferable to other regions of the World in the future. The expected outcome is largely ensured by the participating organisations that are experts in different fields and that will bring together the best available data, modelling and communication techniques.

The resulting tools and data will allow for the analysis of river catchment pressures and their impacts on human and ecosystem well-being by local stakeholders and decision-makers. These efforts will also help to identify and provide early warning to vulnerable populations and identify the efforts needed to adapt and to limit negative social, economic and environmental impacts in the future. Through several validation projects on different societal benefit areas, our international consortium is expected to promote a wider use and acceptance of new data standards such as those contained in OGC, INSPIRE and GEOSS.

The report contains detailed descriptions of planned activities during the project. For implementation of Work program packages of the project, 7 Working groups were established during kick off meeting (April 2009, Geneva):

**WG1** – for Management and coordination of EnviroGRIDS project with tasks:

- ▶ Reporting to the Commission.
- ▶ Setting internal and external communication tools.
- ▶ Performing quality control check on project outputs..
- ▶ Manage project budget.
- ▶ Manage intellectual property issues.
- ▶ Moderate potential conflicts and address cultural and gender issues.

**WG2** for Spatial Data Infrastructure (SDI) development with tasks:

- ▶ Build a Gridded Spatial Data Infrastructure.
- ▶ Perform a gap analysis on Observations Systems in the Black Sea Basin.
- ▶ Gather, format and organize environmental data necessary to run models.
- ▶ Specify interoperability standards to be used in the project.
- ▶ Integrate remote sensing and sensor data.
- ▶ Gridify code of hydrological models.

- Mount a Spatial Direct Server to upload and download spatial data in any - formats and projections.
- WG3** for Scenarios of change development with tasks:
- To create spatially explicit scenarios on demographic changes.
  - To create spatially explicit scenarios on climate change.
  - To create spatially explicit scenarios on land cover changes.
  - To integrate the outputs of the three scenarios.
- WG4** for Hydrological Models development:
- To gather, format, and bring into ArcGIS the necessary data for the application Soil Water Assessment Tool (SWAT) to model water spatial distribution of water quantity and water quality in the Black Sea Basin.
  - To calibrated and validate hydrological models, and perform uncertainty analysis using EGEE network for distributed computations.
  - To run land use/cover and climate change scenarios generated in WP3 using EGEE network for distributed computations.
- WG5** for Impacts on selected Societal Benefit Areas Assessment with tasks:
- To identify key areas of impact and vulnerability in GEO Societal Benefit Areas based on existing analyses and through dialogue with relevant stakeholders.
  - To provide in-depth analysis of vulnerability based on interactive models.
  - To identify policy responses and adaptation options focused on key vulnerabilities based on quantitative model results and consultations with stakeholders.
  - To assess sustainability based on criteria and indicators and the analysis of interlinkages among key emerging pressures and vulnerabilities using modelling results and stakeholder validation.
- WG6** – for Black Sea Basin Observation System establishment with tasks:
- To strengthen Black Sea Basin network of active players in the field of Observation Systems.
  - To start developing a Black Sea basin Observation System providing services to GEOSS.
  - To make the processed information on future regional vulnerability available through the Internet to warn concerned populations and authorities.
  - To create a portal tool on the Internet to guide adaptation strategies aimed at addressing issues of water resource vulnerability.
- WG7** – for Dissemination and training activity with tasks:
- To build capacity of end-users in the Black Sea basin for the domains of EnviroGRIDS; thereby contributing to the Global Earth Observation System of Systems (GEO) by means of workshops, conferences and virtual platforms.
  - To distribute data and open source software for local implementation of different models used within the EnviroGRIDS project on DVD and the Internet.
  - To promote the sustainability of partnerships and enhance local ownership of the data and outcomes.

In conclusion of the report is pointed out that all goals and tasks of EnviroGrids project are actual for all the Black Sea river basins and for all the Black Sea countries as only through joining efforts of all scientists, stakeholders, authorities and population we can introduce new revolutionary approaches and methodology into practice of the Black Sea and European Community using GEOS methods and new information technology. It will be new level of scientific cooperation with goal to join effective efforts of all the Black Sea countries in the process of sustainable development on the basis of good observation information. In this connection all local and regional monitoring and action plans must take into account that global and regional changes in the World are very close.