

WT 7.18 DANUBE DELTA

1. Host Institution: EC Joint Research Centre, Institute for Environment & Sustainability. **Contact:** Wolfram Schrimpf, wolfram.schrimpf@jrc.it

2. Danube Delta-Romanian-Bulgarian Coastal Zone. The Black Sea lies between Southeastern Europe and Asia Minor. The Danube Delta is located around the area where the Danube River flows into the Black Sea in Dobrogea, Romania and a small part in Odes'ka oblast', Ukraine.



3. Characteristics

<i>Marine System</i>	<p>The Black Sea has an area of 422,000 km² and a maximum depth of 2210 m. The basin is ranked among the most ecologically threatened water bodies of the world, it has unique natural features -presence of H₂S at a depth below 150m (13 % of the total Black Sea domain supports life), drainage area exceeding 5 times the surface area of the basin, very low water exchange rate, low salinity and is under great anthropogenic pressure due to the substantial fresh water input (especially in the North-Western part of the basin), that determine the extremely high sensitivity of the Black Sea ecosystem to external forcing.</p> <p>The Danube basin, Delta and Black Sea represent a continuum of closely related ecosystems. The Romanian Black Sea coast is the most subjected to freshwater flow area, the Danube river loads (Danube delta) contributing substantially to the coastal ecosystem degradation. Due to its geographic position and the pattern of the main Black Sea currents the Bulgarian Black Sea shelf is under the strong influence of the major freshwater inflow from the North-West.</p>
<i>Watershed</i>	<p>The Black Sea is the only basin with a drainage area five times larger than the sea. The inflow of freshwater from the surrounding areas, especially central and middle-Eastern Europe amounts to 320 km³ per year. The most important river entering the Black Sea is the Danube, receiving runoffs from substantial parts of seventeen European countries including major industrial and agricultural areas. The watershed of Danube is 817,000 km². The Danube Delta is the largest and best preserved of European deltas, with an area of 3446 km². Romanian irrigated land is 31,020 km², the arable land- 41 %, permanent pastures-21 %, while the permanent crops are 3 %. In Bulgaria 40.02% of the total land is arable land, whilst permanent crops are 1.92%.</p>
<i>Human Activities</i>	<p>Agriculture, industrial and urban effluents, fisheries and shipping, tourism</p>
<i>Impact Responses</i>	<p>Nutrient enrichment, biodiversity changes, invasive species, habitat destruction, food-web shifts</p> <p>Eutrophication has caused severe ecosystem impacts such as phytoplankton blooms, anoxia, and hypoxia and together with overfishing, invasive species and trawling have been considered the key ecological issues especially in the North-Western Black Sea coastal waters. Nutrient over-enrichment has lead to dramatic alteration in the structure of marine fauna and flora, resulting in undesirable food web shifts during the last decades and constitutes a continuous threat to biodiversity and ecosystem functioning. Overfishing and invasive species introductions acting in parallel add further to the cascade of ecosystem alterations.</p>

4. Policy

<i>Policy issues</i>	<ul style="list-style-type: none"> - Water Framework Directive (2000/60/EC); NATURA 2000, Council Directive 91/271/EEC concerning urban waste-water treatment; Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources; - Marine Monitoring and Assessment (eutrophication, biodiversity, hazardous substances) in the context of implementation of the future Marine Strategy; <p>Trans-boundary Integrated Coastal Zone Management</p>
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<i>Policy changes</i>	Implementation of the European policies by the pre-accession countries.
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5. Stakeholders and Institutional Governance

<i>Major organisations</i>	Black Sea Commission, National and Local Environmental Protection Agencies, Romania, National Company “Romanian Waters”, National Institute for Danube Delta –Tulcea, Romania, Ministry of Environment and Water, Bulgaria, Black Sea Directorate, Bulgaria
<i>Other leading organisations</i>	Ministry of Development and infrastructure (Bulgaria), Ministry of Transport (shipping camara), Bulgaria; Ministry of Tourism, Bulgaria; National Agency of fishing and aquaculture, Bulgaria

6. Partner Collaboration

<i>SPICOSA Partner Collaborations</i>	Partners : INCDDD National Institute for Danube Delta –Tulcea Romania; IO-BAS Institute of Oceanology, Bulgarian Academy of Sciences, Varna, Bulgaria; MHI Marine Branch of Ukrainian Hydrometeorological Institute, Sevastopol, Ukraine.
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7. Systems Studies

<i>Long time series</i>	Black Sea inter-disciplinary (physical, chemical and biological data) multivariable historical database was created in the framework of the NATO TU-Black Sea Project; Existing Data base for the Study site belonging to the various institutions in the region
<i>Research Projects</i>	-Danube Delta Project, financed by GEF (1994-1998) aimed at effective protection, enhancement and management of protected areas of the Ukrainian and Romanian part of Danube delta - European River Ocean System (EROS) 2000 and EROS-21 EU Project (1994-1998) developed an integrated approach to the eutrophication, contaminant problem, particle transfer, sedimentation and biogas production of the north-western Black Sea through the establishment of fine resolution coupled hydrodynamical-biogeochemical models of the river and marine systems in order to describe and predict the response of the coastal ecosystem to natural variability and anthropogenic factors such as changes in land use and hydraulic management; - Black Sea Ecosystem Process and Forecasting/Operational Database Management System, NATO SfP (1998-2001) developed further the NATO Black Sea Data Base and Management System for management oriented operational marine forecasting and research; -EUROCAT (European Catchments). Catchment changes and their impact on the coast. EC (2002-2003). An integrated network aiming to determine limiting concentrations of pollutants and nutrients for sustainable development on the basis of ecological and socio-economic indicators; - Sea-Search: a Pan European Network for Ocean & Marine Data and Information Management, EU (2002-2005), a Pan European Network for Ocean and Marine Data and Information Management (oceanographic and biological data). This activity will continue at more detailed level (data of interdisciplinary parameters) within the 6FP Project SeaDataNet, starting in 2006;
<i>Socio-economic study</i>	-CESUM-BS, 5FP-EU (2000-2003)-the objective of the project was sustainable development of the Black Sea region in the context of environmental, economic and social problems for harmonisation with the EC standards through increased regional and international co-operation and networking. The environment-socio-economic aspects included selection of indicators for ecosystem health assessment and identification of priority socio-economic drivers for sustainable management of the Black Sea ecosystem and balanced economic development at regional level; THRESHOLDS, 6FP-EU, (2005-2008) – identification of thresholds for ecosystem performance to provide management options for rehabilitation; GEF/UNDP “Black Sea Recovery Project” – collection of new data for assessment of the recent Black Sea state and provide options for management