

THE INTERACTION BETWEEN ROMANIA'S WATER MANAGEMENT AND BLACK SEA

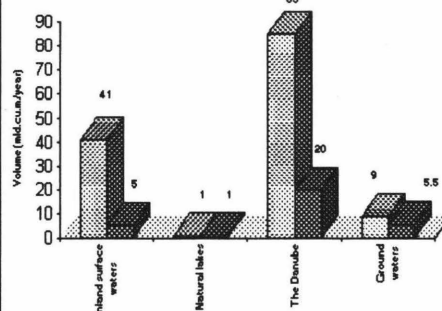
Octavian CEACHIR, Director - Expert Level I A, Adriana MIRCEA, Expert Level II, Directorate of Water Resources and Flood Protection, Ministry of Waters, Forests and Environmental Protection, B-dul Libertatii no.12, Sector 5, Bucharest, ROMANIA

Romania's territory is located in the Black Sea Basin. Out of its whole territory, an area of 98% is considered to be part of the Danube River Basin.

Short presentation of the statistic dates regarding the Romania's water resources

The main Romania water resources are the inland rivers and lakes, the ground-waters, the Danube River and the Black Sea. A short presentation of the main water resources is presented in the table below:

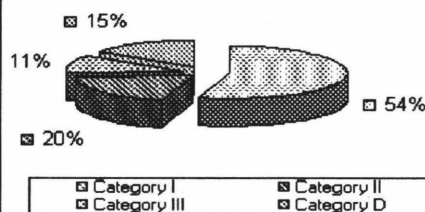
THE MAIN WATER RESOURCES	THEORETICAL VOLUME (mld. cu.m./year)	USABLE IN NATURAL REGIME (mld.cu.m./year)	USABLE IN MODFYED REGIME (mld.cu.m./year)
Inland surface waters	41	5	13
Natural lakes	1	1	-
The Danube	85	20	-
Ground waters	9	5,5	-
Black Sea*	-	-	-
Total	136	31,5	-



*The Black Sea water resources are not taken into account as a prospective resource, due of the technical-economic difficulties.

From the point of view of the water quality, the water courses fall into the following categories: **category I** - include the waters which can be rendered drinkable; **category II** - include the surface waters which can be used for industry; **category III** - include the waters to be used at irrigation of agricultural lands; **category D** - include degraded waters which can not be used.

Hydrographic basins	Quality Category			
	I	II	III	D
Cumulated river lengths (km)	11105	4072	2218	3092
Number of control sectors	108	72	38	58



The evolution of the most important water utilization and their impact on the water resources quality. The principal pollution sources of the water resources

The average water consumption in industry and agriculture are higher than in other countries, much higher even in certain cases, due to the exaggerated losses along the water supply and distribution networks, as well as to the waste and the non-performant technologies in use. For instance, the water losses and waste in the water supply and irrigation are about 40-50 %. This way in which the water is used has a double negative effect: on the hand, a high specific energy consumption, almost twice as high as necessary, on the other hand, an important worsening of the environment conditions.

The evolution of the social-economical development has in time a strong impact on the water resources quality.

The evolution of the most important water utilization is presented in the next table:

YEAR	INDUSTRY	AGRICULTURE	POPULATION AND INDUSTRY (drinking water)	TOTAL
	mld.cu.m.	mld.cu.m.	mld.cu.m	mld. cu.m.
1970	5.00	3.80	1.00	9.80
1980	10.65	6.92	1.36	18.93
1990	6.84	2.31	1.68	10.83
1995	6.16	1.86	1.82	9.84

The unsuitable exploitation of oil deposits, the inadequately waste disposals' developments, the lack of existence or bad operation of waste water treatment plants, the improper use of sewerage system has changed as well the surface as the ground waters too. In Romania there are no water treatment plants having a

tertiary purification step (for the nitrogen and phosphorus elimination). For this reason eutrophy is present in numerous natural and storage lakes.

The diffuse pollution, due to the fertiliser application, as well as to that of pesticides and herbicides on the agricultural lands is also interesting from this point of view.

The Danube river has a high content of polluting factors originary from the upstream riparian countries and from Romania too. Due to the serious upstream pollution, especially with organic matters, nitrates and phosphates, the waters of the Danube river fall at their entrance in Romania into the II-nd quality category.

The Black Sea in the area of the Romanian sea-side is subject to a polluting process due to the polluters in the Danube Basin River and due to the waste waters insufficiently treated or not treated, directly discharged in the Black Sea. The present environmental situation in the Black Sea Basin aggravated by an ecosystem which, in itself, is particularly fragile. The sources of the pollution to the Black Sea are: rivers, direct discharges of industrial and domestic effluents, solid waste disposal and dumping, pollution arising from normal operational and accidents by ships, atmospherically transported contaminants.

The directly polluting sources existing on the Romanian territory that affect the Black Sea waters are identified - six Black Sea pollution hot spots.

Dates about the evolution of hydrotechnical works and water management

The uneven distribution in space and time of water resources have lead to the necessity for applying the integrated management of water resources and to the achievement of important water works.

First water management works for water supply and flood protection is notified since 1576 (Dâmbovită River development). The First dams constructed in Romania are documentary referred in 1750 (Dognecea Mare and Dognecea Mica Reservoirs, which are still working).

The all out territorial approach of water management has been achieved in 1962 by drawing up the first water developments' plans (master plans) at the national scale. These plans are up dated periodically, the last occurred in 1995.

Currently, there have been completed: 400 important reservoirs totaling 13.1 billion m³, 1490 km of diversion works, 18 240 km of embankments and corrective works, innning works over 3.2 million ha, erosion protective works for 2.27 million ha, hydro-power plants with an installed power of about 5700 Mw, irrigation development systems for 3.24 million ha.

The most important hydrotechnical works are as follow: Iron Gate I totaling a volume of 2900 millions m³ and Iron Gate II with a total volume of 800 millions m³, both on Danube River; Stânca Costesti Reservoir on Prut River totaling a volume of 1710 millions m³; the arch dam Vidraru on Arges River that is the highest dam in Romania - 166,6 m.

Consideration about the hydrotechnical work effect on the water quality and on the hydrodynamic equilibrium in the Romanian Black Sea Basin.

The total alluviums quantity, in natural regime of the Danube river at its mouth, were about 67 million tons/year, out of which 30 million tons/year proceeded from the romanian inland rivers. The alluviums retention in the storage lakes on the river and on the Danube, at the Iron Gates I and II, led to the diminution by 50% of the solid flow of the Danube at its point of flowing into the sea. Due also to the configuration of the Sulina arm, the romanian Black Sea seaside from Sulina to Constanta is affected by erosion process, which affect 70 % by the Romanian seaside. 10 % are in cvasiequilibrium and 20 % by Romanian seaside presents processes of silting. During the last 14-15 years, the depth line of the waters at the Mamaia beach (10 m), drew nearer to the shore by 800 m. During 1962-1984 have been lost about 2000 ha of dry land. These processes have affected the ecosystems developed in Black Sea, Danube Delta and the Black Sea and Danube Delta touristic landscapes.

Technical measurement for negative effect's diminution produced by the hydrotechnical works

In Romania are taken two types of measures : structural measures and unstructural measures.

The first category consists in the achievement of the complementary hydrotechnical works. The main role of these kinds of works is to decrease the negative effects already produced. For example: channels performed for the redistribution of the quantity of the transported alluvia and dikes for the protection of the affected areas by serious erosion process (ex. Sf Gheorghe Arm, in Danube Delta) .

The second category includes all the measures undertaken for the improvement of the water resources management and transported alluvium. For example the change of the operation rules of the reservoirs and hydrotechnical complex, during the period with high alluvium quantity transportation.

National and international agreements concerning the protection of the water resources

In Romania the most important law concerning the water is the Law of Water no.107/1996. An other important law is the Law of the Environmental Protection.

In the same time between Romania and its neighbors exist international convention with respects to the water quality of the transboundary rivers and water management regulation.

Due to the Romania's geographical position, the Romanian State is involved in two kinds of international actions for the protection of the water qualities and for an integrated water management. First of them is related to the **Danube River protection** and the second concerning the **Black Sea protection**.

With respect to the Danube River protection, the Romanian State has adopted the *Convention on Cooperation for the Protection and Sustainable Use of the Danube River, Sofia, 1994*. Romania is involved in *The Environmental Programme for The Danube River Basin*. In the framework of the Environmental Programme for Danube have been adopted the *Strategic Actions Plan and the National Actions Plans for the protection of the Danube*. In the framework of the same programme has been developed the *Accidents Emergency Warning System for accidental pollution produced in the Danube Basin River*, which is operational since 11 April 1997. This is a trans-national alert system, having in each danubian country a Principal International Alert Center for accidental pollution that can have a transboundary effect.

With respect to the Black Sea various bases for international cooperation in the Black Sea already exist. Most notably are the *Bucharest Convention on the Protection of the Black Sea against Pollution of 1992* and the *Ministerial Declaration of the Black Sea, Odessa, 1993*. Because it was recognized that ecosystems of the Black Sea region are across international boundaries and because the decline of biodiversity can only be reduced if existing international treaties and convention broadly and uniformly applied, the governments, district administration, municipalities, scientific institution, NGOs and other organizational the Black Sea countries are requested to conform with the requirements of the *AGENDA 21* and the *Convention On Biological Diversity*. It is necessary for the Black Sea countries to implement all relevant regulation and laws which might relate to the conservation of the biodiversity. *The Strategic Action Plan for the Rehabilitation and Protection of the Black Sea* was presented at Istanbul, 1996, and was prepared by government and independent experts of the six Black Sea coastal countries: **Romania**, Bulgaria, Georgia, Russian Federation, Turkey and Ukraine. The aim of this document is to promote the cooperation among all Black Sea basin states and, in particular, between the Black Sea coastal states and the states of the Danube river basin.

Conclusion

- The Black Sea Basin covers seventeen States, with a population of 160 million inhabitants. Six of these states are Black Sea coastal States.
- The Danube Basin River which has an area about 817.000 km², has an important influence on the equilibrium of Black Sea ecosystems.
- Due to the social-economical development of the Romania, the Romanian State performed numerous hydrotechnical works. The management of these works influences the quantitative and qualitative aspects of the water courses and Black Sea
- The diminution of the transported alluvium, due to the performed hydrotechnical works, the unsuitable water quality of the main tributaries of the Danube and of the Danube river too, has a negative impact on the stability of the Black Sea ecosystems
- The Danube Delta, situated on the Romanian territory, represents a natural filter, with positive effects, for waters discharged into the Black Sea from Danube River
Because of the diminution of the transported alluvium to the Black Sea and of the hydrotechnical works performed on the Romanian seaside, 70 % from the Romanian seaside have been affected by erosion process, and 2000 ha dry land have been lost from the Romanian State during 1962-1984.