

ROMANIAN TRANSBOUNDARY WATER MANAGEMENT UNDER CONDITIONS OF CLIMATE CHANGE

C. C. Boscornea, Ph.D.

*National Administration "Romanian Waters",
River Basin Management Plans Office, Bucharest, Romania
corina.boscornea@rowater.ro*

Abstract

By centuries, **the humanity had the right to free use the water as a gift coming from sky**. This time was past. The ecosystems clearly tell us this thing. It is the time to repair some mistakes and to recognize the value of the all services which water assure for humanity and environment. In addition, the water pollution is increased due to economical development. The quick changes of environment are produced by increasing of world population, of consumption rate of resources by the human society and the changes of the technologies and political-social organization. Nowadays the climate changes become an official recognized reality.

The impact of antropic activities and climate change lead to the modification of the hydrological regime (regarding the quantity as well as the quality of water) and to the increasing of transboundary problems for shared waters (rivers, lakes, ground waters, seas). The observations and measurements done on all over the world and in Romania concerning the climate parameters and the climate effects on water resources show certain signals which sustain the hypothesis of climate change. Some noticeable signals observed in Romania are itemed below:

- **In the last 100 years, the global warm tendency was highlighted in Romania too, recording for temperature values the biggest increase until 0.8 °C in the industrial areas;**
- **The appearance of the aridity of climate and the increase of the frequency occurrence for some extreme temperature and precipitation values:**
 - The occurrence of extreme temperature on the Romanian temperature, since exist the meteorological measurements (1884), on July 5th 2000 to Giurgiu station it was registered 43.5°C and Bucharest station 42.4°C;
 - Very intense rainfalls fell down on the small surfaces which produce catastrophic effects; i.e. the rainfall with 120 mm fell down during 40 minutes in Cuculeasa near Buzau on June 22nd 1999 and the rainfall with 285 mm fell down during 30 hours in Bucharest on June 21st -22nd September which represents the annual amount precipitations, etc.

- **The occurrence of some meteorological phenomena unlikely to be recorded in Romania**
On the 12th August of 2002, in Făcăieni place, a tornado was registered which destroyed 420 households and cut off the trees from the nearby forest. After this tornado, the occurrence frequency of such phenomena increased.

- **The increase of occurrence frequency of catastrophic floods**

In Romania the floods represent a hydrological phenomenon existing always on our territory. The old historiographers during the time regularly wrote about catastrophic floods: 10 in the XVI century, 19 the in XVII century, 26 in the XVIII century, 28 in the XIX century and 42 in the XX century. The occurrence frequency of floods and the magnitude of them increased mainly due to the climate change and to the reduction of transport capacity of the rivers by development of localities usually in the major bed of watercourses. **Six catastrophic floods were produced in 2005 on the Romanian territory with an occurrence probability between 1% and 5% (the biggest in April** Timis and Bega hydrographic basins. In 2006 it occurred the biggest flood on Danube during April – May months, when the maximum flow was 15800 m³/s

- **The increase of trend of maximum annual flow on Danube River**

In the last 166 years it was remarked an increasing trend of maximum flow of Danube on Bazias with 1200 m³/s mainly due to the climate changes and the up stream embankments of Danube and his tributaries. This supplementary flow leads to the aggradations of water level with 40-50 cm in the Romanian sector of Danube, which involves supplementary costs to assure the same protection rate against floods for the citizens and their goods.

- **The increase of The Black Sea level with 34 cm during period: 1860-2004.**

In this context it is necessary to plan actions for adapting the water management to climate change such as:

1. The development of scientific research for the vulnerability study of water management systems to the probable climate change, for the structural and un-structural components and for the adapting of reservoir operating rules and operational programmes to the modified hydrological regime and to new water demands taking into account the climate change. Romania participated to the international projects for assessment of the climate change scenario and impact on water resources, such as: CFCAS project “Assessment of Water Resources Risk and Vulnerability to Changing Climatic Conditions” using the lumped model WATBAL (IISA); CECILIA Project “Central and Eastern Europe Climate Change Impact and Vulnerability Assessment”; CLAVIER Project “Climate change impacts in central-eastern Europe”.

2. Planning in the water management field has to be done at the river basin scale.

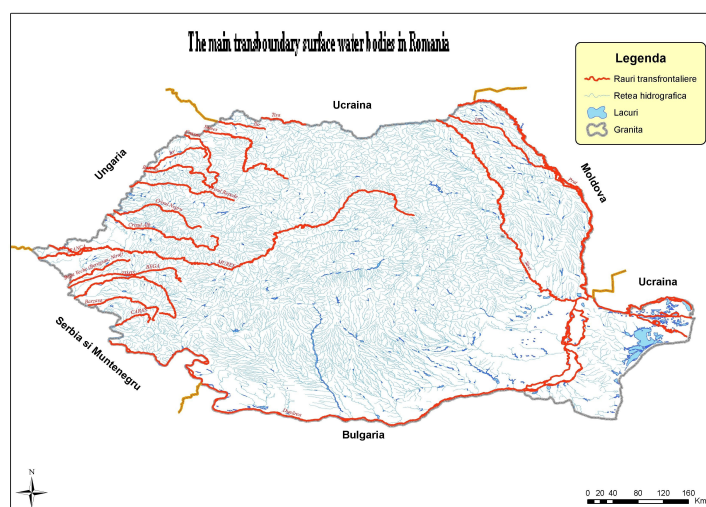
The Water Framework Directive 2000/60 and Directive for assessment and management the flood risk of EU stipulate the elaboration of The River Basin Management Plan at the river basin scale. The River Basin Management Plan has to include the **new concept for the planning of rivers “more room for rivers”** which has the main objectives **to reduce the flood risk and to preserve the environmental aquatic biodiversity**. The new concept “more room for the rivers” implies **new spaces for flood attenuation** by creating wetlands, re-allocation of dikes, retention area with controlled flooding, using old river branches etc., and **new spaces for nature** meaning flood plains - places for development of new ecosystems and for optimum conditions for specific flora and fauna and for recreational activities and tourism.

In Romania, the Strategy for Flood Risk Management and the Plans and Programmes required for implementation of the strategy were elaborated, based on new European concept “more room for rivers”. It is also ongoing projects for proposal actions for lower Danube Green Corridor.

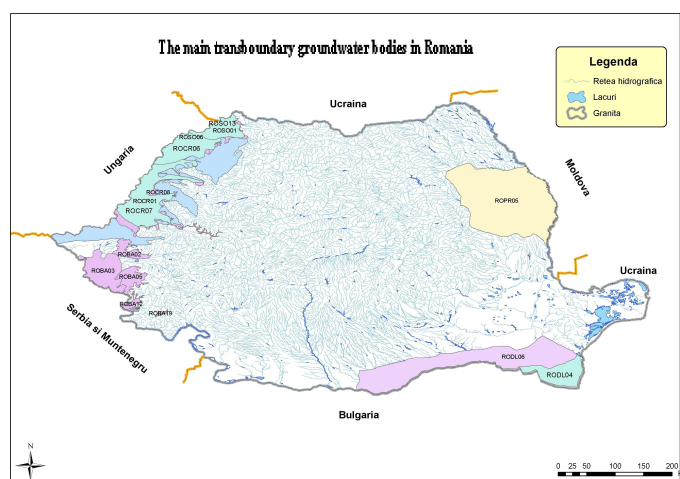
In Romania 18 transboundary rivers shared with the neighbor countries have been identified (map 1). Also 142 groundwater bodies have been identified, of which 19 transboundary groundwater bodies shared (map 2): 10 with Hungary, 5 with Serbia, 1 with Moldavia, 1 with Ukraine and 2 with Bulgaria. From the 19 Romanian transboundary groundwater bodies, through bilateral agreements there were established that being important for a integrated management a number of 8 bodies, as follows:

- 4 transboundary groundwater bodies with Hungary (ROSO01, ROSO13, ROMU20, ROMU22);
- 1 transboundary groundwater body with Serbia (ROBA18);
- 2 transboundary groundwater bodies with Bulgaria (RODL04, RODL06);
- 1 transboundary groundwater body with Moldova Republic (ROPR05).

From the 8 important identified transboundary groundwater bodies, 6 belong to the porous-permeable type (stored in Quaternary, Pannonian and Sarmatian deposits) and 2 of them belong to the fissural-karstic type (developed in Sarmatian and Upper Jurassic – Lower Cretaceous formations).



Map 1 – The main transboundary surface waters in Romania



Map 2 – The main transboundary groundwater bodies in Romania

2. Improvement of monitoring system for meteorological and hydrological data

The DESWAT project for automatization of water monitoring system and for carrying out some Basin centres for hydrological forecasting is on-going implementation process. In addition, the WATMAN project for setting up the Regional Centres for Emergency Action for diminishment of the negative floods effects is currently promoted and SIMIN project for national integrated meteorological system data. All the data flux will be connected till 2010 to the systems of neighbour countries, especially Hungary, Bulgaria and Serbia. All these strategy were included in the draft of National Plan for adapting to effects of climate change which is now available for public consultation.

3. Increasing of the international cooperation in the water management field in order to share the responsibilities to decrease the transboundary effects of floods, droughts, accidental pollution etc.

In general, in order to accomplish such transboundary problems have to create on basis of bi and multilateral convention - the bilateral commissions between the neighbouring states (Hungary, Bulgaria, Serbia, Moldavia, Ukraine), and the commission at the international district level (ICPDR). **The bilateral hydrotechnical agreements and conventions between Romania and neighboring countries** are the following purposes: determination of water stock for the border sections situated on the rivers which form or cross the state border of Romania, analysis and characterization of transboundary aquifers, *in situ* checking of hydraulic works for protection against flooding on Romanian territory and neighboring countries, hydraulic works located on the rivers which form or cross the state border of Romania, harmonization of the activities from the transboundary River Basin Management Plan with neighboring countries.

The main objective of transboundary co-operation program among the 5 countries which share the Tisa River Basin: Romania, Hungary, Ukraine, Slovakia and Serbia and Montenegro is the elaboration of a Common River Basin Management Plan. The overall objective are to produce a **TRBM Plan by 2009** aiming the objectives set by the EU WFD as implemented through the Danube River Protection Convention and the ICPDR Flood action Programme. In the Project “Transboundary River Basin Management of the Körös/Crisuri River, a Tisza/Tisa sub-basin” (2005-2007) there was assistance with the set-up of tools for the control and management of the transboundary Körös / Crisuri Basin.

For the future it is need twin-track mitigation-adaptation strategy approach, at national, European & international level, including an action plan take lead on cross-sectoral and trans-boundary effects policies and measures designed to *address long-term climate change impacts*.

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