

# Joint Efforts Aiming at a Co-ordinated Utilization and Protection of the Danube River

## Des efforts conjoints pour une utilisation et une protection coordonnées du Danube

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Volume 11, Number 3, October 1992

Fleuves, civilisations et tourisme

URI: <https://id.erudit.org/iderudit/1078046ar>

DOI: <https://doi.org/10.7202/1078046ar>

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**Publisher(s)**

Université du Québec à Montréal

**ISSN**

0712-8657 (print)

1923-2705 (digital)

[Explore this journal](#)

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**Cite this article**

Domokos, M. (1992). Joint Efforts Aiming at a Co-ordinated Utilization and Protection of the Danube River. *Téoros*, 11(3), 47–49.

<https://doi.org/10.7202/1078046ar>

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# Joint Efforts Aiming at a Co-ordinated Utilization and Protection of the Danube River

Miklos Domokos\*

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With its total length of 2857 km and its mean discharge of 6850 m<sup>3</sup>/s, the Danube is, after the Volga River, the second greatest river of Europe. The area of its catchment basin is 817 000 km<sup>2</sup>, shared in the past by eight countries (D, A, CS, H, YU, BG, RO and SU) with substantial shares (above 5%) and four more ones (I, CH, PL and AL) with minor shares (less than 0.2% of the basin's area). The total population living in the Danube Basin is about 75 million people, and three of the countries listed (A, H and RO) are practically completely situated within the Basin.

Although the Danube Basin is actually intersected by a number of national boundaries - irrespective both to natural hydrographic divides and to the historically formed ethnic groups living in the Basin - the river and its hydrologic network have always provided strong economic and cultural links between the inhabitants of the Basin, as expressed by Kresser (1984):

To speak about the Danube is substantially more than to deliver a water-related, technical, historical or political lecture it rather means to describe the life story of an essential part of Europe. Why, among the four personified rivers of the famous fountain of Bernini on the Piazza Navona in Rome, it is the Danube which symbolizes the European continent. In spite of that choice, the Danube at that time was divided between two spheres of power: the upper reaches being a part of the Christian Occident and the lower reaches belonging to the Islamic World. But the Danube ignored all orometric and geopolitical hindrances. The Danube has always meant more than a river or a river basin and is in our century still the life artery of a great cultural, spiritual and economic expanse, just called the *Donauraum* (=Danube Space). In this respect, it differs from the other great rivers of Europe, since there is neither a *Wolgaraum* nor a *Rheinraum*, al-

though they share the economic importance of the Danube.

Consequently, in the course of history, there never has been a lack of efforts to politically unify the Danube Space (starting with the Roman and Turkish Empires up to the Austro-Hungarian Monarchy and to our times. Under the reign of Joseph II (Hapsburg dynasty) the post-Roman organic cultural exploration of the whole space reached its climax, testified by uncountable buildings along the river. The steady economic boom, obvious also from increasing traffic activities, suffered then decisive setbacks during the two World Wars. However, the Great Navigation Canal Rhine-Main-Danube, to be put into operation before long, promises once more a new and hopeful future.

The purpose of this study is to survey the most important efforts, surpassing the bilateral level and encompassing the whole River Basin, carried out by the eight Danube countries in order to ensure a water-related co-operation between these countries. Each of these efforts may contribute to a fruitful economic and cultural integration of the people living in the Danube Basin, forming a natural and historical entity.

## Basic Works of Individual Scholars

The first complete factual description of the natural conditions, runoff regime and water quality conditions of the whole Danube Basin, is the work of the Austro-Hungarian co-authors Kresser and Laszloffy (1964), intriguingly published in a French journal. A more detailed description of the hydrography of the river and its catchment basin is included in the German study of Laszloffy (1965). It was also Laszloffy (1982) who published a comprehensive monograph about the catchment basin of the Tisza River, the greatest tributary of the Danube (area: 158 000 km<sup>2</sup>). A valuable result of hydrological investigations encompassing the whole Danube Basin was published by an author

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from Roumania, Ujvari (1967), including a series of maps about the spatial distribution of monthly mean discharges and the sub-regions with typical flow regimes.

Among the most recent works dealing with the entire Danube system, those of Benedek (1986, 1988) are particularly important. They investigate, on the basis of the most recent data and of about 50 papers of the relevant literature, the general characterization of the water quality of the river, its trends and the hydrological consequences of the latter, the ecological impacts of existing and planned river dams, analysing their inherent risks.

After the above survey of the most important works of individual scholars, that of the institutional, joint water-related efforts of the eight Danube countries follows.

### The Hydrologic Monograph of the Danube Basin

The first initiative of this work was taken by the hydrological institutes of only four Danube countries (CS, H, BG and SU) in 1972, in the framework of a Working Group of the international Danube Commission. The remaining four countries (D, A, YU and RO) joined this activity in 1974, under the auspices of their IHP National Committees. The German version of the Monograph could only be finished and issued in 1986 (in Munich), while the Russian version was published in 1989 (in Leningrad). Meanwhile a so-called representative or abridged version in four languages (D, E, F, R) was also compiled and published in Bratislava (Stancik, Jovanovic et al., 1988).

The Danube Monograph (RZdD, 1986) is, regardless of the long and toilsome history of its compilation, an important result of the joint efforts of the eight Danube countries (of quite varied political structures at that time) aiming at a common economic-scientific goal. As a matter of fact, it is the first hydrological manual, related to the entire Danube Basin, based on internationally and institutionally harmonized information. The full Monograph consists of the following three chapters:

- I- Physico-geographic and water resource characterization of the Danube Basin .
- II- Hydrological regime of the Danube and its major tributaries.
- III- Water balance of the Danube Basin.

The latter chapter was compiled, in the framework of the international co-operation of the Danube countries, by the Hungarian institute (Domokos and Sass, 1990). The hydrological balances, expressing the equilibrium of multi-annual mean precipitation versus runoff plus evapotranspiration, were compiled both for the 47 sub-catchments and the 12 partial national areas of the Danube Basin. For each of the 59 regional units, area 1 mean values of the three balance components were derived from the isoline maps of these elements. Most balance errors fell into the rather favourable interval of  $\pm 5\%$ . As a by-product of the balances, the hydrological longitudinal profile of the Danube River was also drawn. As a basic index for water resource development, for each of the 12 partial national areas, the Balcerski Index (i.e., the quotient between owned and *transited* water resources) was also computed.

At present, the joint work on the Danube Monograph is being continued. It is expected that by the end of 1992 four more volumes of the Monograph will be published (in brackets are the symbols of the responsible countries):

- 1- Suspended matter and bed-lead transport of the Danube and its major tributaries (H).
- 2- Temperature and ice regime of the Danube and its major tributaries (CS).
- 3- Long range trends of precipitation in the Danube Basin (A).
- 4- Flood coincidence of the Danube and its major tributaries (YU).

### Water-Related Co-operation on the Basis of the «Bucharest Declaration»

After a duly prolonged period of preparations, the plenipotentiaries of the eight Danube countries signed in December 1985 in Bucharest a Declaration: «On the co-operation of the Danube countries on the issue of water resource management of the Danube, with special regard to its protection from contamination». The Declaration, forwarded to the United Nations and a number of other international institutions, states: «Both the maintenance and rational utilization of water resources and the termination and control of their pollution do form an organic part of the national policies for water resources and

environment of the governments of the Danube countries».

For the first phase of the co-operation based on the Bucharest Declaration, concrete activities were specified in the following fields (in brackets the symbols of the countries responsible for the co-ordination of the topics):

- 1- Protection and control of water quality (RO).
- 2- Flood control and forecasting (H).
- 3- Balance of water resources and needs (SU).

For each of the themes listed above, a working group consisting of the experts of the eight countries concerned has been formed. In the framework of theme No 1, joint water sampling and analyzing has been carried out since 1988 in 11 border cross-sections of the Danube River. Unified methods of analysis are used and the evaluation of the results obtained are annually screened by the working group. After a certain time, the series of these results will enable the identification of trends in the water quality of the Danube River (Hock, 1990).

In the framework of theme No 2, after an intensive exchange of information, two basic works have been issued: *The program of operative hydrometeorologic information exchange and Catalogue of the basic data of the observation stations involved in the exchange of information*. The preparation of a third work, *Methods of operative flood forecasting in the Danube countries*, is now under way (Body, 1990).

As for theme No 3, it seems to have been delayed. So far, a methodology (confined to the compilation of water balances in the border cross-sections of the Danube) was agreed upon and the information required for assessing the balances according to this methodology, were sent to the co-ordinator.

**Striving at a Harmonized Concept of Water Resource Development in the Tisza Basin** (Laszloffy, 1982)

While the activities described in the above chapters 3 and 4, aimed only at laying the foundation for future water resource concepts encompassing the whole Danube Basin (by providing the hydrological, water quality and flood control information required for these concepts), the joint effort of

the five countries (SU, RO, CS, H and YU) sharing the catchment basin of 158 000 km<sup>2</sup> extension of the Tisza River, a major tributary to the Danube, was aimed directly at the preparation of such a concept of water resource development of the Tisza Basin.

As a matter of fact, among the results of the numerous topics of common interest, dealt with in the course of the co-operation of the five Tisza countries (from 1970 to 1985), the most important one is exactly the Water Resources Master Plan of the Tisza Basin. More than its concrete statements (some of which were discussed and withdrawn by some of the countries concerned), the fact itself may be considered of great importance that by having prepared jointly this Master Plan the five countries concerned have unanimously acknowledged that the water resources problems of a river basin can be solved, in the long-range perspective, only by considering the whole basin as a unit; thus a real optimum can be reached only on this level and not on that of the (national) sub-basins. The Tisza Master Plan is, on the other hand, a really valuable precedent for the future elaboration of the master plan of the whole Danube Basin.

### The Project «Blue Danube»

This project, now still under consideration, was launched in 1989 jointly by the programs MAB and IHP of UNESCO. Its declared goal would be the *investigation of hydrotechnical facilities on the ecosystem*.

So far, only one detailed proposal of the project is available (Jolankai, 1989), which lists, among others, the following questions to be investigated in the framework of the project:

- Which are the most important relationships between hydrologic and hydrobiologic parameters, characterizing the main riverbed of the Danube? What measurements are necessary for identifying these relationships?
- What hydrologic and hydrobiologic relationships exist between the Danube and its tributaries, side arms and oxbow lakes?
- What are the interactions between maintenance of water resources and conservation of natural resources (common interests and conflicts)?

The project proposal of Jolankai (1989) also includes a program of action for measurements, pilot zones, modelling, etc., required for answering the above questions.

More recently, the Conference of the Rectors of the European Universities also dealt with the *Blue Danube* project (UNESCO, 1989).



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### Des efforts conjoints pour une utilisation et une protection coordonnées du Danube

Miklos Domokos

Le Danube pourrait symboliser l'Europe non seulement parce qu'il est classé second par sa longueur mais plutôt parce qu'il traverse huit pays: l'Allemagne, l'Autriche, la Tchécoslovaquie, la Hongrie, la Yougoslavie, la Bulgarie, la Roumanie et l'ancienne Union soviétique.

Son bassin a été divisé par plusieurs frontières nationales sans tenir compte des frontières naturelles ou des groupes ethniques.

Le Danube a toujours représenté plus qu'un fleuve; il est l'artère principale d'une expansion culturelle, spirituelle et économique; d'où le nom Le *Donauraum* pour désigner l'espace du Danube.

L'objet de ce texte est de discuter des efforts de développement les plus importants, notamment, ceux qui dépassent le niveau bilatéral et intègrent ainsi l'ensemble du bassin.

Quatre types d'initiatives méritent d'être rappelés: celles venant d'individus et d'institutions, les initiatives de la coopération entre les pays du Danube sur les bases de la Déclaration de Bucarest et enfin, le projet *Blue Danube*.

Les initiatives des individus ont donné des textes généraux en particulier. Une première étude fut écrite en 1964 par l'autrichien Kresser et le hongrois Laszloffy. Ces chercheurs se sont basés sur les plus récentes données traitant du caractère général du Danube, de la qualité de l'eau, des tendances et des conséquences hydrologiques du fleuve, des impacts écologiques de l'existence et de l'aménagement des barrages pour en analyser leurs risques.

Un exemple illustrant les initiatives des institutions est le *Danube Monograph*; il s'agit du premier manuel hydrologique traitant du bassin en son entier. Produit par les huit pays du bassin en 1976, cette monographie explicite les buts économiques et scientifiques qu'ils s'étaient fixés à cette époque.

Le troisième type d'effort est une coopération entre les pays du Danube sur les bases de la Déclaration de Bucarest. Contrairement aux initiatives mentionnées plus haut qui ont porté sur l'ensemble du fleuve et de son bassin, cette coopération concerne cinq pays (Union soviétique, Roumanie, Tchécoslovaquie, Hongrie, Yougoslavie) et touche l'un des plus importants affluents du fleuve, le Tisza.

Enfin, on peut illustrer le dernier type d'initiative par le projet *Blue Danube* qui a été reconnu en 1989 par l'UNESCO; il avait pour but l'étude des installations hydrotechniques dans l'ensemble de l'écosystème.