SUMMARY REPORT, CONCLUSSIONS AND RECOMMENDATIONS OF THE

23RD CONFERENCE OF DANUBE COUNTRIES ON HYDROLOGICAL FORECASTING AND HYDROLOGICAL BASIS OF WATER MANAGEMENT

Belgrade, Serbia - 28 to 31 August 2006.

INTRODUCTORY COMMENTS

Within the framework the International Hydrological Programme IHP of UNESCO, since 1961 the Danube countries successfully cooperate at two levels: (i) implementing joint projects in the Danube Basin and (ii) organizing conferences on Hydrological Forecasting and Hydrological Basis of Water, which take place biannually in a different Danube country, with the participation of experts from other countries as well as of international scientific and professional organizations. It is worth noting that Belgrade already hosted these conferences twice: the 5th in 1969 and the 13th in 1986.

The 23th Conference (28 to 31 August 2006) was organized by the National Committee of Serbia for the International Hydrological Programme of UNESCO, in co-operation with the Republic Hydrometeorological Service of Serbia and the "Jaroslav Černi" Institute for the Development of Water Resources,

Under the auspices of:
Ministry of Science and Environmental Protection of the Republic of Serbia, Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia - Directorate of Water, Ministry of Capital Investment of Republic Serbia, Public Water Authority ″Srbijavode″, Public Water Management Company (PWMC) "Vode Vojvodine" and the "Djerdap" (Iron Gates) Navigation and Hydropower System.

Jointly with:
International Hydrological Programme of UNESCO
World Meteorological Organization
International Association of Hydrological Sciences
United Nations University, Institute for Environment and Human Security, Bonn

The Conference took place in the Sava Congress Centre.

OPENING CEREMONY

The opening session was chaired by the representatives of the organizers. The session was officially opened by the Chairman of the Organizing Committee Dr. Alexander Popovic, Minister of Science and Environmental Protection of the Republic of Serbia.

On behalf of UNESCO, the Conference was addressed by Dr. Andras Szollosi-Nagy, Deputy Assistant General of UNESCO and Secretary of the International Hydrological Programme. Dr. Szollosi-Nagy underlined the importance of the uninterrupted cooperation of the Danube countries in the field of hydrology. Next, he presented the actual water-resources related activities of UNESCO, mentioning the establishment of UNESCO IHE Institute in Delft, and the creation of several IHP regional centres. Finally, he outlined the new priorities in UNESCO's water programme, and the progress in preparing the VIIth phase of the IHP (2008-2013). With warm words, Dr. Szollosi-Nagy recalled the significant contribution to

hydrology and water sciences of Professor Vujica Yevjevich, who passed away in March 2006.

The importance of the regional cooperation of Danube countries was emphasized in the subsequent addresses of Mrs. Jovanka Andrejevic, Director of the Republic Hydrometeorological Service, as well as of Mrs. Ivana Tomic, representative of the Ministry of Capital Investment, and Mr. Vladimir Tanaskovic, representative of Ministry of Agriculture, Forestry and Water Resources Management of the Republic of Serbia. The addresses were followed by an artistic programme, executed by the chorus "Kantates" and the association "Gradimir" from Belgrade.

Dr. M. Miloradov, President of the National IHP Committee for Serbia, in his address recalled that twenty years have passed since the publication in 1986 of the monograph "*The Danube River and its Basin»,* prepared by the pioneers of hydrological cooperation in the Danube Basin. While some of the authors are still active, others have passed away in past period of time. Their achievement is still of capital value for the cooperation of the Danube Countries. In this context, at the end of the Opening Session, the history of cooperation of the Danube countries was addressed in special presentations of Stevan Prohaska (Serbia), Miklos Domokos (Hungary), and Heinz Schiller (Germany).

WORKING SESSIONS

The Conference continued in working session, in accordance with the Agenda. The sessions were chaired by two experts of the respective subject. The 15 minutes presentations of papers were followed by discussions

Altogether 309 participants from 23 countries plus UNESCO (Table 1) took part in the Conference.

The total number of papers presented orally or by posters was 201, by participants from 22 countries (Table 2). 9 papers submitted after deadline have been accepted for presentation at the Conference, but could not be included into the printed proceedings,

The number of participants and the number of presented papers was larger than at any of the previous conferences on hydrological cooperation of the Danube countries. This fact proves the increasing importance of water issues in the Danube basin and the vitality of the cooperation of Danube countries in hydrology.

Table 1: Number of participants per country

	Country	Number of participants		Country	Number of participants
1	Austria	7	13	Macedonia FRY	1
2	Bosnia & Hercegovine	2	14	Montenegro	1
3	Bulgaria	11	15	Norway	1
4	Canada	4	16	Spain	1
5	Croatia	28	17	Slovakia	33
6	Czech Rep.	4	18	Slovenia	17
7	Finland	3	19	Serbia	95
8	France	1	20	Poland	1
9	Germany	17	21	Romania	39

10	Great Britain	2	22	Russia	1
11	Greece	1	23	Ukraine	7
12	Hungary	22	24	UNESCO	2
Total					300

Table 2: Distribution of papers per country

	Country	Number of papers		Country	Number of papers
1	Austria	5	12	Macedonia FRY	1
2	Bulgaria	13	13	Montenegro	1
3	Canada	4	14	Norway	1
4	Croatia	15+1*	15	Spain	1
5	Czech Rep.	2	16	Slovakia	18
6	Finland	1	17	Slovenia	11
7	France	1	18	Serbia	28
8	Germany	10 + 4*	19	Poland	1
9	Great Britain	1	20	Romania	39
10	Hungary	9+4*	21	Russia	7
11	Italy	4	22	Ukraine	19
Total					192+9*
* Received after deadline					

Table 3 Distribution of the presented papers by topic

Topic No.	Title of topic	Number of papers
1	Hydrological Forecasting	**26 (**23+3*)
2	Meteorological inputs for hydrological forecasts	**25 (**23+2*)
3	Hydrological processes	**44 (**43+1*)
4	Erosion, sediment transport and sedimentation	**20 (**19+1*)
5	Water quality and ecohydrological processes	**34**
6	Water resources management	**52 (**50+2*)
Total 201 (192+9*)		
* Received after deadline		

The Local Scientific Committee of the Conference selected 66 papers for oral presentation, taking into account the distribution per topic and by country. In addition, 135 papers were presented on posters, including the 9 papers that arrived after deadline.

MAIN CONCLUSIONS OF THE DISCUSSION

Topic 1: Hydrological Forecasting

- It is of urgent importance to strengthen the cooperation between countries sharing the basin, taking into consideration both the improvement of modeling methods and the organization of communication of information.
- There is till a great gap between the high level of theoretical knowledge in hydrology and the daily practice in the field. Better cooperation is thus recommended between the scientific institutions and the operational structures.
- Better cooperation is recommended between hydrologist and meteorologists, especially with regards to the quantitative forecast of precipitation, including the data obtained by satellite observations and radar.
- Hydrometeorological services should maintain close relationships with the users of hydrological forecasting, in order to assure the cooperation and support of the stakeholders and decision makers.
- Continuing education is recommended within the respective technical services, in order to improve the use of efficient hydrological models of forecasting

Topic 2: Meteorological Inputs for Hydrological Forecasts

- Meteorologists, hydrologists and experts in remote sensing should give particular attention to quantitative forecasting and extrapolation of precipitation in space and time, which are the most sensitive elements of hydrological forecast models. Indispensable for forecasts in small and medium size basins, these elements can be of great help also for the mitigation of flood damages in large basins.
- Remote sensing based on meteorological radar observations and classical terrestrial observation networks should be considered as complementary rather than alternative methods.
- Rainfall and runoff forecasts must be probabilistic, bearing in mind the high non-linearity of atmospheric and hydrological processes
- Data on land use, vegetation cover and soil humidity obtained by satellite observation are becoming essential elements to obtain relevant input to hydrological forecasts, and are equally important for the monitoring of the extension of flooded areas, draught prone land, and other information needed for water management decisions in critical situations.

Topic 3: Hydrological Processes

- Regional cooperation at the level of Europe and the Danube Basin is indispensable for the early warning of hydrological and agricultural draught, as well as for the advancement of methods to mitigate their socio-economic consequences.
- With regards to protection against flood damages more attention must be attached to the interaction between high stages in the rivers and increased runoff from urban areas during flood events.
- When evaluating the effect of global change on hydrological extremes, it is necessary to distinguish clearly between the consequences of land use changes (e.g. urban development, shrinking of forests, etc.) and the effects of global climate change.
- In this context, the methods of time series analysis must be improved, making best use of GIS technology, supported by extensive regional analyses.

Topic 4: Erosion, Sediment Transport and Sedimentation

- In order to reduce the disagreements of conclusions as regards to the intensity of erosion and sediment processes in the Danube Basin, it is indispensable to develop comparable methods of monitoring and analysis of the data;
- The first step to that effect should be the setting up of unified databases, developed by harmonized techniques of measurements and data processing;
- Particular attention should be given to the evaluation of the respective impacts of global change and hydraulic developments on the intensity of erosion, sediment transport and sedimentation processes in the basin and river channels;
- Efforts should be made for improving of models for the simulation of the effects of alternative measures and works in the basin and main water course, in order to develop an optimal strategy for the preservation of a natural equilibrium between erosion and sedimentation processes in the Danube basin and watercourses.

Topic 5: Water Quality and Eco-hydrological Processes

- The implementation of the EU Water Framework Directive requires important efforts to improve and standardize the methods of monitoring and analysis of water quality parameters;
- The improvement of monitoring methods requires the introduction of improved indicators of water quality and ecosystem status in water bodies;
- Efficient mathematical models are indispensable for water quality analysis, particularly for the mitigation of the consequences of water pollution accidents;
- The application of the WFD stimulates the identification and setting up of eco-hydrological regions at national levels, but also calls for intensive international cooperation to protect the status of transboundary water bodies in the Danube basin.

Topic 6: Water Resources Management

- Sustainable water resources management and application of the EU WFD cannot be achieved without improved understanding of the water balance in natural conditions and exposed to change owing to human activity;
- In this context, further study is needed to better understand the trends of increase, stagnation or reduction of the intensity and frequency of hydrological extremes which determine the critical discharges used in designing hydraulic engineering works, and decisively influence the management strategy of water systems;
- Improvements are needed of the methods of monitoring, exchange of data and information, as well as of simulation and forecasting models, in the interest of the development of optimal water management strategies to deal with extreme situations, occurring naturally and being influenced by human activity;
- Socio-economic analyses are indispensable integral parts of sustainable water resources management, including the analysis of their impact on the environment.
- Life-long learning of water professionals including water managers at all levels must be recognized as an important precondition of successful application of advanced techniques of sustainable water resources

management methods, not forgetting the edification of decision makers, stakeholders and the general public.

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CONFERENCE PROCEEDINGS

At registration, the participants of the Conference obtained the Proceedings, with printed abstracts of all papers, with an attached CD comprising the full papers. The CD comprises relevant audio and video elements, and enables fast search by subject and authors, with direct approach to the web sites of authors and institutions. The publication and CD have been provided with the adequate ISBN identification. The Proceedings were edited by Tiosav Petkovic and Stevan Bruk, whereas the technical implementation is due to Borivoje Djordjevic of the Republic Hydometeorogical Service.

FULL DAY EXCURSION

Full day excursion on 30 August to the Djerdap (Iron Gates) Hydropower and Navigation Project was organised. The program included a visit to the archeological site of Vincha culture in Lepenski Vir, navigation across the storage reservoir, and visit to the hydropower plant. The CD of the Conference comprises a film entitled “Navigation on the Danube in the past and at present”.

HYDRO-METEOROLOGICAL EQUIPMENT STANDA

During the Conference, producers of hydro-meteorological equipment had their publicity stands. The following firms were represented: VAISALA (Finland), OTT and SEBA (Germany) and WERKOS (Croatia)

ACKOWLEDGEMENTS

In line with the tradition of the preceding conferences, participants did not have to pay fees. With the help of the sponsors the organizers secured free boarding and local transport for the first authors of papers, meals for all participants. All participants received free copies of the Conference Proceedings including a CD, as well a bag and various tourist information.

The National Commission of the IHP herewith acknowledges the assistance of UNESCO which made possible to organize the Conference. It is foreseen that special recognition to all sponsors of the Conference will be acknowledged at the occasion of the next World Water Day (22 March 2007).

CONCULDING COMMENTS

This report summarizes the partial reports that give account of the Conference:
by T. Petkovic (Conference Secretary),
by Dr S. Prohaska (for the Organizing Committee),
by M. Andjelic (for the Committee for Conclusions),

Belgrade, October 2006. For the Local Scientific Committee

Prof. dr. Stevan Bruk and dr. Zoran Radic