Buletinul Ştiinţific al Universităţii "POLITEHNICA" din Timişoara
Seria HIDROTEHNICA
TRANSACTIONS on HYDROTECHNICS

Tom 55(69), Fascicola 1, 2010

The significant steps in the promotion of some concepts in water management

Gh. Cretu[1] , C. Badaluta Minda[1]

Abstract – The field of the water management has developed in Hydro technical engineering school of Timisoara, with that maturity and especially after founding of the faculty 20 years ago. The paper work presents the significant steps of this way in promotion of some concepts, regarding the water management and approach of some issues in daily, from the watershed to the sustainable management, integrated of the water.

The significant steps in promoting the concepts in water management, some of national priority :
- the complex arrangements study of Jiu and Mures watershed for the graduates of 1957 and 1958 under the direction of the professor honored Pompiliu Nicolau (Water Law of 1967 included the concept of the watershed management plans).
- Researches on the phenomena of the suspension separation for the water levigation and the ad measurement of the respective separators (1972).
- Studies regarding the transformation of the non permanent reservoirs in permanent reservoirs (Cadar – Duboz reservoir, 1983 -1985)
- Studies and researches about the accidental inundations (1985-2009)
- Studies on promoting "more space for river" concept (2001 -2010)
- Ecohydrology studies
Keywords: basin settling, ecohydrology, water management

1. INTRODUCTION

Hydro technique education of Civil Engineering Faculty, "Politehnica" University of Timisoara, in 2008 celebrated 60 years since founding, and in this year it celebrates 20 years since commencement of the Hydrotechnics Faculty.

In this historical background, of the 60s, so that almost half a century, the water management both in the syllabus and the scientific researches, took place. "Water economy", the lithographed course for the students, appeared in 1965, a beginning that can be distinguished through its orientation, valid today.

Also in this field, can be considered as the collegiate books, of the reference in the specialty literature of our country, those occurring in 1978 "Hydrology", 1980 "Optimization of the water management systems", 1998 "Water management" and 2010 "Foundations of the water management" . The courses, the textbooks were accompanied of the guides for the practical activity (seminars, laboratory, etc.) and the problems gathering.

2. RESEARCH AND TECHNICAL WORK. CONCEPTS

Early stage was orientated toward the water levigation through the suspension settling basin, which involves the water levigation by its transition through a suspension layer maintained in balance. Known many years ago, the first kind of the suspension settling basin were made based on the empirical considerations.

In our country, concerning the suspension settling basin , the first collective that had made research and have established a series of theoretical problems, designing and working, its were: Institute of Studies, Researches and Designing for Water Management; Institute of Civil Engendering, Bucharest; Hydrotechnics Faculty of Timisoara.

Analyzing the theoretical aspects of the water levigation process through a sludge level in suspension [Gh. Cretu, 1972] obtained the fundamental law (Fig. 1)

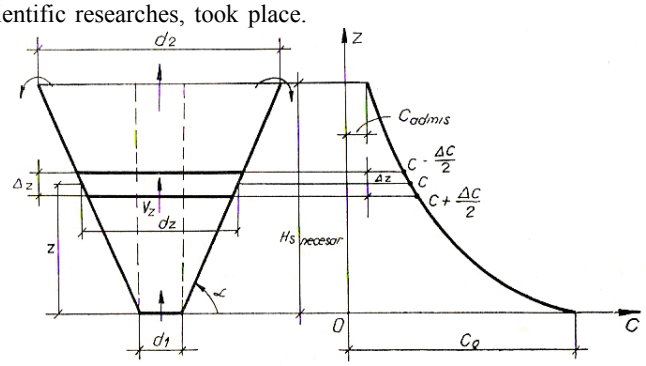

Fig. 1 – Determination of the main hydraulic parameters of separation

[1]Faculty of Hydrotechnical Engineering Timisoara, CHIF Department, George Enescu Str. No. 1/A, 300022 Timisoara, E-mail: badaluta_minda@yahoo.com

$C = C_0 \quad e^{Z}$

Where:

C – the final concentration of the water in the suspensions

C_0 – the concentration at the entrance in suspension layer

Z – the dimensionless complex as follow :

$$Z = \frac{b \quad C_s}{v_i} \quad z + \frac{1}{r_1 \quad tg\alpha} z^2 + \frac{1}{3r_1^2 \quad tg^2\alpha} z^3 \quad \text{- for progressive section}$$

$$Z = b\frac{C_0}{v} \quad z \quad \text{- for constant section}$$

Where:

$b \bullet C_0 = B$ - the separation parameter

b – factor determined of the adsorption capacity (determined experimental)

v_i – the accessional speed at the entrance in the suspension layer

z – the height measured from the base of the suspension layer

r_i – radius in the input section

α – the inclination angle to the horizontal

Imposing a certain degree of water levigation C_{ad} at the suspension layer level, the necessary height of it is express as follow:

$$H_{snec} = (r_1 tg\alpha)^{2/3} \quad r_1 tg\alpha \quad 3\frac{v_1 \quad \ln\frac{C_{ad}}{C_0}}{b \quad C_s}^{1/3} \quad r_1 \quad tg\alpha$$

The studies on the model were based on the assumption that both at the natural scale and the model of the levigation effect: $E = \frac{C}{C_0} = e^{Z}$ were considered as a general criterion of propinquity for the progressive sections, the complex coefficient [Z].

The dynamic propinquity of the levigation process by a mud layer is provided through the geometrical propinquity of the system for which $\alpha_b \quad \alpha_c \quad \alpha_l \quad \alpha_v^{1} = 1$ and the scale coefficient of the length is conditioned by:

$$\alpha_l < \frac{v \quad D}{6\mu \quad C_s \quad Re_{cr}}^{1/2}$$

Through the researches effectuated in our schools and in the country (ISCH and ICB) has opened a buildings complex of Romanian conception (settling basin / the suspension separator with the mud layer) serving in various places from the country (Ocna Mures, Valea Calugareasca, Vaslui, Tulcea, Cluj, Constanta, Tg. Mures).

The researches effectuated have enlightened a series of the issues about operation of the suspension separators, which allow their design and exploration with a low risk. The ad measurement own method of the settling basin with progressive section is known in the literature. [CNA, 1973]

In a certain stage of time (1985) but in nowadays the transformation of some non permanent reservoirs in the permanent reservoirs was imposed mainly to satisfy of some use of the local interest [Gh. Cretu et al., 1983].

Has elaborated a computation methodology including the technical - economics conditions accordingly the transformations (maintain of the flood mitigation volume, of the balance and proofing the dam, etc.) for Banat drainage basin – view Cadar – Duboz watershed.

Flooding in recent years and the requirements established in the developed countries have imposed to accomplish the theoretical and experimental researches. Since 1984 so far, one were studied [Gh. Cretu et al., 1986]: Oradea area, Dognecea valley, Firiza – Berdu watershed , Oravita watershed , Timis – Bega catchments, Barzava watershed, Calinesti – Oas watershed , etc. (Fig. 2 -6).

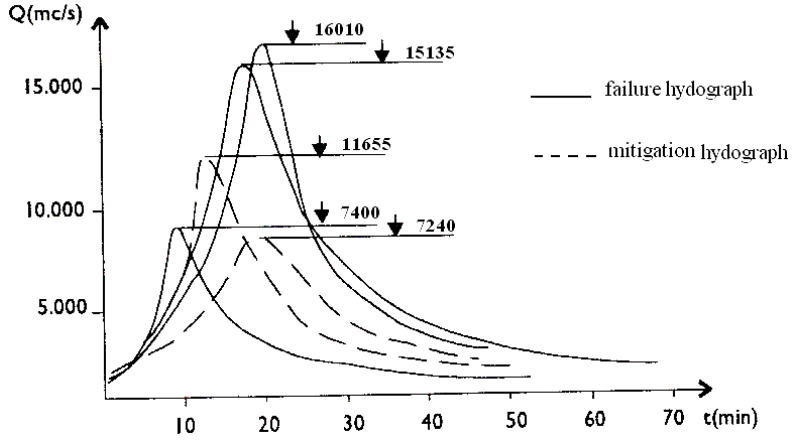

Fig. 2 – The dams' failure hydrographs of Barzava system and the mitigation hydrographs

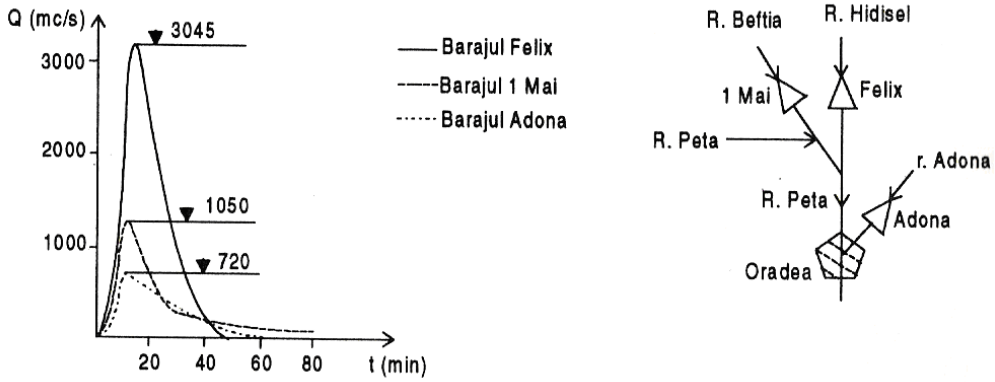

Fig. 4 – The dams' failure hydrographs of Oradea area

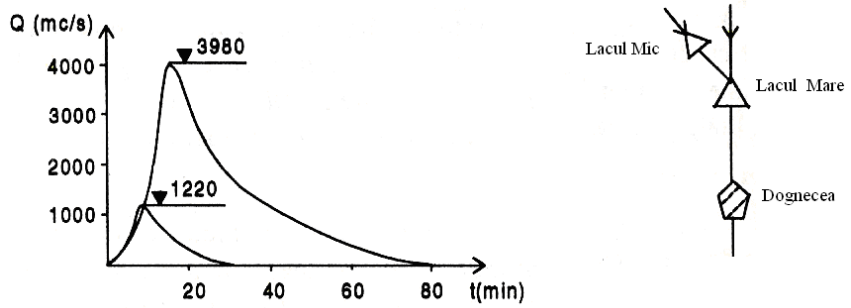

Fig. 5 – The failure hydrographs of the dams located in Dognecea upstream

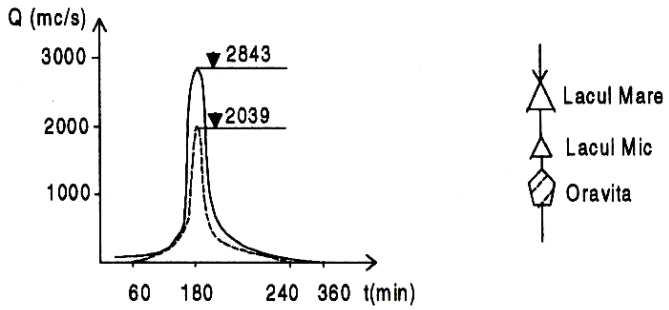

Fig. 6 – The dams' failure hydrographs of Oravita

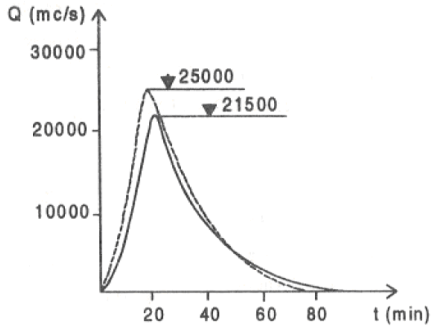

Fig. 3 – The failure hydrographs of Calinesti dam

They were studied in detail: [C. Rosu, Gh. Cretu, 1998]: the dam safety based on the risk, the failure sceneries in the hydro technical systems, the failure hydrographs computation and the generalization models of the results for the design (Fig. 7 - 9)

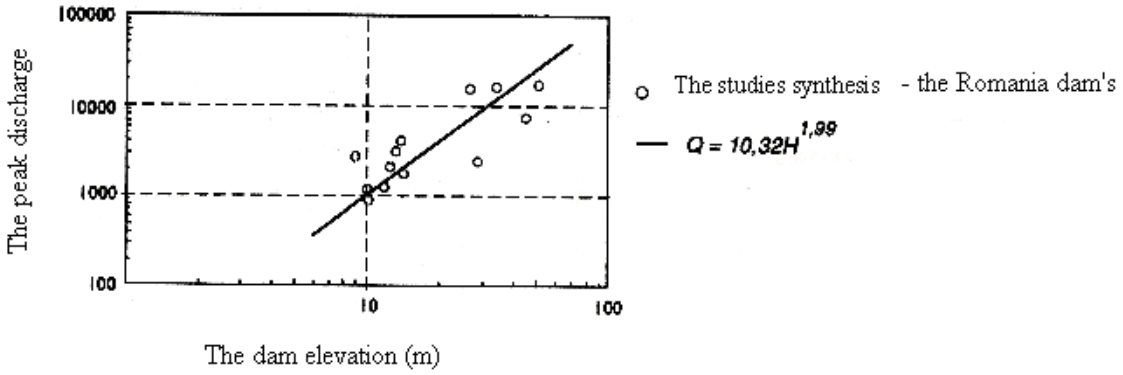

Fig. 7 – Diagram Q=f(H)

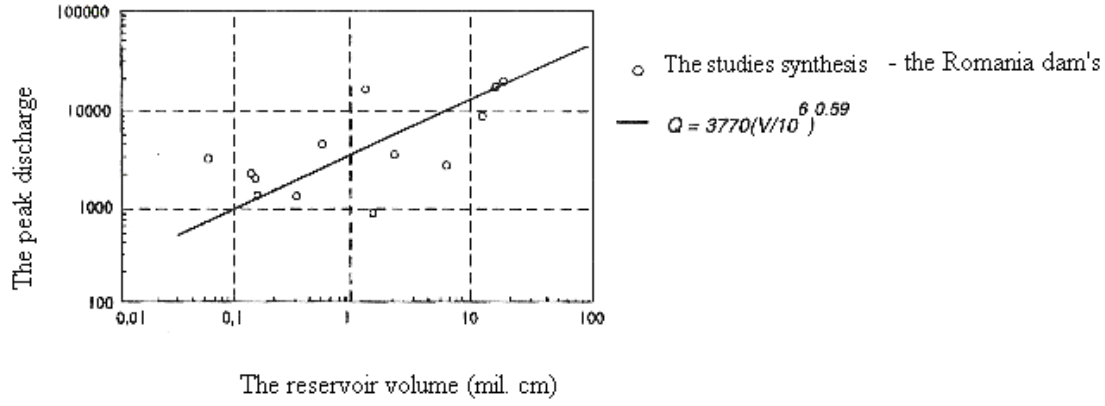

Fig. 8 – Diagram Q=f(V)

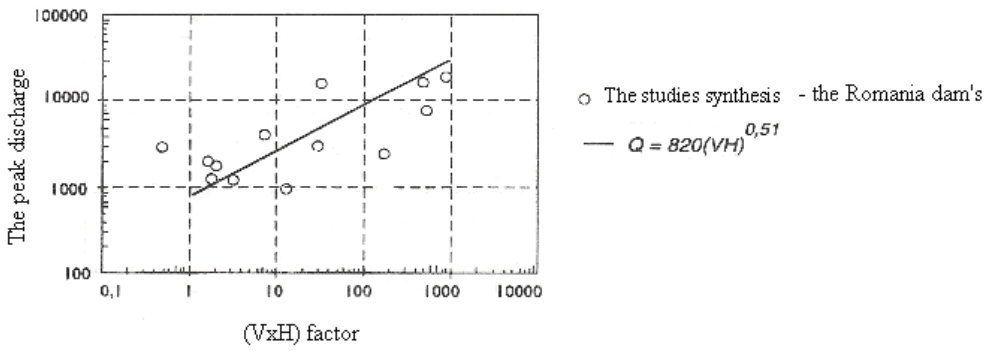

Fig. 9 – Diagram Q=f(VH)

Concerning the researches assessment about the accidental flood as regards the defence longitudinal works [C. Badaluta, 2008] was elaborated the calculus models and programs applicable for any arrangement scheme.

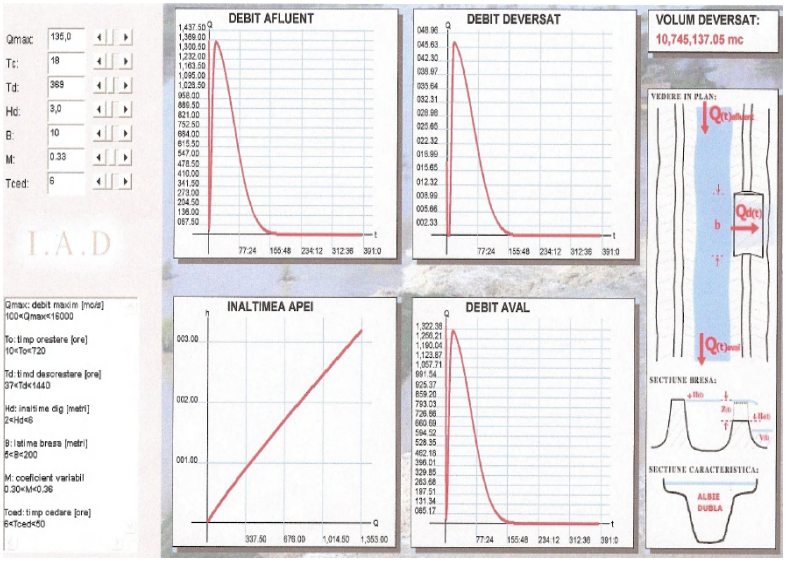

Fig. 10 – The discharged volume by I.A.D. program

Worth to highlight the preoccupations after the appearance of the Water Framework Directive (2000) and Directive on the assessment and management of flood risks (2007) as regards the development, promotion and implementation of new concept regarding the big water and "more space for river" concept [Gh. Cretu et al., 2005; C.Badaluta, 2007], the economical models [Bojin, 2004], the renaturation and revitalization of the water course / water body [M. Madar, 2007; C. Nagy, 2008] and the hydrological researches regarding the influence of the ecological factors (ecohydrology)[F. Mocanu, 2007; Gh. Cretu, 1996 - 2001].

It can give further significant results as regards the researches effectuated over the years (making an experimental stall at the semi – industrial scale for the basin settling; achieving an experimental stall in our laboratory of the faculty for the simulation of the accidental floods: development of rules for flooding calculus and some questionnaires realized in all systems of the water management in our country.

REFRENCES

[1] M. Madar, 2007 , Cercetari privind renaturarea corpurilor de apa puuternic modificate, Ed. Politehnica, Timisoara
[2] F. Mocanu, 2007 , Contributii la modelarea ecohidrologica a unor sisteme acvatice, Ed. Politehnica, Timisoara
[3] C. Nagy , 2008, Optimizarea functionarii unui sistem de gospodarirea apelor in perioade secetoase, Ed. Politehnica, Timisoara
[4] C. Badaluta Minda, 2008, Contribuții la studiul inundațiilor produse de avarierea lucrărilor de apărare, Ed. Politehnica, Timisoara
[5] Bojin Titu, 2004, Contributii la studiul si implementarea instrumentelor economice in gospodarirea apelor, Universitatea Politehnica, Timisoara
[6] C. Rosu, Gh. Cretu, 1998, Inundatii accidentale, Ed. HGA, Bucuresti
[7] Gh. Cretu et al., 1986, Studii privind viiturile generate de ruperea barajelor (1986 - Oradea , 1988 - Valea Dognecei, 1988 – Acumularea Firiza, 1989 – Ac. Oravita, 1989 -1990 – bazinul hidrografic Barzava si Timis – Bega , 1991 – Ac Calinesti Oas, 1992 - 1995 – Barzava Superioara)
[8] CNA , 1973, Limpezirea apei prin decantoare cu strat de suspensie – Studii de sinteza, nr. 9, Bucuresti
[9] Gh. Cretu, 1972, Contributii la studiul si dimensionarea separatoarelor suspensionale cu sectiune progresiva pentru limpezirea apei, teza de doctorat, Ed. Institutul Politehnic Timisoara
[10] Gh. Cretu et al., 1972, Studiul procesului de limpezire a apei la Uzina Chimica Valea Calugareni , proiect de cercetare
[11] Gh. Cretu et al., 1972, Constructiile si instalatiile de limpezire a apei prin separatoare suspensionale la Combinatul Ocna Mures, proiect de cercetare
[12] Gh. Cretu et al., 1983-1985, Transformarea cumularii nepermanente in acumulare permanenta – Cadar – Duboz, proiect de cercetare
[13] Gh. Cretu et al., 1996 – 2001, Interaction between river systems flood plains and wetlands – Ecohydrology , project PHI Unesco
[14] Gh. Cretu et al., 2005 -2006 , Studiul inundatiilor incluse managementului integrat, grant CNCSIS, cod 718
[15] C. Badaluta – Minda , 2007 -2008, Cercetari privind identificarea, intelegerea , simularea simularae si calculul mecanismelor inundatiilor din cedarea sistemelor liniare de aparare , grant CNCSIS , Td 10