



Получена: 20.12.2019 г.

Приета: 22.01.2020 г.

CHALLENGES IN THE DEVELOPMENT OF THE WATER MANAGEMENT OF THE REPUBLIC OF BULGARIA AFTER 1989: TECHNICAL CONDITION AND OPERATION OF THE SMALL DAMS

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Keywords: hydraulic structures, dam walls, dams, water management

ABSTRACT

The economic development of Bulgaria after September 9, 1944 was marked by a great rise in the hydrotechnical construction and water management. By 1989, a number of large dam walls, entire hydropower systems, irrigation systems, thousands of small dams and various water facilities related to urban development and industrial development were built. All these facilities are important for the economy, because they meet the ever-increasing needs of water users and water suppliers, energy production, irrigation and industrial needs. In the first years after 1989, some advanced hydraulic engineering works have been completed, others have been discontinued and there was a clear tendency of slowing down. The change of ownership and the reforms undertaken in the restructuring of the water management have led to problems with the technical condition, operation and maintenance of all small dams and water bodies. The causes of these problems related to personnel training, the new water management organization, and the legal and regulatory changes that outline a new approach to development are analyzed in this report in one discussion plan.

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1. Brief Introduction to the History of the Development of the Water Resource Management in Bulgaria

The history of the development of the water resource management in our country is brief and enlightening. Immediately after the liberation from Ottoman rule, the attention of the builders of the new Bulgaria is aimed at the construction of a new state device, the deletion of the remains of Ottoman feudalism, construction of roads, railway lines, and ports. Priorities are the organization of education, Enlightenment and culture of the nation, which is experiencing the end of its late Renaissance. The water farm is left to the care and initiative of the population.

The first important step in the development of the water farm as a state policy was made with the adoption of the Water Syndicates Act and the General State Program for Waters in 1920 year. According to these documents, the construction, operation and management of water-management facilities and facilities of national importance are the responsibility of the state and the water unions, while water bodies and events of regional and local importance are concern of public and private organizations.

The need for water for the needs of industry, agriculture, energy, as well as the water supply of towns and villages, serves as the undisputed lever in economic development and urban planning in each country, regardless of the existing political structure. It is not accidental that after the World War II and the change of the political regime in Bulgaria there is considerable progress and upsurge in the development of water management structures. The dynamics in the development of all areas of the water sector is evidence by the facts. During the mid-80s of all 4700 urban systems (towns and villages) 4259 were water supplied, or 80%, while by 1944 they were only 1026 (75 cities and 951 villages) or only 22%. In the meliorative hydrotechnical construction the irrigated areas increased from 36000 ha before 1944 year to 1 128 000 ha in 1984, the power of water power plants rose from 45 MW to more than 1800 MW with annual production of 3830,106 kWh [3]. The main sources of water supply, irrigation and electricity generation are the huge number of small, medium and large dams that regulate water runoff. A curious fact is that at this time Bulgaria ranks third in the world by the number of built dams relative to the number of population [3]. Thousands of dam walls have been built on small and large dams, most of which are less than 15 meters high and they mainly serve for irrigation, for the operation of hydroelectric power plants, for the development of the fishing industry or for the needs of local industrial objects.

In the organization of the water resource management during this period particular attention was paid to the preparation of well-trained cadres in the Hydrotechnical Faculty (HF) of the Higher Institute of Architecture and Construction, (later renamed to the University of Architecture, Civil Engineering and Geodesy), whose 70 Jubilee anniversary HF celebrated. In the course of 70 years we train specialists for the water resource management, for the design and construction of water bodies, for the technical operation and maintenance of water-business systems and complexes to various departments and design organizations, as well as for scientific institutes and directorates. An indisputable accent in the development of the water resource management during this period is the involvement of science and the application of research in hydrotechnical practice. A national automated system for management of water resources with the relevant scientific unit and data center, scientific directorates to "Vodprojekt", "Water Pipeline project", "Energoprojekt" was established. At the Bulgarian Academy of Sciences, after 1963 the academician Dimo Velez founded the "Institute of Water Problems", which deals with solving various water and business problems and applying the

results of the research developments in hydrotechnical practice. There is an understanding to elevate the role of science in making technical progress in the water resource management and political will to turn science into productive power.

In the first years after 1989, some advanced constructions in Hydrotechnics were completed, others were discontinued and there was a clear tendency of calming down. The change of ownership, the problems with the technical condition and the maintenance of all small dams caused by the absence of qualified personnel performing their operation, as well as the regulatory framework, are the subject of this study.

2. The Technical Condition and Maintenance of Small Dams

After the change of the political situation in 1989 and the collapse of the labor cooperative agricultural holdings (LCAH) and the AIC (the agro-industrial complexes) in the whole country a vacuum was formed in the ownership of all small dams and reservoirs. The state decided to hand over the ownership of all water bodies that were built to meet local needs, for irrigation in agriculture and watering in livestock, to the municipalities. The municipalities had an act for public municipal property for most of the sites located on their territory. During the 90s, through deals with treasury notes of the LCAH, some people managed to buy small dams as private property.

The neglect of the maintenance of the dams that are municipal property has been realized only in the last few years, after rainfall and catastrophes with dams all over the country, unfortunately, with the cost of human casualties. With the change initiated in the Water Act of 2016, a Directorate-General has been established to supervise the maintenance of the dam walls and the facilities to them in a properly technical and operating state. With decree № 262 of 07.10.2016 (State Gazette (SG) 81 of 14.10.2016) was adopted "Ordinance on the Conditions and Procedures for the Realization of Technical and Safe Operation of the Dam Walls and Facilities to Them, as Well as the Control of Their Technical Condition". In the line of work of the newly formed directorate clear problems are outlined with the lack of maintenance over the last 25 years by the owners, misunderstanding of the seriousness of the problem and shortage of qualified low-paid staff. Unlike most of the municipal dams, all private dams have been maintained and continue to be maintained – that clearly shows the overall irresponsibility. It has been found out that not all municipalities have added in the act all the water bodies on their territory and refuse to make efforts and care. These reactions are caused by the lack of foreseen financial resources. The municipalities did not foresee in the column expenditure of their budget the maintenance of dams for two and a half decades and suddenly, when this is necessary, it is perceived as a burdensome, unnecessary feather.

The lack of maintenance for a quarter of a century negatively affects the technical and operating state of the dams (Fig. 1, 2). Earthly-bulk walls of local, sandy-clay soils have been built on a large scale. One or two cleanings per year of the vegetation from the slopes and the crown of the walls has become a serious problem, requiring specialized machines or many more forces and resources to be solved.

The overflows are often flooded with earth masses or construction waste. Wire nets are installed along the overflow edges. With these measures, tenants aim to stop the loss of fish during overflow through the spillway. Unfortunately, there is no understanding that these unlawful acts can cause emergencies, human and material losses. Since the passage of high waters over the last 15 years, large ravines of many dams with earth spillways were formed (Fig. 3, 4, 5, 6).



Figure 1. Water slope of the Domuslavets dam



Figure 2. Cleaning of the air slope with specialized equipment



Figure 3. Buried overflow of the Zharkovets dam



Figure 4. Wire net on the overflow of the Ezerska padina dam

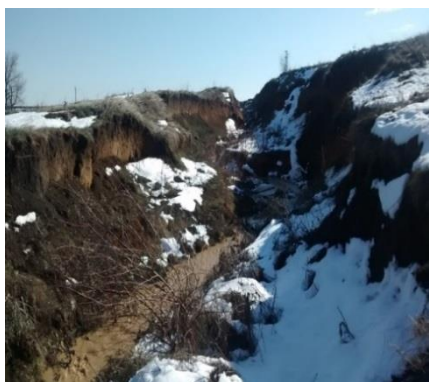


Figure 5. The overflow of the Ezerska padina dam



Figure 6. The overflow of the Lesura dam

Untimely repair measures led to frequent emergencies in municipalities such as Hayredin and Borovan. In 2018 the government lent up to 3 million BGN solely for the urgent reinforcement of the spillway of several dams in the region.

The main exhausters (ME) are often clogged, concreted or cluttered by non-working or stolen for recycling shut-off cranes. Most of the available cranes have leaks and are with missing manipulating devices. The improper handling of the shut-off valves of the regular ME leads to the accumulation of sludge and deposits in the pipes, which over time are layered. The lack of manipulation was caused by the reluctance of the tenants to lose 4 – 5 m³ water in the month. Most likely this volume is vital for farmed fish (Fig. 7, 8, 9, 10).



Figure 7. Shaft of ME with leakage from shut-off valve without manipulation device



Figure 8. Shaft of clogged main exhauster with shut-off valve



Figure 9. Attack on the metal pipe of the main exhaust



Figure 10. Mounted siphon for main exhauster

A prerequisite for accidents and catastrophes of the water bodies in the country is ongoing with dozens of years of change from one water management system to another, after 1989. Only with the last changes since August 2019 in the Water Act, dam municipal property may already be transferred free of charge to the state in the face of State Enterprise "Management and Stewardship of Dams" (SEMAD). The Minister of Economy is chairman of the Management Board of the SEMAD. The decision to transfer the ownership is taken by the respective Municipal Council on a proposal from the mayor. On the basis of the decision, the

municipal mayor submits to the governor of the district a reasoned proposal for change of ownership of the dam. To the proposal is applied the decision of the municipal council and a municipal Property Act for the dam, subject to the decision. A copy of the file shall also be sent to the Minister of Economy. The governor of the district shall issue an order for accepting or refusing the donation within one month from the receipt of the decision of the municipal council and notify the mayor of the municipality, the executive director of the State Enterprise "Management and Stewardship of Dams" and the Minister of Economy. The transfer of the property is made through a donation contract concluded between the mayor of the municipality who owns the dam and the government of the district. The contract shall be concluded within 14 days of notification. A transcript of the entered contract shall be made available to the executive director of the SEMAD. For a dam, free of charge transferred to the state, the governor of the district draws up an act of public state property with rights for management of SEMAD. The governor refuses by order to accept the donation and returns the proposal and the accompanying file to the municipality when: the water body requested for transfer from the municipality is not a dam under § 1, para. 1, item 94 of the additional provisions of the Water Act, or the proposal refers to a dam given to a concession, or there is no municipal property act.

Another reason for the misadventure of the water farm during the transition period, besides the delayed and poorly implemented change in the management of water resources in Bulgaria, is the shortage of well-trained personnel. The absence of qualified personnel was felt at the formation of the Supervisory Directorate in 2016. Municipalities also have difficulties in finding well-trained professionals to meet the requirements for the "dam operator" norms. Indeed, in increasing the qualification and preparation of personnel, besides the Hydro-technical faculty of UACEG, other higher schools and private universities, such as the "Todor Kableshkov" Technical University or the Technical School for Higher Education are also included. However, the master's degree in "Supervision and Exploitation of Hydrotechnical Facilities" is obtained only for a period of training of 4 semesters under a shortened programme, unlike classical training in the faculty of UACEG, where it continues 10 semesters and the speciality Hydroconstruction is protected. In the summer of this year, the appointed expert group for accreditation of the speciality Hydroconstruction strongly recommended to the Accreditation Agency to stop accrediting schools for higher education where the programs for training in the speciality Hydroconstruction are shorter or there is a short-term course for retraining in the above specialty in the professional field 5.7. Architecture, Civil Engineering and Geodesy. As a rule, new specialties are usually masked under other names such as "Supervision and Exploitation of Hydrotechnical Facilities", and in fact it is the well-known hydrotechnical construction. As a consequence, the industry is flooded with poorly prepared specialists who have not undergone the full course of the program offered in UACEG and do not have the necessary professional qualification. In practice this obviously is a prerequisite for accidents and catastrophes at the hydro technical facilities.

Another prerequisite for future accidents and catastrophes with hydrotechnical facilities and projects in Bulgaria is short-sighted ignoring the science in the water resource management after November 1989 year. The scientific units that served as a link between science and practice were abolished. In the Bulgarian Academy of Sciences during the presidency of academician Stefan Vodenicharov, the Institute of Water Problems, created by the academician Dimo Velev, with an unique scientific base and infrastructure of wave and flow channels for model research, research stands, and swimming pools was literally wiped after its closure, as the decision of The Board of Directors of the BAS (Bulgarian Academy of Sciences) accommodated on its place the Institute for Space Research in Block № 1 on the 4 km, gave what it could on secondary raw materials for scrap, and the rest discarded in the garbage. Whether space research has gained from this decision when in frequent floods in the country this institute would be helpful, the future will show.

3. Conclusion

In the technical condition and operation of small dams after 1989, in Bulgaria part of the results of the change of a system of management of water resources reflect in some sense each other. This study raises questions whose answers can improve the state of the water farm in Bulgaria. Really, how many years are needed to count the dam walls in our country, or to establish their owner, or how many years it takes to replace one water management system with another? Whether we can reach objectively the causes of accidents and catastrophes with hydrotechnical facilities and water bodies in our country, accompanied often not only with material damage, but also with human casualties? Often excuses with climate change and unusual precipitation seem ridiculous.

We hope this discussion will continue in order to find the right solutions.

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ПРЕДИЗВИКАТЕЛСТВА В РАЗВИТИЕТО НА ВОДНИЯ СЕКТОР НА РЕПУБЛИКА БЪЛГАРИЯ СЛЕД 1989: ТЕХНИЧЕСКО СЪСТОЯНИЕ И ЕКСПЛОАТАЦИЯ НА МАЛКИТЕ ЯЗОВИРИ

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Ключови думи: хидротехнически съоръжения, язовирни стени, язовири, управление на води

РЕЗЮМЕ

Икономическото развитие на България след 9 септември 1944 г. се характеризира с голям подем в хидротехническото строителство и водното стопанство. До 1989 г. са построени редица големи язовирни стени, цели водноенергийни системи, напоителни системи, хиляди малки язовири и най-различни водни обекти, свързани с благоустрояването на селищата и развитието на индустрията. Всички тези съоръжения са важни за икономиката, тъй като задоволяват непрекъснато нарастващите нужди на водопотребителите и водоползвателите за водоснабдяване, производство на енергия, напояване и

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промишлени нужди. В първите години след 1989 г. се завършват някои напреднали строежи в хидротехниката, други са преустановени и се наблюдава ясна тенденция на затишие. Промяната на собствеността и предприетите реформи в реструктурирането на водното стопанство доведоха до проблемите с техническото състояние, експлоатацията и поддръжката на всички малки язовири и водни обекти. Причините, породили тези проблеми, свързани с подготовката на кадри, новата организация на водното стопанство, законовите и нормативните промени, очертаващи нов подход на развитие, са анализирани в настоящия доклад в един дискуссионен план.