

QUANTITATIVE AND QUALITATIVE SITUATION IN THE WATER SUPPLY SECTOR

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Summary

Water is a vulnerable natural resource unevenly distributed on plant Earth, which must be preserved, adequately protected, and rationally disposed of in available quantities. Water is good for general use and should be treated in accordance with the Water Charter, and provide users with access in the sense that no one deny another person the use of water. Proceeding from the fact that the improvement of water requires the attention of the public at the local, national, regional and world level, it follows that activities of new amounts of water, as well as their protection and distribution to all those who need it, must be given special attention with concrete measures and activities. Article 18 of UN Agende 21 refers to the protection and preservation of sources of drinking water, while at the same time providing a sufficient amount of fresh water. Therefore, there is a warning about the misuse and continuous of water resources which disrupts the quality and quantity of water. In the European Charter of water, it is said that water is a general hereditary good, the value of which must be known by everyone, and it must be economized and used carefully. However, the human population, in its excessive desire to manage water resources, has also had a counter-effect, although it is a well-known fact that it is impossible to find a substitute for water.

INTRODUCTION

The most important document on which the regulations and strategy for managing water resources, especially groundwater bodies, are based is the Framework Directive on Water of the European Union, the basic concept of which is aimed at preserving, protecting and improving the quality of the environment in which water bodies exist. There are numerous problems in the water sector, but in addition to recording the problems, it is necessary to carry out concrete activities to improve the condition of water bodies both quantitatively and qualitatively. It is a set of processes for which it is necessary to organize expert teams, secure financial resources, formulate legal regulations and continuous monitoring. As an example of the complexity of water supply for a number of municipalities in the Tuzla Canton, we can take the hydrogeological research in Srebrenik, which for a long time has lacked the necessary quantities of water for proper water supply to the population.

1. THE IMPORTANCE OF PLANNING AND EFFECTIVE ACTION TO PROTECT WATER RESOURCES

In the modern world, water is becoming an increasingly important resource, and the dynamic development of society and the increasing threat to the three geological environments (water, air and soil) is becoming a key issue of sustainable development. Water knows neither administrative nor territorial boundaries, but is a medium that is in constant motion, in the dynamics of which it is often exposed to different pressures of polluting substances. At the same time, the occurrences of increasing hydrological unevenness and extreme hydrological events are especially pronounced nowadays. Bosnia and Herzegovina is a country with significant amounts of underground and surface water, but these resources are not inexhaustible and are directly related to hydrological conditions. At most hydrological stations in the water area of the Sava River in FBiH from August 2021 to August 2022, water level and flow values were recorded that are close to historical minimums or even record low, while 2024 was the leading year. Rivers, lakes, underground water bodies are polluted with different forms of pollutants from a very wide spectrum of pollutants, without any remediation treatment. River flows that are polluted to a greater or lesser extent in the entire river basin (flows of the Sava river basin - the area of the rivers Una, Vrbas, Bosna and Drina) are particularly under attack. They are increasingly becoming recipients of sewage waste and industrial waste water. Ensuring sufficient quantities of physical-chemical and bacteriologically correct drinking water is becoming more and more a problem in the territory of the Federation of Bosnia and Herzegovina, where, according to estimates, about 50% of the population is connected to the public water supply system, and even less to the sewage system. Most of the local water catchment facilities do not have sanitary protection zones, and therefore there is no adequate insight into the correctness of drinking water, nor its protection. The water resources of Bosnia and Herzegovina consist of river basins, natural lakes, artificial accumulations and underground waters. Due to the discharge of untreated waste water from the population and industry, most of the river courses in Bosnia and Herzegovina are polluted or contaminated with various pollutants, which make some water courses out of class IV (especially the Bosna and Vrbas rivers). The main polluters as sources or foci of pollution from which different spectra of contaminants are emitted are: population, thermal energy plants, exploitation of mineral raw materials, food industry, crafts, garbage dumps and wild disposal of municipal and industrial waste, uncontrolled disposal of hazardous (toxic) waste, soil erosion conditioned by the stripping of the forest cover, i.e. cutting down the forest. On the basis of the above, problems arise in the water sector, which are manifested through:

1. Inadequate (even questionable) water supply to the population and industry,
2. Water quality that, by sampling water samples from the source, shows physical-chemical and bacteriological defects,
3. More and more frequent incident pollution of the source and the spread of infectious diseases through the consumption of defective water,
4. Insufficient, inadequate or no protection of water quality (designed zones of sanitary protection), and inadequate protection against the harmful effects of water due to unregulated water flows, flood waves and non-maintenance of embankments,

5. Occurrences of soil erosion due to excessive and uncontrolled cutting of forests, erosion within unorganized and unmaintained riverbeds, and the occurrence of landslides.

The causes of this state are different both in terms of extent and diversity. First of all, one of the causes is the absence of integral water management, as well as the absence of clear strategies in this sense that would be legally conceived and based on the actual situation on the ground. The lack of development plans that would harmonize the needs of urban and rural areas is something that must be systematically worked on and legislated. Another problem, no less, is the damaged or destroyed infrastructure of the water supply and sewerage network, which cause large losses of water, especially drinking water, for the rehabilitation and construction of new infrastructure, it is necessary to allocate significant financial resources, which can be ensured from the good chargeability of its services if the users are satisfied, so without restrictions and with an orderly supply of hygienically correct water, and with mandatory water monitoring with an information system (database). The third and perhaps the biggest problem is the inadequate or complete lack of protection of water resources, that is, the source, which makes the water exposed to various pollutants, and thereby physical-chemically and bacteriologically endangered. A special segment is protection against the harmful effects of water, such as unregulated water flows, floods and erosion of surface land, and landslides, which also leave unfathomable consequences for drinking water. The causes of such problems are most often the lack of financial resources (lack of funds and favorable financing mechanisms), equipment, but also adequate personnel, and from this result poor or no plans and programs and development strategies. When it comes to drinking water, it is necessary to establish an integral management of water, as well as an adequate strategy for hydrogeological research and the discovery of new amounts of drinking water, as well as the coordination of several disciplines that deal with water. the water directive is sporadically applied to solve the problem of water resources in the territory of Bosnia and Herzegovina). In order to extend the life of water bodies, we need to establish a purification system, i.e. different types of remediation of waste water that threaten the quality of the source, and to replace and introduce new methods of remediation treatments (replacement of dirty technologies), along with water monitoring and the introduction of an information system for early detection of incident situations and creating database. Special and primary attention must be given to the purification of waste water (and not only in liquid, but also in solid and gaseous state, they all affect the three geological environments), because due to waste water with a different spectrum of pollutants, most river courses are polluted, and indirectly and underground water bodies. As an example of the complexity of water supply for a number of municipalities in the Tuzla Canton, the example of hydrogeological research carried out in Srebrenik, which for a long time has lacked the necessary quantities of water for proper water supply of the population, will serve.

For a long time, the city of Srebrenik has had problems with an insufficient amount of water for the water supply needs of the population, but also with the increasingly developed industry, which affects the quality of the water. This problem is particularly reflected in the local communities of the eastern part of the Municipality, given that there are no significant water bodies of underground water, from which drinking water needs could be met through wells. The urban area of Srebrenik lacks 10 l/s of drinking water in a period of two to three months in one year. For this reason, construction of a replacement well at the source of Vlahulje (well B-5A), in the immediate vicinity of well B-5 built in 1987, was started.

Well B-5A was constructed in 2018 by the company "Geoservis" d.o.o. Livestock. In 2023, work began on the introduction of well B-5A into the water supply system of the municipality of Srebrenik - pressure line from facility 1 and 2 of well B-5A to the facility for the connection with wells B-6 and B-7 (PHASE II).

It was necessary to record and inspect the state of the well, its possible cleaning and conquest, as well as defining the hydrogeological parameters, i.e. determining the capacity of the well and the conditions of exploitation (optimal capacity of the well), as well as the water quality.

Given that more than five years have passed since the construction of the well, and that it was not in operation, we were of the opinion that it is necessary to carry out certain works in the B-5A well itself before putting the well into operation. A program of works was carried out, which included recording the condition of the well with an underwater camera, cleaning with the air-lift method, during which constant control of the sand content (impurity) in the water would be carried out. After the full depth of the well structure is reached, as well as the purity of the water, it is planned to proceed with further cleaning of the aquifer and increasing the porosity of the environment in which the well was built, with constant pumping using a pump with a set capacity 50% higher than the designed capacity of the well, if that allows dynamic lowering of groundwater. Pumping would last a minimum of 15 days, with constant monitoring of the groundwater level at well B-5A and well B-5. After that, it is necessary to perform well testing using the "Constant-test" method, with three (3) pumping capacities and three (3) established reductions in the groundwater level.

Before the start and after the preliminary works were carried out, it was necessary to perform a complete biological-physical-chemical analysis of the water, that is, water sampling at the beginning and end of the activity, for: two samples for extended analysis of the physical-chemical composition of the water at the beginning and end of the work, two samples for bacteriological analysis of water at the beginning and end of the works and one sample for testing the α and β activity of the water (at the end of the work testing). After all the necessary work that was carried out according to the stages of preparation and organization of the work site, taking water samples for microbiological and chemical tests, and recording the well structure with a video camera, the II phase - cleaning and flushing of the well for a minimum of 72 hours was started, then the III phase - pumping the well pump for 15 days with monitoring of the water level in wells B-5A and B-5, and IV phase - testing of the well for a minimum of 72 hours with three pumping capacities and with three stabilizations of lowering the groundwater level and taking samples for microbiological, chemical and testing α and β water activity.

CONCLUSION

From the above, it is clear that due to the necessity of providing sufficient quantities of water for the needs of the residents of the city of Srebrenik, the construction of a replacement well B-5A was carried out, with a program of works that would ensure the functionality of the well. The works were carried out in accordance with the previously completed Work Program, which was completed in its entirety. During pumping at well B-5A, with a pump with a capacity of 18 l/sec, a drop in the level was also recorded at well B-6, which is used for the City's water supply (17 l/sec), because a hydraulic connection was established between these two wells,

which is why a pump tripped on B-6. The actual capacity of the B-5A well is at least 25 l/sec (25-30 l/sec), which was determined during the construction of this well in 2018, as well as the testing carried out in 2023 with the previously described works.

However, this capacity seriously impairs the existing pumping capacity at well B-6, so with further exploitation of the existing capacity at well B-6, the optimal pumping capacity at B-5A would be 10-12 l/sec. By recording in the well, it was established that the well was cleaned, as well as that the built-in filters were fully functional.

The results of the physical and chemical tests of the water sample taken before the cleaning works of well B-5A show that the water does not meet the regulations of the Rulebook on natural mineral and natural spring waters "Official Gazette of BiH" No. 26/10 and 32/12, due to turbidity, the presence suspended particles and a higher manganese content of 0.253 mg/l (allowed less than 0.05 mg/l). Also, according to the microbiological analysis, the water does not meet the requirements of the "Regulation on natural mineral and natural spring waters" Official Gazette of BiH No. 26/10 and 32/12. (increased presence of illegal microorganisms-bacteria). This example of water supply in the city of Srebrenik is only one in a series of similar problems of all the municipalities of TK, and it is necessary to solve them systematically with an expert team, sufficient financial resources and the implementation of legal regulation.

LITERATURE

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