15th International Research/Expert Conference
"Trends in the Development of Machinery and Associated Technology"
TMT 2011, Prague, Czech Republic, 12-18 September 2011

PROTECTION OF WATER BODIES OF GROUNDWATER IN THE MOUNTAIN KONJUH, BOSNIA AND HERZEGOVINA

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ABSTRACT

Mountain Konjuh groundwater bodies were analyzed in this paper. Water bodies Kladanj and Kladanj-1 belong to the sub-basin of the Drina river, and water bodies Stupari and Krabašnica belong to sub-basin of the river Bosna.

By this analysis a series of information were collected on the type and size significant pressures and impacts to which defining of the exposed of the these water bodies of groundwater.

Studies of pressures and impacts to provides defining of the monitoring programs, as well as creating in register of polluters.

When assessing risk, were analyzed and identified all negative impacts on water bodies and groundwater and surface water.

The information collected are related to activities that cause pressures and impacts, and based on that were proposed in other measures to improve the quality of water.

Keywords: water bodies of groundwater, monitoring, Water Framework Directive, protection and prevention

1.CHARACTERISTICS OF THE ANALYZED WATER BODIES

Separate accumulation of groundwater within carbonate aquifer exist in the upstream catchment river Gostelja, situated up to southern rim Sprečko polje. This water body as designated as "Stupari".

Springs discharges on the contact with Lower Triassic clastics and volcanic-sedimentary rock formations. The most important springs are "Tarevčica" with Q_{min}= 20 l/s , "Zatoča" Q_{min}= 60 l/s and "Seven springs" Q_{min}= 60 l/s. The area of this underground water body amounts 91,2 km^2.

Broader area "Stupari springs" is made of carbonate rocks (limestone), Triassic age ($T_{2,3}$) sedimentary and volcanic rocks (diabase-sedimentary Formation) of Jurassic age (J?).

Hydrogeological sistem is characterized by two complex expressed as follows: - older complex built by a very fractured Middle Triassic limestone (about 60% of the basin), some of which were built in the slopes of mountain peaks, and – younger isolation complex, of low permeability made of clay and diabase-sedimentary formations, that make up about 40% of the catchment area.

Total reserve of water is 200 l/s.

By prospecting areas within which spring Tarevčica (water body Stupari) situated , to locations of wild dump were recorded. Those a wild waste dump made have negative impact on pollution of

existings springs, especially on pollution of underground water courses due to infiltration from waste dump, and that is while detaile analysis of this waste dump. Limestone qarry "Hrastić"is located southeast of the spring Zatoča ("Hrdar kosa") and presents potential risk to the water body of groundwater Stupari. In the Stupari area (near the village Tarevo), exploitation of forests made the forest enterprise "Ramex" and individual users in the form of illegal logging, is expected to cause more soil erosion. Protective zones was not performed for this specific ground water body.

Water body Krabašnica is located in northeastern Bosnia (headwater Spreča), about 12 km southeast of Banovići. Broader area of Krabašnica springs located within the water body of groundwater Krabašnica occupies part of the northern rim of the massif Konjuh, belonging to the central ophiolites zone. Clouse area of forming springs is composed mainly of Mesozoic formations of Triassic and Jurassic age as follows: limestone of middle and upper middle Triassic ($T_{2,3}$) and volcanic-sedimentary formations, Jurassic Melange ($J_{2,3}$). Krabašnica water intake is located elevation of 527,3 meters above sea level, in the contact complex limestone mass, which allows intensive infiltration of surface water. Groundwater reserves of the water body Krabašnica ranges from Q_{min}=10 l/s up to Q_{max}=90 l/s.

Water body Krabašnica serves for water supply of Banovići, but due to very old supply network with high water losses, there are sometime appearance of dilapidated . The basic problem in water supply Banovići is blurring of surface water catchment area of springs, which are filtered through the surface deposits of the earth. The appearance of blur water is related to uncontrolled forest loging. General problem related to listed and analyzed groundwater bodies is the lack of or adequate protection of water springs, causing ongoing pollution of the catchment.

There are no planned protective zones of mentioned groundwater bodies.

This region belongs to ofiolitic hydrogeologic zone in a broader regional sense, and includes spring area Drinjača, as well as the terrain around Kladanj, Turalići, Javornik mountain, and is labeled as a body of water Kladanj.

Impermeable rock mass are serpentinite massif to the west, and Verfen sandstones, conglomerates and marls in the east of the broader area. This rock masse makes floor and lateral barrier to groundwater, that is accumulated within the middle Triassic limestones.

There are no planned protective zones of mentioned groundwater bodies.

Groundwater body Kladanj-1 is located on the left side of the river Drinjača, near the village Starić, on the slopes of the limestone massif "Vrtača". Area of groundwater body Kladanj-1 amounts 4,5 km^2 .

Hydrogeological complex of groundwater body Kladanj-1, is characterized by: the older collector complex – built by cartifications middle Triassic limestone and yonger slightly permeable complex built of clay sediments and diabase-sedimentary formation. The directions of the fault zones and structure of the limestone massif, have led to a power source connected with the water in the basin "Starička rijeka". "Starička rijeka" basin supply source for water supply Kladanj.There are no Elaborate on protection zones.

Capacity of groundwater spring Kladanj-1 amounts 11,0 l/s. Kladanj has inadequate water supply works mostly outdated water supply network, but also for problems in the quality of water source in the rainy period, when it comes to an interruption in water supply. Insufficient exploration of water bodies of groundwater Kladanj and Kladanj-1, the inability of a single register of polluters, and the necessity of purifying water, make even more difficult to resolve problems in water supply.

2. CONCLUSION

The issue of sustainable use, management and protection of surface and groundwater, is actual in l all countries in the Europe. In this sense, running a series of activities global character, aiming to harmonize the way of water management, with special emphasis on continuous monitoring of their use and condition. In accordance with the Water Framework Directive, assessment of risk of groundwater bodies is carried out depending on the state of quantitative and qualitative pressures and impacts. Inside this water body is located in the famous mineral spring water "Muška voda" (Men's water). The miraculous properties of these waters have been known for hundreds of years. The research was carried out of the water a hundred years ago, at the time of the most famous laboratories in Europe. "Muška voda" is a water spring to whom many attribute aphodisiac properties.

All water bodies without performed Protection Studys, are at risk, and that requires urgent implementation of prevention, rehabilitation and other measures and activities on the ground.

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