International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

http://ijpsat.ijsht-journals.org
Vol. 30 No. 2 January 2022, pp. 523-526

Factors Influencing Changes In The Groundwater Level In Fergana

Mamadali Mamadaliyevich Madraximov, Zokhidjon Erkinjonovich Abdulkhaev, Islomjon Ilhomjon ugli Inomjonov

Fergana Polytechnic Institute

Abstract – The article describes the external and internal factors influencing changes in groundwater levels. The causes of groundwater formation and their dynamics are considered. The history of the theory of groundwater formation is analyzed.

Keywords – Groundwater, Artesian Water, Hydraulic Factors, Irrigation Factors, Natural Factors, Kars Waters.

I. INTRODUCTION

Groundwater is the second largest component of the hydrosphere, with a total volume of 1491049 thousand km3, after the ocean. The study of groundwater is of great scientific and practical importance, as it forms the bulk of the available drinking water on the planet.

Groundwater, which meets human demand for drinking water, is the only source of water used in all sectors of the economy, including medicine, agriculture, and so on. Groundwater is all the water that occurs in the form of liquid, solid (ice) and vapor in the rocks of the earth's crust, in the cavities within the soil layers. These waters differ from other constituents of the hydrosphere in that they move between the layers of the earth under the influence of gravity or pressure[1]–[7].

II. METHODS

Various theories and hypotheses about the origin of groundwater have been put forward by many scientists, and there are still many theories.

In the 18th century, a Russian scientist, Lomonosov, and a French physicist, Marriott, suggested that the formation of groundwater was caused by rock erosion. Lomonosov believed that groundwater was formed by the interaction of soils and rocks. However, after a long time, when it became clear that there is almost no precipitation in the desert and semi-desert zones, the presence of groundwater and groundwater, the disadvantages of the theory became clear. The fact that the composition of groundwater in solution is completely different from the composition of the water and the rocks in the area where they are located, once again proves the reliability of this theory[1], [8]–[13].

The German hydrologist O. Folger advanced the condensation hypothesis in the early twentieth century. He hypothesized that water vapor entering the pores of rocks and soils would condense and accumulate to form groundwater. The large amount of groundwater and the hypothesis put forward have been criticized by many as insufficient to produce such a large amount of groundwater.

Corresponding Author: Mamadali Mamadaliyevich Madraximov

At the beginning of the twentieth century, the Australian geologist E. Zeuss founded the Juvenil theory. E.Seuss, water vapor and gaseous products released from the underground magma rise close to the surface and condense to form juvenile water. This theory has not been proven because of the small amount of water available.

As a result of his research, A.F.Lebedev developed his theory of condensation, according to which air and water vapor entering the cavities of soil and rocks after cooling condenses into a liquid state, and as a result lum part appears.

According to relict groundwater theory, some of the groundwater is formed in ancient times by water present in the pores of sedimentary rocks under lakes or seas. Such waters are called relict waters. As a result of geological development, new strata have formed on top of such strata. Due to the increase in pressure in the lower layers, some of the water left in the gaps between the layers is compressed and added to the surface water or water in other layers[14].

According to G.N.Kalinsky, the main part of groundwater is water absorbed from surface runoff, rainwater, water from condensation of water vapor. The lithological and petrographic composition of the rocks is influenced by the long-term water exchange activity of freshwater to salt water and vice versa. Groundwater in motion is not only the melting of rocks, the extraction of various mineral components from its composition. During the movement of freshwater to wet areas, they cause the transfer of saline chloride and sulfate to 50 g / l saline.

According to the theory of infiltration, most of the groundwater is formed by the absorption of snow and rainwater, water from canals, rivers and ditches. Although these ideas have been expressed long ago, Lebedev's contribution to its formation as a theory is significant.

In 1948, A.M.Ovchinnikov and P.P.Klimentov developed their own classification, according to which groundwater is given as follows:

- Waters in the aeration zone;
- Groundwater;
- Artesian waters.

From the above classifications, it is clear that each expert has proposed a classification of groundwater based on scientific research. O.K.Lange proposed a classification of groundwater that belongs to the Central Asian area and may be suitable for this area. The Lange classification classifies groundwater in terms of hydraulics and the depth of groundwater. This classification is still used by Central Asian hydrogeologists.

III. RESULTS

Groundwater changes are influenced by the following factors:

1. **Hydraulic factors.** Infiltration of water from large canals, streams, water bodies, reservoirs and other structures;
2. **Irrigation factors.** Groundwater collection of infiltrated water from irrigated lands, small water mains and irrigation systems;
3. **Natural factors.** Many factors are considered here, including the increase in groundwater precipitation and the infiltration of surface water into the ground. The location of the underground waterproofing layer plays an important role here. The depth of the drainage systems used and their mode of operation are important here.

Today, there are about 30,000 reservoirs on Earth, with a volume of more than 6,000 km3. The fact that the water areas of large reservoirs occupy large areas of fertile lands, lead to secondary salinization of the soil, and change the regime of groundwater have a negative impact on the environment. Hydraulic structures lead to the destruction of river ecosystems. Recently, schemes have been developed in the country to improve the natural and technical condition of large canals and reservoirs. This reduces the level of negative impact on the environment[9], [15]–[24].

We know that hydraulic structures primarily disrupt the regimes of rivers and reservoirs, negatively affect fish migration, and affect groundwater levels. Reservoirs designed to balance rivers and provide hydropower plants with uninterrupted water also have a detrimental effect on the environment.

IV. Conclusion

In the city of Fergana, groundwater is formed by the melting of glaciers in the mountains. Accumulation of water from streams and water bodies above the groundwater table[1], [9], [18], [19], [25]–[28]. Groundwater is water that seeps into the ground from rainfall and hydraulic structures and collects in a layer above the impermeable layer.

In the city of Fergana, the change in groundwater level is mainly influenced by the Isfayram and Shohimardon rivers, which are formed as a result of melting mountain water. The water from the streams collects in a waterproof layer and moves under the influence of gravity.

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