

The Effects of Irrigation Water Wells on Spring Waters and Ecological Balance of Agricultural Area of Çifteler (Eskişehir) Region

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ABSTRACT

In this study, the effect of irrigation water and drill wells on the flow rate of spring waters in the agricultural areas in Çifteler region of Eskişehir and also on the ecological structure were investigated. The study was conducted between 2013 and 2018. During the study, the number of agricultural irrigation wells in the surrounding area was noted at regular intervals and compared with the number of wells included in the data of Regional Directorate of State Hydraulic Works (DSI). In addition, the flow of some spring waters and the areas covered by them were measured during the study. As a result of our research, it was found that unconscious and randomly drilled irrigation wells caused a significant decrease in the flow rate of groundwater and even some resources were destroyed. As a secondary effect, this has disturbed the ecological balance of the environment and it has been observed to cause negative effects on many invertebrate species in the region as well as single and perennial plant populations.

Keywords: Drilling, Irrigation Well, Ecological Balance

INTRODUCTION

Water and soil are indispensable in agricultural areas. Soil and water together increase the quality and efficiency of the product. But agriculture can never be done without water. Soil needs water in both winter and summer months. Due to the decrease in precipitation globally and global warming, drought is seen from time to time in our country. This situation has been seen in many points of our country since the 2000s. Especially in Eastern and South-eastern Anatolia where arid climate prevails [2,3].

As in many countries, agriculture is the most intensive area where water is consumed. Unfortunately, our unconscious farmers use more water than they need. In open irrigation, almost half of the water evaporates and disappears. However, this drop in drip irrigation regresses up to 5% [2,3].

In our country, groundwater is used not only for agricultural purposes but also for drinking water. As drinking water systems are closed systems, loss is almost negligible. However, this situation is the opposite in irrigation waters. According to the State Hydraulic Works (DSI) irrigation water regulation; After 2004, all irrigation systems have to be closed [1,2].

Çifteler region is one of the regions where irrigated agriculture is most intense in Eskişehir. Wheat, barley, corn, sugar beet, onions, potatoes and green vegetables are the most cultivated species.

All these planted plants need water at regular intervals. Species cultivated in winter need water in autumn and spring. However, the plants planted in the summer need constant water. This increases the use of surface and underground water [4].

MATERIALS AND METHODS

During the general field studies conducted between 2013 and 2018, plant density, ground and surface waters were observed. In this process, electricity poles rising every day within the agricultural areas in the region of Çifteler were noted.

RESULTS AND DISCUSSION

According to 2014 data of DSI; There are 1049 irrigation wells in Eskişehir. These irrigation wells irrigate approximately 43,000 hectares. However, when we come to our day; The area to be irrigated by 1276 wells should be 55,000 hectares, while this area is limited to 50,000 hectares. This shows that the underground water wells have decreased. Decreases in perennial and one-year plant populations on the soil have been observed with the decrease of ground water capacity. The green area duration observed in 2013-2014 has decreased considerably by 2018. The pastures and pastures that bloomed in April-May 2014 continued to be alive until the end of June. However, by 2018, it can remain alive until the end of May.

This applies to all plants. For example, the flowering period of flowering plants continued until the end of June, in 2018 at the end of June seed formation was observed.

The vast majority of groundwater supports groundwater, which ensures the viability of plants. Ground water is the area where the moist soil provides the root growth and nutrition of the plant. No significant water mass is visible, but moisture in the soil can be seen. Some of the groundwater is transmitted to the surface by capillary means. These waters provide the plant roots to remain moist. With groundwater draining to the depth, the plant cannot be fed and dies because the ground water will fall.

Groundwater is drawn deep for two reasons. The first is the underground tectonic movements. Occasionally, some earthquakes occur underground. After these earthquakes, cracks and fractures occur in the layer supporting the water body from below. From these fractures and cracks, water escapes deep. However, this situation is temporary as rain water that fills over time will fill these cracks. This period can last from several years to tens of years. As a result, nature will restore balance.

The second is unconsciously opened underground water wells. This situation is very difficult to return. Each well is a gate to drought. The opening of water wells at more than necessary number and depth causes the groundwater to decrease. Permission is obtained from DSI when a well will be drilled for irrigation purposes. In the DSI Groundwater Technical Regulation published in the Official Gazette dated 23.06.1972 and numbered 14224, information on the use, drilling and operation of the water well is clearly stated.

According to this; 167 Laws 167, 8, 10 and 11 on groundwater; All technical works to be complied with in the drilling of wells specified in Article 4 of the Groundwater Regulation are explained in this Regulation. As stated in the Groundwater Regulation, 10 m. shallow wells shall be considered as açılan hand-drilled wells bahis referred to in Article 8 (a) of Law no. 167 and shall not fall within the scope of the Regulation” [5].

However, other wells should be drilled in accordance with the required legislation. Permission should be obtained from SHW for the well to be drilled by authorized persons. The depth of the well should be determined by considering the underground geological structure. Do not use wells with a deeper or more capacity than allowed.



Fig. 1. An Obruk formed in the Konya Plain

In recent years, especially in the Konya plain OBRUKLAR have been trouble for the farmer (**Figure 1**). These pits are formed either at a time or by growing over time. Today, the number is 400. Underlying these are the wells drilled unconsciously and overcapacity in the last 10 years.

Lake Eber is a living proof of this situation. The use of water from the surrounding agricultural irrigation caused the lake to dry (**Fig. 2**).



Fig. 2. Eber Lake

At the same point in 2012 and 2017, these photographs taken during field surveys are the best evidence of what has been said. (**Fig. 3-4**).



Fig. 3. In 2012, the 11th kilometer of the Çifteler-Han road is the water source on the left



Fig. 4. In 2017, the 11th kilometer of the Çifteler-Han road is the water source on the left

CONCLUSION

According to the 2018 data, the number of underground wells is 1276, which is higher than expected. At present, there are approximately one hundred unauthorized drilled wells around Çifteler. The electricity of these wells is provided by the permitting wells located next to it. The farmer starts the drilling process with

permission from DSİ for 100 hectares. However, the depth of the well is above the permissible value. During the inspection, a pump of 100 hectares is used. At the end of the inspection, a larger capacity pump is switched. Thus, with a permit for 100 hectares, 1000 hectares of area are irrigated.

When we think about it, it looks like it's okay. After all, he could get permission for 1000 hectares. However, the groundwater capacity of the regions is limited. These inspections are carried out regularly by DSI and the capacity is increased if deemed necessary. If there is a decrease in the groundwater body, the capacity is reduced or the new well is not allowed. However, people who think of their own interests at every opportunity cause great harm to nature again.

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