



Evaluation of the effects of water intake of Seymareh dam on groundwater level around the site and discharge of downstream springs

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Review History:

Received: Jun. 11, 2022

Revised: Apr. 24, 2023

Accepted: Apr. 30, 2023

Available Online: May, 23, 2023

Keywords:

Seymareh dam

water level reservoir

groundwater. spring

observed well

ABSTRACT: In this study, the quantitative effects of the construction of Seymareh Dam in the Karst site of this structure on the fluctuations of groundwater level and discharge of springs have been investigated. According to 10-year measurements in the network of observation wells and springs in this area, it was found that there is a direct hydraulic relationship between the water level of the dam reservoir and the water level of the observation wells. The results revealed a significant difference in the amount of water level of the North Edge wells compared to the South Edge wells, especially in the right abutment and the right abutment wells compared to the left abutment can be seen, respectively, the evidence and confirmation of an Asmari core with Low permeability is along the axis of the anticline and also more efficiency of the sealing curtain on the right side is another reason for this difference. Flow changes in most springs are directly related to changes in reservoir water level and there is a high correlation between those. Changes in the total discharge of the total springs measured on both banks (right and left) have a similar trend to the changes in the discharge of the left bank springs, which is due to the more discharge of the left abutment springs. The results showed that with increasing the water level of the reservoir to 660 meters, the amount of discharge of springs in the region reached 1400 liters per second, and with decreasing the level of reservoir water in the next year this amount decreased and again with increasing level to 704 meters, the amount of discharge to 1800 Liters per second has increased.

1- Introduction

Leakage of water from abutments and foundation of dams is one of the events that are considered during the construction of the dam and during operation. In dams where part or the entire site is on Karst layers, the importance of the issue is doubled. The presence of seams and cracks, especially dissolution cavities, make it possible that when the reservoir is in operation, the water flow is diverted to one or more of those and after penetrating it, it is transferred to areas far from the reservoir of the dam [1].

Seymareh Dam is one of the dams in Iran that has such conditions from the point of view of geological formations and the water leakage process. Cheshmoei et al. in 2014, studied which was at the beginning of the operation period of this dam, and showed that with increasing water surface level of the reservoir, the possibility of leakage in the right edge of the dam site increased [2].

In this paper, using the data measured by the Group of Environment and Field Research of the Water Research Institute of the Ministry of Energy, which was provided during the 10-year period before reservoir operation until 2019, the amount of quantitative changes of discharge in springs, rivers, and water surface elevation in the observation

wells with changes in the water level of the reservoir on both the left and right edges of the site was investigated Since the measured data cover the conditions before and after dewatering of the reservoir.

2- Materials and Methods

The location of Seymareh Dam is 30 km northwest of Darehshahr city and 3 km upstream of Talkhab village in Ilam province with coordinates 704550 east longitude and 3686000 north latitude. The volume of the reservoir at the normal level is about 2.8 billion cubic meters, which is one of the largest reservoirs of the dam in Iran.

Figure 1 shows the locations of springs which were measured for long-term statistics, out of a total of 58 springs, 34 springs are on the left abutment and 24 springs are on the right abutment.

The discharge of springs after the operation of the reservoir is measured almost twice a month. To reveal the relationship among the water surface in the reservoir and groundwater water level, in 39 observed wells, of which 25 are on the left abutment and 14 are on the right abutment water level was measured(Figure 2).

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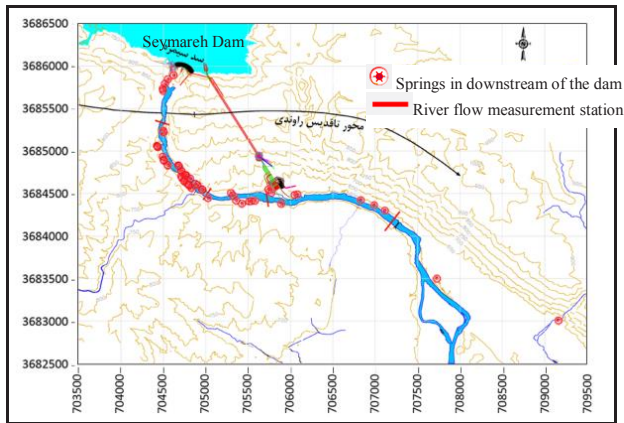


Fig. 1. Location of the main springs in the river downstream of Seymarch Dam

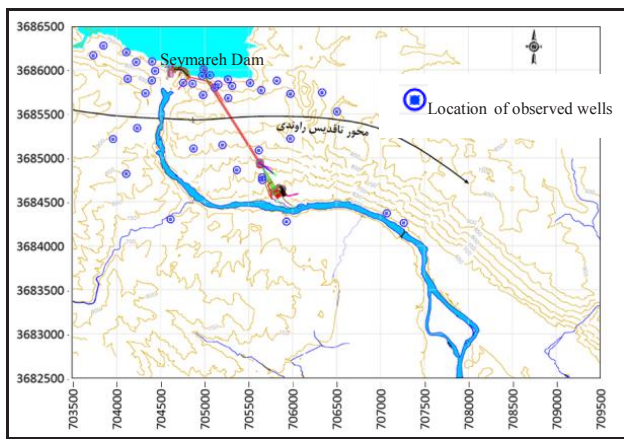


Fig. 2. Location of the observed wells in Seymarch Dam

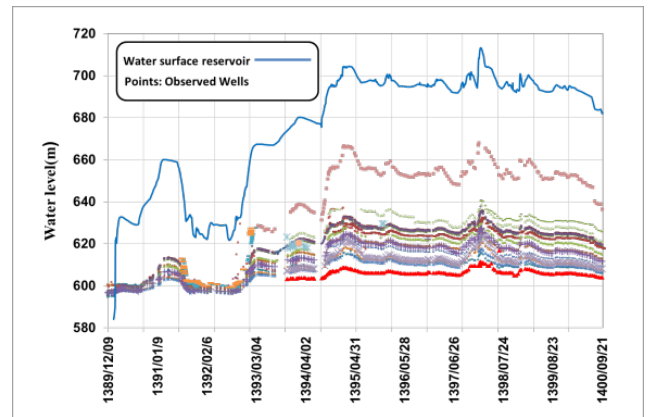


Fig. 3. Changes in water level in observation wells (left abutment) and water surface reservoir

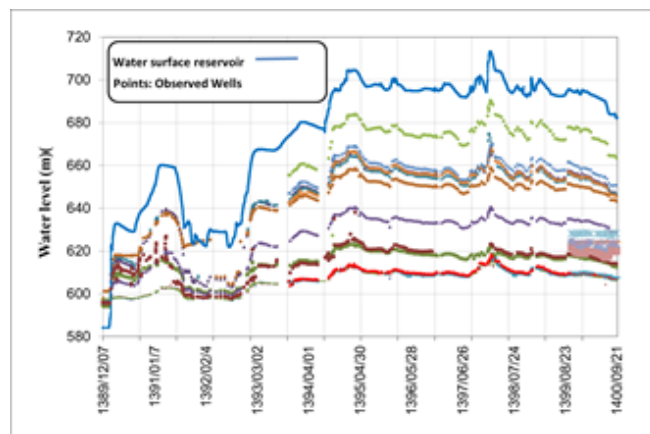


Fig. 4. Changes in water level in observation wells (right abutment) and water surface reservoir

3- Results and Discussion

With the operation of the Seymarch Dam reservoir, the water level of the reservoir gradually increases and due to the increase of hydraulic gradient, it is expected that if there is a clear hydraulic relationship between the reservoir, observation wells, and downstream springs, changes in the water level of wells as well as spring discharge, which are explained as follows.

3- 1- Evaluation of observation wells

Figures 3 and 4 show the close correlation between the fluctuation trend of the reservoir water surface and the water level in the observation wells of both sides of the dam from the beginning of the reservoir water intake until now. In most of the measurements, with increasing or decreasing the reservoir water surface, the water level in the wells has also changed accordingly. Another point is that the water level in the observation wells of the right abutment in the northern edge of the Ravandi anticline is always higher than the wells

of the left abutment in this part.

3- 2- Evaluation of downstream springs of the dam

Evaluation of changes in the discharge of springs to changes in the water surface of the Seymarch Dam reservoir according to Figures (5) and (6) on both sides of the site is presented.

4- Conclusions

In this paper, the results of monitoring water resources around the Seymarch dam and power plant were evaluated quantitatively and qualitatively. The key results are as follows:

In most springs, a significant correlation is seen between changes in reservoir water surface level and leakage discharge from them so that with increasing or decreasing reservoir water level, spring discharge also increases or decreases, which indicates the direct relationship between springs and reservoir as source of feed.

Evaluation of the measured data related to water level in

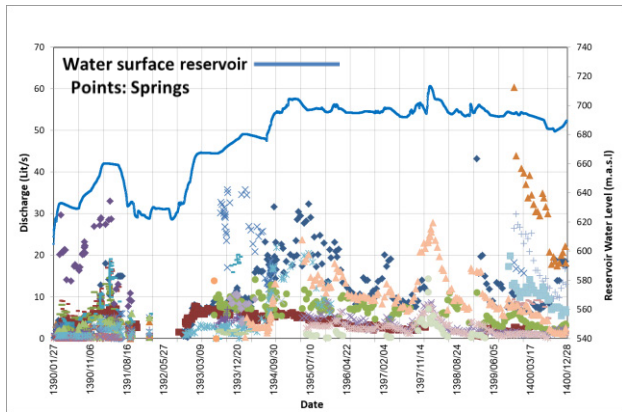


Fig. 5. Changes in measured water discharge of springs in left side and changes in the water surface reservoir over time

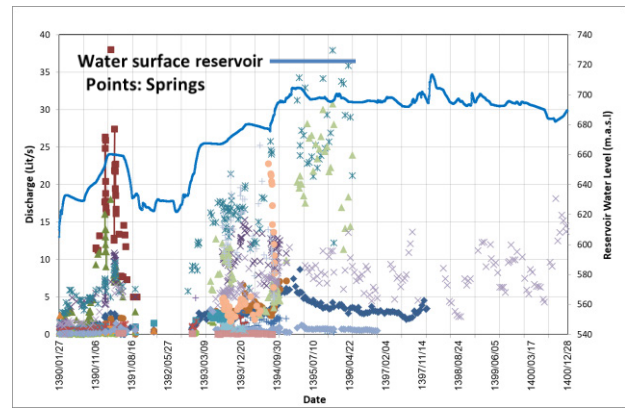


Fig. 6. Changes in measured water discharge of springs on right side and changes water surface reservoir over the time

observation wells, it was found that before the construction of the dam, the water level in the wells of both abutments was almost the same and the differences were not significant, but after the construction of the dam and reservoir operation in the observation wells of the northern edge, the Ravandi anticline in the right abutment is higher than the observation wells of the northern edge of the anticline in the left abutment and sometimes reaches 40 meters. Clear reasons for this can be the presence of a sealing layer in the lower Asmari Formation and also the greater efficiency of the sealing curtain on the

right side and the absence of these two features on the left side.

References

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HOW TO CITE THIS ARTICLE

Sh. Safavi, Sh. Faghihrad, H. Kardan Moghaddam, S. M. H. Meshkati, H. Sharifimanesh, H. AmirSoliymani, Evaluation of the effects of water intake of Seymareh dam on groundwater level around the site and discharge of downstream springs, Amirkabir J. Civil Eng., 55(6) (2023) 253-256.

DOI: 10.22060/mej.2019.15465.6128



