Determine The Most Suitable Water Transfer From Seymareh River To Seymareh Dam

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ABSTRACT : One of the most important and strategic policies in efficient development is using water sources. In this method, MATLAB is used for modeling the existing transfer condition based on limiting factors. The results show that shortening the path from 650 km to 220 km is the best choice from economic-technical aspects and in more than 50% of path length, there is no need for power higher than 12.3kw to transfer discharge 300 /sm3due to suitability of topography conditions, but in the continuance of path, the proposed pump cannot transfer this amount of water based on topography conditions, and we can use the engine of pumps with 18.8kwpower. Under such conditions, it is required to perform additional studies regarding proposed path to the dam reservoir.

Keywords: topography, water transfer, Dam, River

1 INTRODUCTION

The optimal water guidance all over the world is using water transfer projects of productive sources to the regions that are exposed to high shortage of water sources, despite other potentials as agriculture fields and pastures. The study of geographical and ecological area of some regions shows the inherent talent to fulfill development goals in agriculture and husbandry productions. One of the practical strategies is development of these regions via using water transfer method from Seymareh River branches to Seymareh dam in Dareshahr town. The initial evaluation and monitoring of this plan can lead to improving economic position of this valuable plan. Various researches have been conducted all over the world regarding water transfer projects and this section investigates some of these projects. The major activities in water sources management are formulating water sources management policies, the attempt to achieve goals of policies and evaluation of their effects [1]. Limitation of available water volume with heterogamous temporal and spatial distribution of sources is factors increasing the existing problems. Water transfer from one field to another one to establish balance and homogenous distribution is one of the most important ways of water need fulfillment in these regions [2, 3, 4]. In a study, water transfer networks as the most important performance evaluation components evaluated water transfer networks in 6 fields of management, technical, economic and financial, product production, environmental and social index [5]. In a study on water supply choices and technical-economic comparison, it was found that water transfer method is better than other methods and the reason is the applicability of this method in the studied region and low operation costs of project [6]. It is based on water supply systems of Dez irrigation networks and transferring and distribution in this system and considering improving performance of water delivery to consumers dependsonimproving hardware and software condition of transfer and distribution networks. The results of this study showed that potential defects in channels transfer water have some reasons as necessary to improve existing condition and achieving good condition of review of water transfer from pumping station to four degree channels [7, 8]. The average annual evaporation of free water level in water area of Seymarehdam is 1814.01 mm. The average annual yield of the river in this dam is about 85.7 m3/s and maximum flood discharge is 11525 m3/s. This statistics show that based on high capacity of this dam for impounding and high capacity of energy plant and water outflow of this dam to supply water for various applications, the water inflow of this dam is low and water inflow can be reduced from this river to this dam by some events as drought or various branching in upstream areas and water wasting due to long path and climatic conditions of river studied area caused that some studies have been conducted regarding creation of new path in water transfer from this river to inflow areas of Seymareh dam [9].

2 STUDY METHOD

The study is applied and data collection is based on field method. By achieving reference point for impounding SeymarehRiver, establishment of main pumping station and other minor stations in the entire path to Seymarehdam opening is simulated. Based on availability of topography information in the path 220km, all slopes, measuring the distance of points for establishing pressure improving stations, difference of height of stations based on the distance of points to each other, difference of height to sea level in the proposed path of transfer system can be considered. Also, based on water discharge in the origin and discharge to destination, the reasons forwater wastage are investigated.

Table 1 *220 km distance from impounding site of Seymareh River in (kuhdasht) to the beginning of Seymareh dam basin opening*

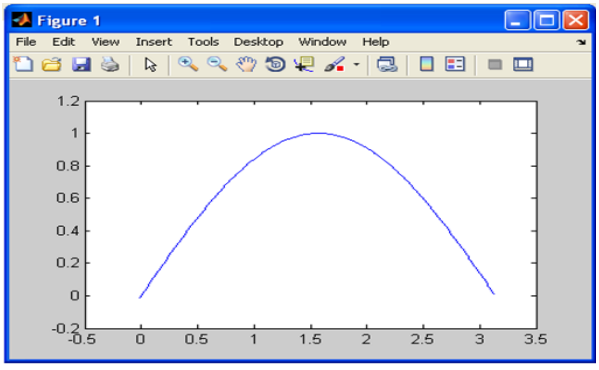
Raw water transfer lines		
Dimensions 1.2×1.64	8 km	Channel
Diameter 2700mm	18 km	Tunnel
Diameter 1000mm	98 km	Steel pipes
Diameter 2000 mm	96 km	Concrete pipes

3 TYPE OF EVALUATED PUMPS

By centrifugal pumps, radial flow ishighly applied in water industry and in a centrifuge pump, it is applied based on existing

height in path and designed yield. The power of these pumps is 12.3kW as used for driving arm of water transfer and limitation assessment and feasibilities in the path. The evaluation of simulation of transfer from proposed path and its limitations: In this section, by entering the information aboutwater transfer path from origin (origin of Seymareh River in Lorestan) and Seymareh dam in destination (in Dareshahr located in Ilam province), we can investigate the simulated trend of water transfer based on the limitations. Some issues should be considered as mutual effect of land gradient, land topography, transfer system path, number of pumping stations in path, maximum water transfer volume. The power of pumps in the system is one of the variables considered regarding simulated trend of water transfer based on existing limitations. By considering x axis to determine the variables, we can investigate the limitations based on y axis regarding path limitations. Thus, we initially investigate the number of pumping stations in the proposed path (220km). In this section, it is shown that we need 22 pressure increase stations number 1 to 211 (numbering in the proposed software). As there is a pumping station in each 10k, we need totally 22 pumping stations in the path. Later, we enter other study variables and evaluate the path limitation. The vector of path length is 9220km, number of pumping stations in path is22,average slope of land 0.03 and maximum power of water transfer of proposed pumps engine 300 m3/s. In this vector, it is found that based on water transfer discharge level and land slope level and number of stations, water transfer flow was progressive to site 1.5 in distance 0.5 to 3.5 as equal to path length and number of path stations and then,it was slow and had a descending trend due to some limitations as slope, land topography, inadequate power of engines based on rising and falling in the entire path and etc. This issue shows that along transfer path, from station No. 11, some changes are made in good performance of stations and in this part of path, we should use pumps engine with 18.8kWpower or we should consider the number of pressure increase stations. The following chart shows the limitations of path length based on the establishment of all components in transfer system as in X axis, there is path length of 220km, 22 pressure increase stations, each with a 10km distance from each other and land slope in Y axis, maximum water transfer volume in transfer line and power of proposed pumps are also considered.

Fig 1 *The limitations of proposed path length based on existing conditions in water transfer path*



In the next chart, we evaluate effective power of centrifugal pumps for maximum water volume transfer of proposed pumps as 300m3/s. This study shows that based on effective power of centrifugal pumps as 12.3kw and based on the number of required stations in water transfer path as 22 stations, it can be said water transfer power in stations engine sectors, stations (1-81) (stations 1-10) show suitable and highly productive trend. In stations 81-111 (stations 10-13) (breaking in line) due to the land slope conditions and difference of stations'height to each other, water transfer power is reduced by each engine in each station and it starts thedescending trend and in the next stations leads to station 211(stations 14-22).As these stations don't have the capacity of water transfer due to topography conditions, flow transfer shows increasing loss. Thus, in these stations we can use engines with power of 18.8 kW to change into an optimal path or we can pay much attention to the number of stations. Also, we can show the work trend of pumps for area assessment in the path in chart as path length 220km with 22 stations in x and y axis, a component as pump output performance is based on difference of stations' height for transferring water.

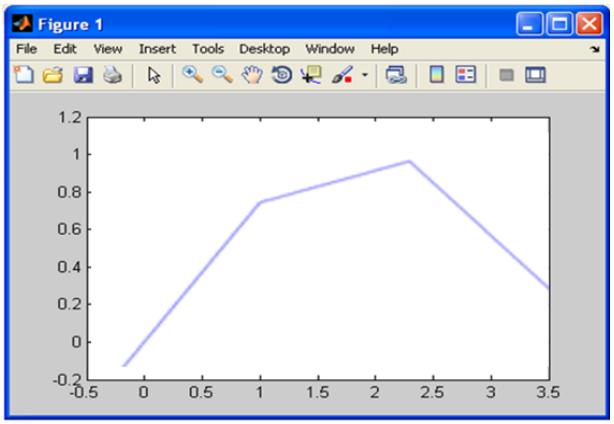


Fig 2 *The function of pumps in the proposed path based on topography conditions*

To eliminate the limitations of proposed path length, based on software modeling, it was shown that in the half of path, the proposed pumps 12.3kw can meet the demands of this water injection amount to water transfer lines and based on topography conditions, this pump power is not adequate and we should use proposed pumps engine with 18.8kwpower to prevent any fluctuation in the proposed path length. Based on modeling in software, this shows the suitability of proposed path without any limitation.

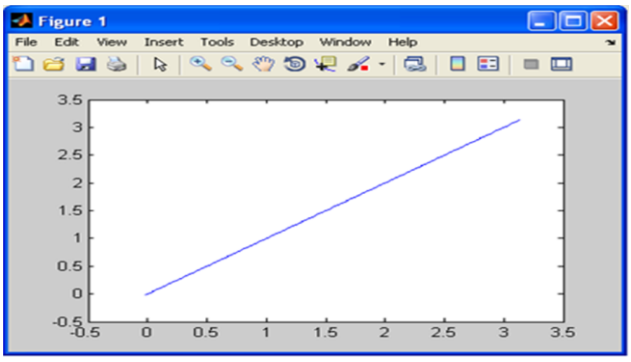


Fig 3 *In case of the lack of limitations in the proposed path and using engines with high power*

4 Discussion and conclusion

This study attempted to evaluate water transfer from branches of SeymarehRiver to Seymareh dam in Dareshahr town and the selected path is analyzed by MATLAB. It wasshown that based on economic-technical level of plan and high demand in supplying water demand of agriculture and industrial plans in the region, this study project can be of great value. One of the advantages of this plan as strengths of this plan can be relative stability of Seymareh dam in water supply namely in the years with low rainfall and drought and wastages in river path. Entering considerable water into Seymareh dam, the water inflow loss is compensated from other paths (branches) and the dam efficiency and output can be increased. Some reasons as land topography, rising and falling, land slope, geology conditions of land, difference of stations height to each other and investigation of height difference conditions from sea level in transfer system and etc. are inhibiting and challenging criteria in water transfer. Also, the results showed that in water transfer line, establishment of pressure increase stations as dynamic aid of water transfer can be of great importance as improving the performance of existing condition based on geographical location and pumping to other stations and it can improve the performance of existing structures in the path as irrigation channel, pipes lines, water transfer tunnels. The comparison of the results of the study in Matlab (this software has high sensitivity and accuracy) showed that they can have high quality and output by entering all slopes of path length, establishment site of stations and the difference of their height from each other, engines power, volume of transferring water to destination along the proposed path (220km) in a part of path, performance of equipment and tools based on engine power performance of stations and investigation of all important challenges in this system. The results showed that in another section of pumping engines, based on their arrangement and site in transfer system had not efficient productivity power due to slope conditions. Such issues can lead to reduction of flow and considerable loss.Therefore, some strategies should be chosen as using pressure increase stations in transfer system or improving power of12.3Kw pumps in the continuance of path to 18.8 Kw to improve transfer system performance of proposed path and turning it into an optimal path. In all projects of water transfer line system, slope conditions are varied under special cases, this is due to the rising and falling in the paths. In this proposed path as the most suitable choice of water injection line from origin to Seymareh dam basin, the total average of this slope is 3% and its validity is shown clearly by modeling in software. Also, the difference of height fromfree water level is evaluated as another important component in water transfer lines. The average difference in the system is 1093m from sea level while the height in origin is 1030m. Water transfer was done by pumping method and this advantage could be suitable for simplification and prediction in terms of suitability in selecting optimal path and decision making to eliminate this challenge. Also, the difference of stations height to each othercan be of great importance in long distances infacilitating decision making in selection of pump type, stations equipment, and selection of type of pipes based on hydraulic issues in water transfer systems. As the average of stations difference is 35m, we can provide many strategies than those required to control and additional installations of stations.

5 Final Conclusion

In this study, it is shown that one of the most important projects of water transfer as its operational performance is evaluated in this project.Water is transferred from SeymarehRiver origins in Kuhdasht town of Lorestan province to Simre dam in Dareshahr,Ilam province. The initial studies have shown that the water from initial path (650km) had above 40% wastage as evaporation or leakage on surrounding lands. In this plan, it is shortenedto lower than 220km and wastage had reached 18%. In this study, dam water supply is investigated under new conditions and this project plays an important role in water supply.

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