

Full Length Research Paper

Evaluation of management transfer of irrigation scheme in Düzce valley located in Western Black Sea Region of Turkey

Selçuk ÖZMEN

Department of Biosystem Engineering, University of Düzce, 81620, Düzce, Turkey.

Accepted 13 August, 2021

Management transfer of Düzce irrigation scheme was evaluated using appropriate performance indicators and the effects of farmers' opinions on water using and agricultural effectiveness. The results of the analysis indicated that the transfer process was not useful for farmers generally. Transfer management had no effect on sufficiency, equality, and irrigation time. However, maintenance of irrigation channels has gone better even though yet to be improved. Transfer affected management interest in the farmers' wish and suggestion positively, and farmers trusted the irrigation association. But, it is still needed that irrigation association should work on water distribution in the district. The irrigation association should repair the existing ones and construct new irrigation and drainage channel in the scheme network and organize meetings how to increase higher performance of irrigation management for farmers.

Key words: Irrigation, irrigation system performance, irrigation management transfer, Düzce irrigation scheme.

INTRODUCTION

Water shortage is a major problem in most countries especially river basins of the Eastern and Southern Mediterranean due to rapid growing up demographic and economic development, urbanization, industrialization, tourism, and inefficient agricultural activities, which is the prevailing water user. This case is exacerbated by low availability of renewable water, excessive use of the groundwater, pollution, inefficient infrastructure, and pronounced seasonality with unfavorable demand patterns

which are very different from the seasonal supply (Nalliah et al., 2009).

In Turkey, 4.89 million ha of 8.50 million ha potential irrigating land area was opened to public and private irrigation presently. But, it has not still reached the expected level because remaining of total irrigating land area has not yet opened to public and private irrigation in Turkey (Anonymous, 2008).

Düzce valley, located in western Black Sea Region of Turkey, has very high agricultural potential, and 3% of agricultural land and rich natural resources with a very high quality of Turkey. Moreover, Düzce area is the leader concerning the water potential in the Black Sea Region in Turkey (Özmen, 2013). However, diffusion of agricultural pollutant into surface and underground fresh water resources, unsustainable urbanization and industrial development into the water supplying basins

*Corresponding author. E-mail: selcukozmen@duzce.edu.tr,
Tel: +90 380 542 12 97. Fax: +90 380 542 12 97.



Figure 1. Location of Düzce Area in Turkey.

can affect the sources impairment negatively (Ahmed et al., 2012). Therefore it needs to study more about water management.

The performances of many irrigation system in developing countries are mostly far below their potentials. This failure is caused by the lack of an effective system of irrigation management, rather than problems in planning, project developing and construction (Mengü and Akkuzu, 2010). Hence, irrigation managers should have enough knowledge to make necessary and accurate decisions about increasing costs, and water distribution. Moreover, the government and local agencies should be involved in the management of such projects since irrigation has a socio-political importance (Douglas, 2009).

Study done by Tanrıverdi and Değirmenci (2011) showed that the program of irrigation transfer management had no effect on indicators of water use efficiency such as sufficiency, equality, and irrigation time; it had negative effects on maintenance and operation of irrigation and drainage channels. Additionally, farmers had insufficient knowledge of the transfer of irrigation management and did not understand the transfer of management, which indicates that one of the major aims of the transfer program. However, Tanrıverdi and Değirmenci (2011) received different results when compared with the results of Nalbantoğlu and Çakmak (2007). In this context, the results of these studies can show variability according to region due to social and cultural background.

The aim of this study was to evaluate the effectiveness of the irrigation transfer program in the Düzce valley. Therefore, questionnaires in which included the success of water distribution criteria, such as sufficiency, equality, and safety of the program were applied to local farmers, village heads, association personnel and managers in Düzce irrigation district in Düzce area in Turkey.

MATERIALS AND METHODS

Studied area is located in the Düzce irrigation district under serving fifth State Hydraulic Works (SHW) in Düzce in Turkey (Figure 1). Irrigation water is supplied from Hasanlar Dam in Düzce Area. The scheme of Düzce irrigation which was put into operation in 1975 by SHW under 11.000 ha irrigation area of 20.000 ha irrigable area and transferred to Water Use Associations (WUAs) in 2005 (Özmen, 2013).

For determination of the success of water distribution, sufficiency, equality, trust towards the irrigation association and the timing of irrigation were used. In determining the indicators, the questionnaires were administered to farmers, village heads, association personnel and managers (Vermillon, 2000).

RESULTS AND DISCUSSION

Four questions were asked to farmers about the sufficiency of water distribution before and after the transfers (Figure 2). Water delivery by irrigation scheme and utilization of water by farmers from drainage channels

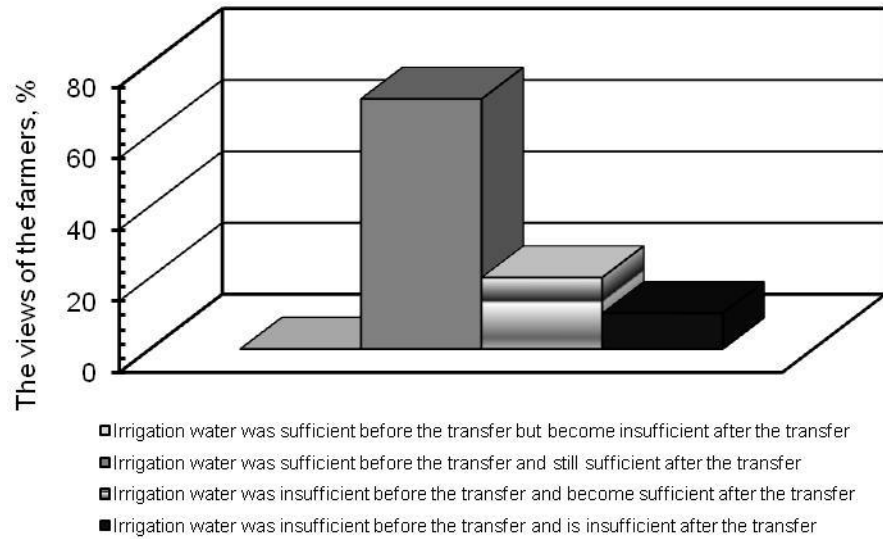


Figure 2. Farmers' status on receiving sufficient irrigation water.

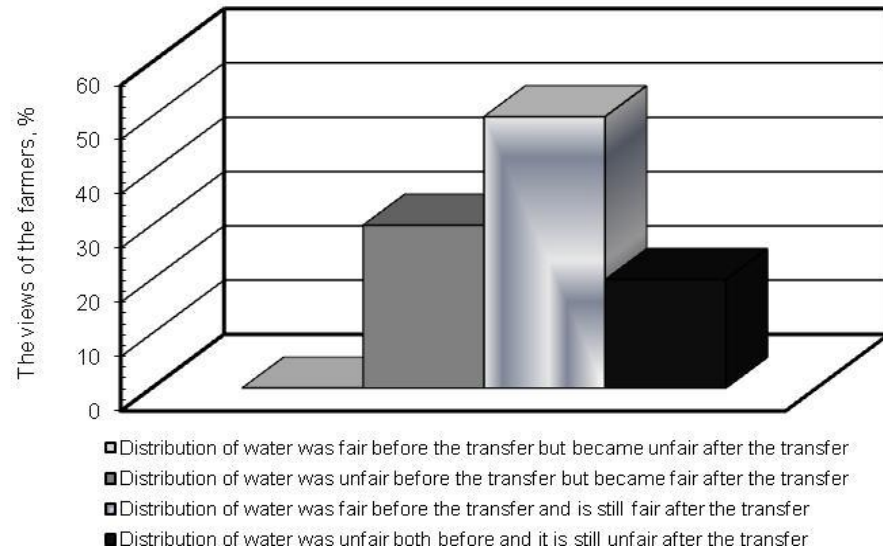


Figure 3. Farmers' views on equal distribution of water.

and ground water were evaluated. Additionally, farmers' irrigating at night was also included to evaluate. However, farmers received water sufficiently from irrigation channels, 70% of farmers received water sufficiently before the transfer and still sufficient after the transfer; 20% reported that they received insufficient water before the transfer and become sufficient after the transfer. A total of 10% of farmers got water insufficiently before the transfer and insufficiently after the transfer while a total of 0% of farmers received sufficiently before the transfer but become insufficiently after the transfer (Figure 2). This work indicated that farmers mostly received water

sufficiently for that transfer management is well. Study results are similar to studies done by Tanrıverdi (2011).

Figure 3 shows farmers' views about the fair distribution of water before and after the transfer. 50% of the farmers reported that distribution of water was fair before the transfer and is still fair after the transfer while 30% of the farmers reported that distribution of water was unfair before the transfer but became fair after the transfer. 0% of farmers responded that distribution of water was fair before the transfer but became unfair after the transfer while 20% of farmers reported that distribution of water was unfair both before and it is still unfair after the

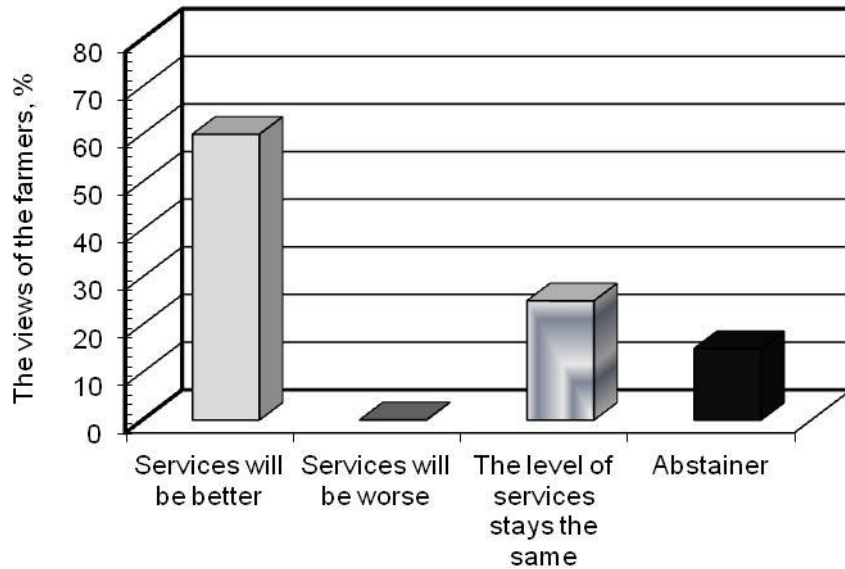


Figure 4. Farmers' views about the sustainability of the irrigation association.

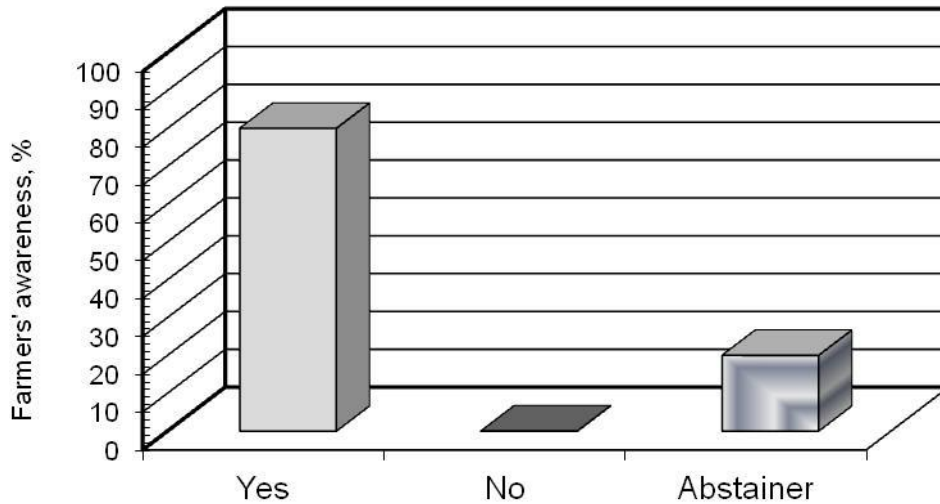


Figure 5. Farmers' awareness of funding the operation-maintenance-management (OMM) services through water fees.

transfer. Yercan et al. (2009) found that Water User Associations (WUAs) performed better than cooperatives when they searched general aspects of irrigation performance in Gediz River Basin in Turkey. Therefore, results can be changed according to region thanks to management and social status of region.

As indicated in Figure 4, farmers were questioned on their trust in the management of the irrigation association. This is related to operation-maintenance management (OMM) services of irrigation association. 60% of farmers expected that the OMM services of irrigation association would be better while no one was thinking OMM services

would not be worse in the subsequent years. Additionally, a total of 25% of the farmers thought that OMM services would remain the same while 15% abstained in this issue (Figure 4). The study show that farmers generally believe the irrigation association but it is still needed to be recovered the irrigation management of irrigation union. Moreover, this study results conformed with study done by Nalbantoğlu and Çakmak (2007).

Farmers were questioned if they were aware of the irrigation fees collected that was used for OMM water fees. According to results; 80% of farmers were aware of that (Figure 5). Views of farmers on this issue were

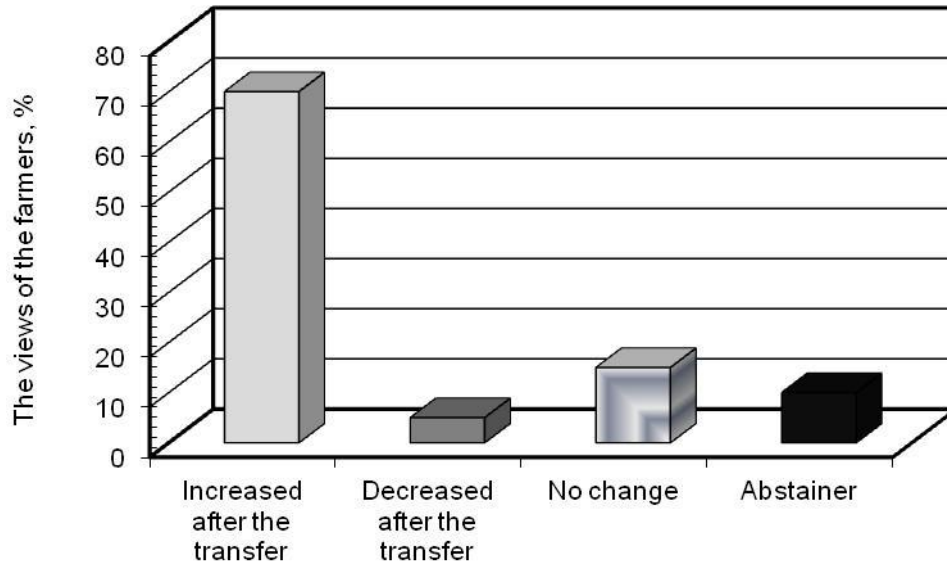


Figure 6. Management interest in the farmers' wishes and suggestions.

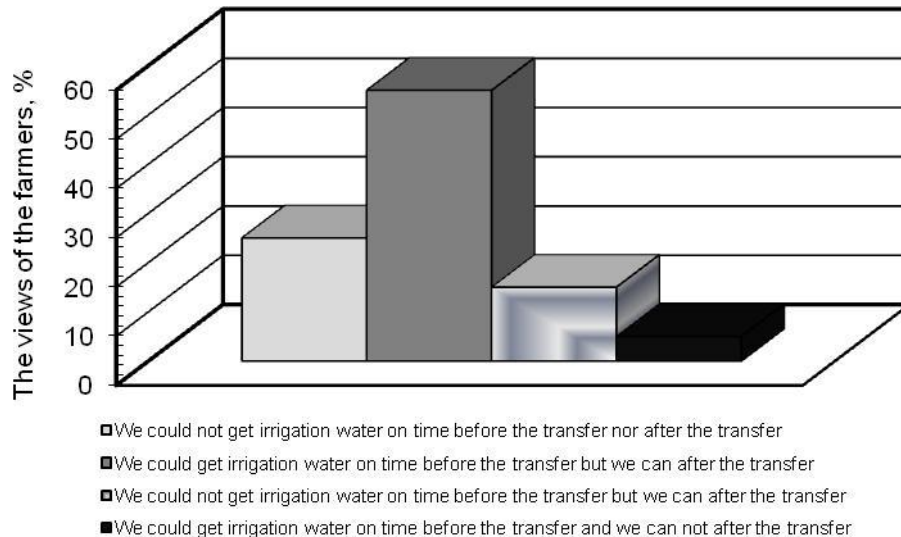


Figure 7. Farmers' views on receiving irrigation water on time.

indicated in Figure 6. A total of 70% of the farmers explained that the management was more interested in farmers' views after the transfer while 5% explained that the interests of irrigation management decreased after the transfer. Moreover, 15% explained that there was no change in the interest shown by the management while 10% of the farmers abstained. At this point, irrigation union performed well for its activity but not enough. On the other hand, similar results were obtained by Tanriverdi and Değirmenci, (2011).

Figure 7 shows farmers' views about irrigation timing. A total of 55% of the farmers reported that they received

irrigation water on time before the transfer but they can after the transfer while a total of 25% of the farmers did not received irrigation water on time before transfer nor after the transfer. Additionally, 15% explained that they were not able to get water on time before the transfer, but were able to get water on time after the transfer while 5% reported that they were able to get irrigation water on time before the transfer, but were unable to get water on time after the transfer (Figure 7). According to results, farmers did not mostly received irrigation water on time after transfer. The reason is due to management of irrigation union. Study results were similar with a work

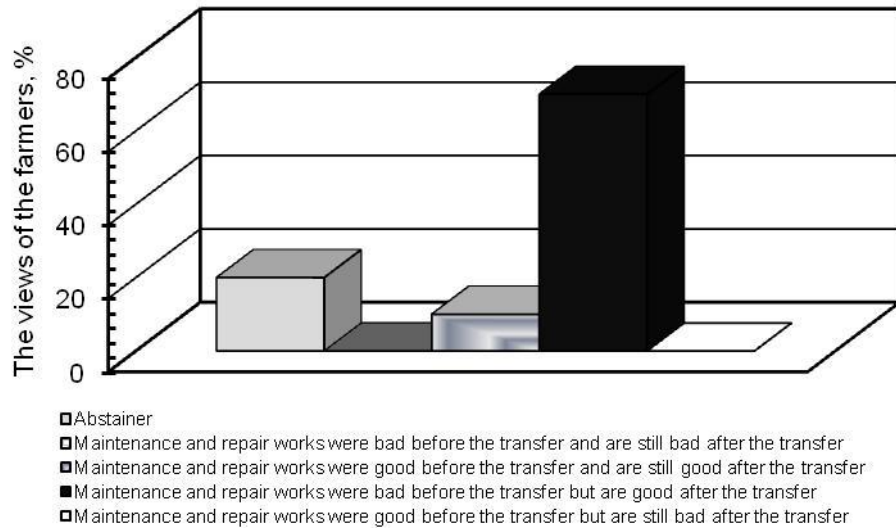


Figure 8. Views on the maintenance and repair of irrigation channels.

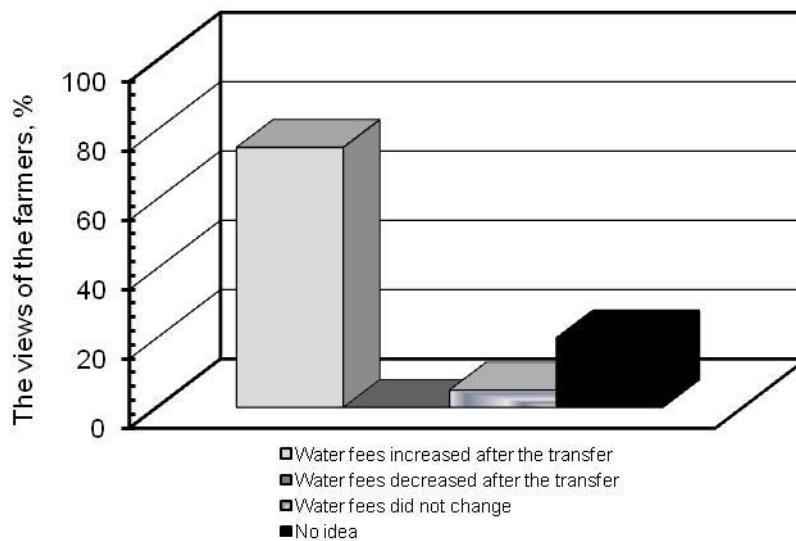


Figure 9. Changes in irrigation water fees.

done by Tanrıverdi and Değirmenci, (2011) but lower than the results found by Nalbantoğlu and Çakmak (2007). Views of farmers on the maintenance and repair of irrigation channels are shown in Figure 8. A total of 70% of the farmers explained that the maintenance and repair works were bad before the transfer but were still good after the transfer while 10% of farmers reported that these maintenance and repair works were good before the transfer and are still good after transfer. According to results; abstainer were 20% while other question were not answered (Figure 8). Irrigation management transfer has not been active to the maintenance and repair works of irrigation scheme (Dorsan et al., 2004). This situation can be explained due to administrative of irrigation union.

Changes in water fee before and after the transfer of management are given in Figure 9. A total of 75% of the farmers reported that irrigation water fees increased after the transfer while 5% explained that fees did not change after the transfer. Moreover, 20% of farmers had no idea about transfer of management. This increase can be related with expenses of OMM. Figures 10 and 11 show the views of the farmers about the appropriateness of the maturity data and payment date of water fees and payment alternatives for water fees, respectively. A total 45% of the farmers reported that maturity and payment dates were appropriate before the transfer but they are not appropriate after the transfer while 25% of the farmers reported that maturity and payment dates were

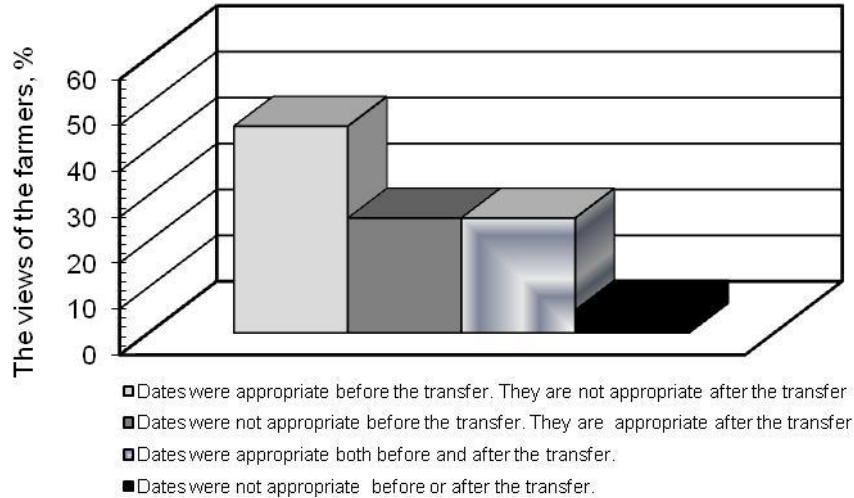


Figure 10. Maturity and dates of water fees.

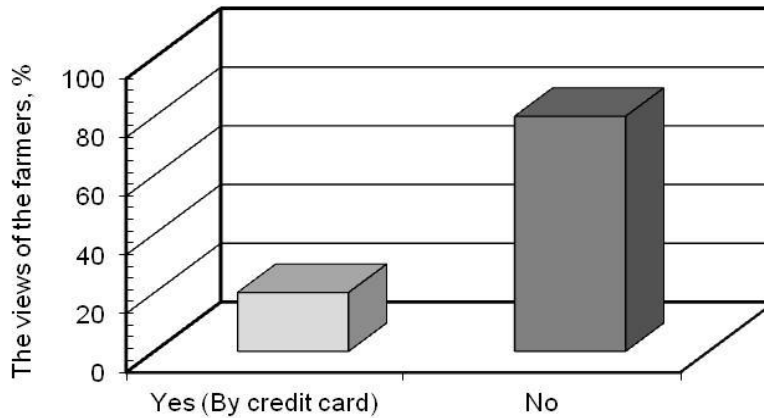


Figure 11. Payment alternatives for water fees.

not appropriate before the transfer but they are appropriate and, maturity and payment dates were appropriate before and after the transfer. Additionally, 5% of the farmers reported that maturity and payment dates were not appropriate before and after the transfer. A total 80% of farmers reported that payment alternative for water fees were cash while 20% of farmers explained that payment alternative for water fees were by credit card. According to these results, the reasons which farmers have not mostly been receiving water on time can be due to technical information of farmers and personnel of irrigation union, and distribution of network. Similar results can be found in the study reported by Tanriverdi and Değirmenci, (2011).

Conclusion

Results of the study, it was achieved that the transfer did

not have effect on the general scheme of Düzce irrigation except maintenance and repair of irrigation channels. However, it was found that the farmers trusted the irrigation association and the transfer had a positive impact on the management interest in the farmers wish and suggestion. This study showed that farmers were aware of funding the OMM services through water fees. Moreover, farmers explained negative views about the water distribution performance of after the transfer. This case pointed out that water is not distributed effectively throughout the irrigation network. The results emphasized that water fees were increased and maturity and dates of water fees were bad after the transfer. There was no need payment of alternatives after the transfer. It was concluded that the irrigation association should repair or reconstruct the places of scheme network for higher water distributions, sufficient irrigation water deliver and on time. On the other hand, it should carried out more activities to meet farmers for maintaining the network and

be taken into consideration farmers' requirement such as water fee increase and date and maturity of water fee.

ACKNOWLEDGEMENTS

The author is grateful to Düzce irrigation district presidency in Düzce in Turkey for data information support in this study. Furthermore, the author thanks to Dr. Oktay YILDIZ and Dr. Kadir GÖKŞEN for their help in preparing the manuscript.

Conflict of Interest

The author(s) have not declared any conflict of interests.

REFERENCES

- Ahmed FRS, Alexander IJ, Mwinyihija M, Killham K (2012). Effect of arsenic contaminated irrigation water on *Lens culinaris* L. and toxicity assessment using lux marked biosensor. *J. Environ. Sci.* 24:1106-1116. [http://dx.doi.org/10.1016/S1001-0742\(11\)60898-X](http://dx.doi.org/10.1016/S1001-0742(11)60898-X)
- Anonymous (2008). Soil and Water Resource. General Administration of the State Hydraulic Works, Operation and Maintenance Unit (in Turkish), Ankara, Turkey.
- Dorsan F, Anaç S, Akçay S (2004). Performance Evaluation of Transferred Irrigation Schemes of Lower Gediz Basin. *J. Appl. Sci.* 4:231-234. <http://dx.doi.org/10.3923/jas.2004.231.234>
- Douglas A (2009). Social, Political, and Institutional Setting: Water Management Problems of the Rio Grande. *J. Water. Resour. Plann. Manag.* 135:493-501. [http://dx.doi.org/10.1061/\(ASCE\)0733-9496\(2009\)135:6\(493\)](http://dx.doi.org/10.1061/(ASCE)0733-9496(2009)135:6(493))
- Mengü GP, Akkuzu E (2010). Impact of Irrigation Management Transfer on Land and Water Productivity and Water Supply in the Gediz Basin. Turkey. *J. Irrig. Drain Eng.* 136:300-308. [http://dx.doi.org/10.1061/\(ASCE\)IR.1943-4774.0000191](http://dx.doi.org/10.1061/(ASCE)IR.1943-4774.0000191)
- Nalbantoğlu G, Çakmak B (2007). Benchmarking of Irrigation Performance in Akıncı Irrigation District. *Journal of Agricultural Sciences, Ankara University Faculty of Agriculture*, 13:213-223.
- Nalliah V, Sri Ranjan R, Kahimba FC (2009). Evaluation of a plant-controlled subsurface drip irrigation system. *Biosystems Eng.* 102:313-320. <http://dx.doi.org/10.1016/j.biosystemseng.2008.11.011>
- Özmen S (2013). Irrigation Water Use and Water Table in Düzce Area. *Düzce University J. Sci. Tech.* 1:47-57.
- Tanrıverdi Ç, Değirmenci H (2011). Assessment of management transfer of Kahramanmaraş irrigation system. *Sci. Res. Essays.* 6: 522-528.
- Vermillion DL (2000). Guide to Monitoring and Evaluation of Irrigation Management Transfer. International Network on Participatory Irrigation Management, USA.
- Yercan M, Atis E, Salali HE (2009). Assessing irrigation performance in the Gediz River Basin of Turkey: Water User Associations Versus Cooperatives. *Irrigat. Sci.* 27:263-270. <http://dx.doi.org/10.1007/s00271-008-0142-z>