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Evaluation of Community-Managed Irrigation Scheme's Hydraulic Performance

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Abstract

In order to evaluate the effects of irrigation practices, discover performance gaps, and enhance system performance, irrigation scheme performance assessment is essential. However, since the Yelen irrigation scheme began operation, no irrigation performance assessment has been carried out. As a result, the purpose of this study is to identify and comprehend the Yelen irrigation scheme's current irrigation performance. Hydraulic performance was assessed using the adequacy, efficiency, dependability, deficiency, and equity indicators. While secondary data came from a variety of sources, primary data were gathered through transect walks, household surveys, group discussions, and flow measurement with a Parshall flume and current meter. The data were analyzed using the CROPWAT 8.0 model, SPSS, Microsoft Excel, and GIS software. The amounts of water that were applied, as well as the amounts that should have been applied, were used to evaluate water delivery indicators. The study's findings revealed that the values of adequacy, dependability, efficiency, deficiency, and equity were respectively 0.84, 0.26, 0.93, 0.17, and 0.34. In general, the irrigation system performs poorly. It mostly happened as a result of a lack of water, illegal water extraction, canal sedimentation, and inadequate provisions for operation and maintenance. To improve the irrigation system's performance, appropriate management strategies and adequate maintenance are required. During times of water scarcity, enhancing the performance of water delivery systems may present an opportunity to save water at the field level.

Keywords: Hydraulic performance • Canal sedimentation • Water scarcity

Introduction

The study area's mean minimum and maximum temperatures are 13.5 and 27.7°C, respectively. From 9.6°C in December to 16.9°C in July, the monthly mean minimum temperature varied. The mean monthly maximum temperature ranged from 24.3°C in December to 31°C in June. The project area's rainfall distributions revealed a "unimodal rainfall pattern" and unreliable "belg rainfall." Summer which lasts from July to early September, is the main rainy season. The unreliable period of belg rain is from March to April. The project area received 712 millimeters of precipitation on average per year. Figure depicts the mean monthly rainfall, Tmax, and Tmin values. 1. Daily sunshine hours at the project site range from 6.4 in August to 9.2 in November. The average amount of sunshine per year is 7.7 hours. The project area has a mean annual relative humidity (RH) of 46%, ranging from 30% in June to 57% in January. The project area's wind speed ranges from 164 km/day in August to 192 km/day in June, which is high and likely to harm crops.

Literature Review

An intake irrigation project known as the Yelen irrigation scheme can be found in Kewet Woreda, which is in the North Shewa Zone of the Amhara region. The Woreda capital, Shewa Robit, is approximately 10 kilometers from the study area; the zone capital, Debre Berhan, is 95 kilometers away, and the regional capital, Bahir Dar, is 795 kilometers away. The project is on the Addis Ababa-Dessie main road, which is a short distance to the west and connected to the project by a gravel road that is about 7 kilometers long. It is anticipated that the project will cover a total commend area of 180 ha. The study area is approximately 1245 m.a.s.l. in elevation at 10° 4' 51.6" N latitude and 39° 53' 13.2" E longitude. The project's area is located in the Kola Ecological Zone, according to the traditional agro-ecological classification system. After spring water joins the Sewer River, an intake structure with a base flow of 60 L/s and a 12 L/s release for downstream users and ecological services supplies the scheme with water. On the right side of the river's course, there is a 1.6-kilometer-long primary contour canal. Water flowing down slope from the main canal enters the command area via the secondary canal, which is 1.761 kilometers long. By means of field ditches, nine tertiary canals with a total length of 5.516 kilometers and contours serve standard-sized irrigated plots [1,2].

Discussion

Surface drains remove rainwater runoff and excess irrigation water. The command area's slope is between 2 and 4%, while that of the main canal is between 0.29 and 0.49 percent. This aids the farmers in successfully irrigating the command area. There are total 720 household beneficiaries of the irrigation program. Farmers have formed mandatory Water Users' Associations (WUAs), which create bylaws and collect fees for canal maintenance. It was built in 2012 by the Bureau of Water Resource Development at a cost of 7.1 million ETB, and it will last roughly 30 years. This study was conducted for a single irrigation season from October 2018 to December 2018. The data collection was carried out with the DA on the selected small-scale irrigation project that was assigned by the Woreda (Kewet) Agricultural Office. The choice of these months was made because there is a lot of water available and more fields are irrigated during this season than during the other irrigation season (February to June). The wereda's agricultural office, Debre Brihan's agricultural research center, and professional field visits provided all the necessary secondary data for the study [3-5].

Conclusion

DAs and farmers were consulted about the general state of small-scale irrigation during the field visits. Both primary and secondary data were gathered. Formal and informal surveys were used to collect a variety of primary data types.

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For the purpose of data collection and analysis, group discussions and interviews with farm households were practiced. Additionally, plot size was measured. The rate of soil infiltration was tested in the study area, and soil samples were taken at each of the nine locations to measure various soil parameters. GPS data were also recorded with the intention of positioning various points in accordance with the systematic layout of the study area. In order to evaluate indicators of water delivery, flow was measured. In order to observe and investigate the method of water applications as well as practices related to water management techniques carried out by the assigned individuals and farmers, frequent field observations (transect walks) were made. Plot-by-plot, the field visits were paid to observe the scheme's current water management practices. The researcher was able to learn about the status of various plots and identify obstacles to maintaining the schemes' services for the intended communities through observations.

Acknowledgement

None.

Conflict of Interest

None.

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