

Research Application Summary

Evaluation of water distribution systems at Igomelo Farmer-Managed Irrigation Scheme in Tanzania

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Abstract

Evaluation of water distribution systems at Igomelo irrigation scheme was conducted to assess the performance of the scheme after intervention of the Irrigation Management Transfer (IMT). The scheme was divided into three blocks: head, middle and tail end of the scheme. Three plots from each block were selected for study, where water deliveries were monitored throughout one irrigation season. Irrigation performance indicators such as Dependability (PD), Equity (PE) and Adequacy (PA) of water supply, Conveyance efficiency and Structure Condition Index (SCI) were used to evaluate the system. Conveyance efficiency was on average 85% for the three sections. Dependability and equity values were 0.70, 0.62, 0.84 and 0.76, 0.90 0.96 for head, middle and tail and sections of the scheme, respectively. The structure condition index was on average 90% for the 3 sections of the scheme. All the above, are indicators of a system that is performing well.

Key words: Distribution efficiency, irrigation, irrigation performance indicators, water distribution

Résumé

L'évaluation des systèmes de distribution d'eau au système d'irrigation d'Igomelo a été menée pour évaluer le rendement du régime après l'intervention du Transfert de Gestion de l'Irrigation (IMT). Le régime a été divisé en trois blocs: le régime de la tête, du milieu et de la queue. Trois parcelles de chaque bloc ont été sélectionnées pour l'étude, où les livraisons d'eau ont été suivies tout au long de la saison d'irrigation. Les indicateurs de performance tels que l'irrigation de fonctionnement (PD), l'Équité (PE) et l'Adéquation (PA) de l'approvisionnement en eau, l'efficacité du moyen et de la Structure de l'Index de Condition (SCI) ont été utilisés pour évaluer le système. L'efficacité du moyen de transport était en moyenne de 85% pour les trois sections. Les valeurs de fonctionnement et de l'équité étaient de 0,70, 0,62, 0,84 et 0,76, 0,90 0,96 pour la tête, le milieu et la queue et les articles du

régime, respectivement. La Structure de l'Indice de Condition était en moyenne de 90% pour les 3 sections du régime. Tout ce qui précède, sont des indicateurs d'un système qui fonctionne bien.

Mots clés: Indicateurs d'efficacité de distribution, l'irrigation, le rendement d'irrigation, la distribution d'eau

Background

Poor operation and maintenance of irrigation systems have been reported as limitation to sustainability of most irrigation schemes in Tanzania (Masija and Kabugila, 1994). Conflicts among head and tail water users, water logging due to poorly maintained systems, low efficiencies and inadequate water supply are major problems associated with irrigation systems. In order to improve the situation the government of Tanzania adopted the Irrigation Management Transfer (IMT) to irrigators' associations in each established scheme to help alleviate the problems. Therefore this study aimed, at evaluating the water distribution systems under the Irrigators associations.

Literature Summary

IMT is a reform which has been strongly supported by many governments due to financial pressures on government, lack of sufficient funds, widespread deterioration, poor performance of irrigation systems, failure to collect sufficient water charges from farmers and creating a sense of ownership within farmers (Yercan *et al.*, 2004). In Turkey, Sri Lanka, India, Japan and Mexico success has been noted in areas of operation and maintenance, more equitable water distribution, increased fee collection, decrease in wasteful use of water, enhanced durability of irrigation facilities, reduction in government burden and facilitation of cost recovery (Yercan *et al.*, 2004, Tanaka *et al.*, 2005).

Study Description

The study was conducted at Igomelo Irrigation Scheme located in Mbarali District, Mbeya Region. The scheme lies at latitude 8° 47' 47" South and longitude 34° 23' 13" East at an altitude of about 1050 meters above sea level. The climate of the scheme area is described as semi arid with mean annual rainfall estimated at 686 mm. The scheme was rehabilitated in 2000 and handed over to the irrigators association in 2001. The association is responsible for water allocation through irrigation schedule preparation, maintenance of infrastructure, fee collection, conflict resolutions and water management.

During the study the scheme was divided into 3 blocks namely; head, middle and tail. From each block one canal was sampled

for efficiency determination. Also for each canal, the structures were inspected to evaluate the maintenance level. Three plots from each block and at different distances from the canal were selected and monitored throughout the season so as to determine equity, dependability and adequacy of the water supply. Flow measurements into the plots and irrigation duration were recorded during irrigation and later calibrated through a pigmy current meter. Also using flow measurements the efficiency of the irrigation canals were determined. The Data were statistically analyzed using Genstat computer program.

Research Application

The relative water supply (RWS) at the upper reach were 1.79, 1.94, 1.64 while at the middle 3.96, 2.09, 1.91 and at the tail 1.4, 0.92 and 1.44. The results indicate that each plot had adequate water. Although the RWS among plots at the three reaches were different, they were statistically not different ($P \leq 0.05$).

Dependability was 0.70, 0.62 and 0.84 for the mentioned locations respectively, indicating poor dependability because all are above the recommended threshold value of 0.25. Dependability and equity are expressed as coefficient of variation hence cannot be compared statistically. Calculation of equity using the Area Uniformity (AU) indicator gave 0.76, 0.90 and 0.96 for head, middle and tail plots showing more equity at the tail and middle compared to the head plots. The distribution efficiency for the three canals was 89, 87 and 79% which shows sufficient management and communication. All indicators point to good irrigators management.

Recommendation

Irrigators associations should get proper training on crop water requirement.

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