

Performance Evaluation of Tawi-Lift Command

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Abstract Present study is conducted within 18000 ha of Tawi - Lift command of Jammu. The annual average rainfall in study area is 1150 and 1250 mm with percent cumulative departure of rainfall ranging between (-) 50.0 to (+)150.0 for last 10 years. The performance indicators indicate that percentage gap between actual command and cropped area is 20%, 30% and 46% within head, middle and tail reaches. The output per unit command area for rice-wheat sequence within three different reaches of the canal command is 7.3 Rs/m³, 6.8 Rs/m³ and 4.8 Rs/m³. The relative water supply within three different reaches of canal command is 0.91, 0.82 and 0.35 respectively.

Keywords Rainfall pattern, Performance indicators of command area, Impact on ecology of rice-wheat sequence.

Introduction

Jammu region has 20.3% area under rice cultivation with 81% under irrigation [1]. In view of crop intensification and increase in acreage under rice within said

command area. To bridge up gap between irrigation supply to that of crop demand of Basmati rice crop, the irrigation department has adopted rotational distribution of water on 3.5, 2.5 and 1.5 days per week basis in different reaches of the said canal command [2]. During *rabi* – wheat crop the canal is closed from 15th December to 15th April converting irrigated area into rain dependent area. These natural resource constraints affects environment and ecology as well as water productivity of rice-wheat sequence by 20 to 30% against its potential yield. The objective of the study was to develop performance indicators of the study area so that outcome of the study is up-scaled by stakeholders at basin as well as at farmer field levels to improve water productivity of such alluvial plains of Jammu region for rice-wheat sequence as well as develop ecology and environment of the said area

Materials and Methods

Study area

Tawi-lift canal command originates at Bahu-fort near Jammu. The length of main canal is 28.80 kilometers (kms) with design discharge of 8.5 cumec. It has eleven (11) number of distributaries with majors and minors on left and right side which have total length of 124.75 kms and command area of 18,000 ha. In addition to this the canal system has Main Ravi canal towards tail end to receive water from river Ravi and newly developed subsidiary lift scheme at Village Raya [3].

Climate

The annual average rainfall in the study area i.e. Jammu

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Table 1. Percentage gap between cropped commands to actual command. Head @ 80% (3724 ha) for each crop IC=160%, Middle @ 70% (4490 ha) for each crop IC=140% and Tail @ 50% (4997 ha) for each crop IC=100%.

Reaches	CCA (ha)	Output per unit command (Rs/ha)	Output per unit irrigable command (Rs/ha)	% age gap between cropped command to actual command	Gap per unit command to potential yield/ command (%)	Gap per unit irrigable command to potential yield/irrigable command (%)
Head	4655	56258	70323	20.0	41.2	41.2
Middle	6415	42452	60653	30.0	53	49
Tail	9994	23074	46148	46.0	69	61

and Kathua districts is 1150 and 1250 mm with percent cumulative departure of rainfall ranging between (-) 20.0 to (+) 200.0 and (-) 50.0 to (+) 150.0 in Jammu and Kathua districts respectively during last 10 years. As, a result of this climatic variability the effective rainfall do not match with crop stages of rice-wheat sequence and area is dependent on timely irrigation supply from surface and groundwater during *kharif* season in particular.

Ground water

Total fresh in storage ground water resources is 2445359.66 ha-m and dynamic stage of ground water development within outer plains i.e Jammu, Samba and Kathua districts is 19.52% [4]. Water quality is good for irrigation excepting isolated water pollution near industrial estate district Samba, therefore there is no issue regarding development of Grey water as of now in the study area.

Performance indicators

Gap between actual to cropped command area

Benchmark survey along three reaches of the study area in relation to irrigation water supply on rotation basis for *kharif* and *rabi* crops. It is recorded and estimated that present percentage gap between cropped to actual command area for rice-wheat sequence is 20 to 46 % as presented in Table 1.

Relative irrigation water supply

The relative irrigation water supply based on total irrigation water supply (m^3) and crop water demand (m^3) for rice-wheat is estimated along head, middle

and tail reach is varying and decreases by than 300% from tail to head reach as presented in Table 2.

Output per unit water consumed (Rs/m^3)

In this study output per unit water consumed based on production value (Rs) for rice wheat sequence and volume of water consumed by evapotranspiration (m^3) is determined and the output per unit water consumed (Rs/m^3) is estimated along head, middle and tail reaches which decreases by 52% from head to tail reach area as presented in Table 3.

Results and Discussion

Tables 1 to 3, indicated that the percentage gap between cropped to actual command area along head, middle and tail reach of the said command area for rice-wheat sequence is variable by 20% , 30% and 46% respectively. The relative water supply along head, middle and tail reach of said area is estimated is variable due to deficit irrigation supply against crop water demand by 0.91, 0.82 and 0.35 respectively. As such the output per unit command area rice-wheat sequence along head, middle and tail reaches estimated as 7.3 Rs/m^3 , 6.8 Rs/m^3 and 4.8 Rs/m^3 . This variability in revenue per unit water consumed is mainly by 52% from head to tail reach and effects farmer

Table 2. Relative water supplies in Tawi-Lift command.

Reaches	CCA (ha)	Total water supply (m^3)	Crop demand (m^3)	Relative water supply
Head	4655	42063840	44874200	0.91
Middle	6415	51184224	61840600	0.82
Tail	9994	34145280	96342160	0.35

Table 3. Output per unit water consumed in Tawi-Lift command.

Reaches	Effective CCA (ha)	Production value (Rs)	Volume of water consumed by ET (m ³)	Output per unit water consumed (Rs/m ³)
Head	3724	261882852	35899360	7.3
Middle	4490	272331970	43283600	6.3
Tail	4997	230601556	48171080	4.8

income. The outcome of the study, proposes that the stakeholders like irrigation department must increase number of days of irrigation supply from present rotation distribution of 3.5, 2.5 and 1.5 days water supply per week basis. The concerned stakeholders must develop the existing unconfined aquifer potential of ground water resources available to the tune of 2445359.66 ha-m and provide the same in conjunction with canal water to improve ecology and water productivity of rice-wheat sequence at disaggregated

level of canal command area. Further, there is immense need of disseminating agro-techniques like adoption of laser-leveling, direct seeded rice cultivation and SRI practice of rice to be propagated in farmers fields for improving water productivity by 20 to 30%

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