Irrigation Water Pricing in Sone Command Area

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Abstract

The objective of the study was to estimate irrigation water price for wheat and rice crops in Paliganj distributary under the Sone canal System in Bihar. Data regarding canal and tube well water charges were collected from WRD and local farmers through questionnaire and using Residual Value Method, price of irrigation water was calculated. The average irrigation water price on the basis of applied irrigation through canal and tube well lies between Rs. 3.70/m^3 to 4.67/m^3 for rice and Rs 4.17 /m^3 to 5.94 /m^3 for wheat.

1. Introduction

In India, gross irrigation potential has increased about five folds since 1951 due to phenomenal expansion in irrigation development. However, direct recovery from these irrigation schemes has been very low. The staggering difference between expenditure incurred and revenue recovered, is largely responsible for dismal performance of the irrigation sector. This can also be attributed to the defective pricing structure for irrigation water, which is highly subsidized and is not reflecting its true supply cost. Under-pricing of water has induced excess use of irrigation water leading to environmental problems like waterlogging and salinity in the irrigation commands. Water rates have not been revised in many states. Even now, lower and outdated water rates are continuing and as a result there has been a drop in the revenue from water charges. Irrigation is a crucial input for success of agriculture production and economic development of the country. It is one of the key inputs for food production. With agricultural sector being a major consumer of water, pricing of this input is one of the basic steps and an integral component in the process of rationalizing the totality of the price structure and increasing the efficiency of water use. The pricing has to be such so as to achieve full cost recovery in due course and in the process promote savings, create disincentives for wastages and thereby enable expansion of the service area and assure more reliable delivery.

India is gifted with large and reasonably good land and water resources by nature, but with an alarming increase in population, per capita water use and high living standard availability of water resources is continuously decreasing. The declining per capita availability of water for diverse uses has attracted serious concern for regulating the use of these finite but vital natural resources through rational price structure. Better utilization and management of land and water resources seems to be the only feasible way to increase production on sustainable basis. Worldwide water demand is growing in all parts of the globe.

2. Irrigation water pricing in Bihar

Bihar is one of the prominent states of India, which plays an important role in the Indian economy with the geographical area of 94,163 km^2**.** Bihar is a landlocked state of India and is covered by forest

and mines with huge resources of rivers. It lies between latitudes ranging from 24° 17' 6" N to 27°30.93' N and longitude ranging from 83°19' 17" E to 88° 17' 47" E.

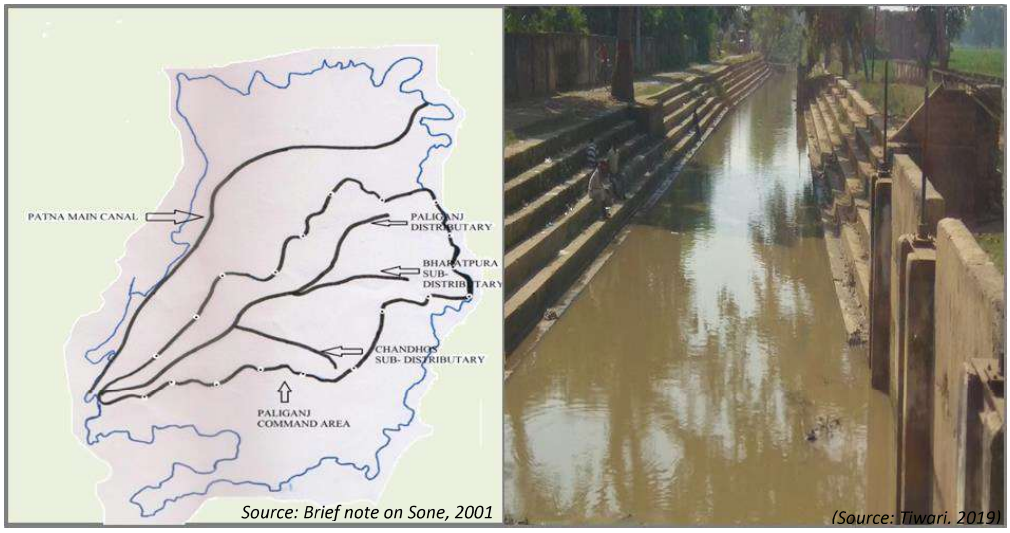

Table 1 Salient Features of Paliganj Distributary (Srivastava, 1994)

1.	Parent channel	Patna Canal
2.	Total length of parent channel	125 km (78 miles)
3.	Discharge of parent channel at offtake of Paliganj distributary	31.5 cumec (1100 cusec)
4.	Offtake point of Paliganj Distributary	75 km (46.2 miles)
5.	Total length of Paliganj canal Network including Chandos and Bharatpurasubdistributaries	40km (25 miles)
6.	Discharge at the head of Paliganj distributary	5.1 cumecs (180 cusecs)
7.	Gross Command area(geographical) under Paliganj Distributary	14,867 ha
8.	Culturable Command area under Paliganj Distributary	12,197 ha
9.	Reported Kharif area (paddy) in rainy season	4960 ha
10.	Reported Average Rabi area (wheat, pulses, oil seeds) in winter season, December- March	2000 ha

Sone command area development authority was created on 1st November, 1973 for all-round development of the command area for the purpose of increasing the utility of irrigation potential and agricultural output i.e. the programme is meant for maximum utilization of available water of the Sone canal system, increasing agriculture production, optimum utilization of underground water with provision of drainage as well, maintenance and regulation of distribution system, restoration of

proper crop programme, production management and increasing production and providing marketing facilities. Districts under Sone Command area are Patna, Bhojpur, Buxar, Rohtas, Bhabhua, Gaya, Jehanabad, Aurangabad, Palamu and Garhawa. The salient features of Paliganj distributary and its cropping pattern are as given in Table 1 and 2 respectively.

Table 2 Cropping Pattern in Paliganj Distributary (Brief note on Sone, 2001)

Crop	Rice	Wheat	Maize	Pulses	Oilseeds	Sugarcane	others
% Area	42.1	27.7	9.2	6.9	1.6	3.3	9.2

3. Results and Discussion

As per report of Government of India on flow and lift irrigation water in public system in India (2017), the maximum flow irrigation charge varies from Rs 6297/ha for the state of Maharashtra to the minimum of Rs 61.78/ha in the state of Tamil Nadu. The minimum flow irrigation charge varies from Rs 312.50/ha for Tripura to Rs 2.77/ha for Tamil Nadu. Similarly, the maximum rate of lift irrigation varies from Rs 5405 /ha for Maharashtra to Rs 12.35/ha for Haryana. The minimum rate of lift irrigation varies from Rs 312.50/ha for Tripura to Rs 12.35/ha for Haryana. In States of Arunachal Pradesh, Meghalaya, Mizoram, Nagaland and Lakshadweep, there are no water rates either for flow irrigation or lift irrigation. Thus it is observed that there is wide variation of water charges across the country.

Using Residual Value Method in which difference of gross returns of each crop and costs of production (excluding water) is divided by the amount of water applied (m^3), price of irrigation water was calculated.

The Benefit cost ratio is defined as the ratio of the total present worth of benefit and the total present worth of cost. The costs of cultivation with and without irrigation are estimated. The difference of these two will give the cost of irrigation water. The comparison is usually done using the present works of capitalized benefits and estimated costs. Benefits are capitalized over the life of the system; and normally 50 years life expectancy is used for a diversion irrigation scheme. The present worth of the capitalized benefit or cost is calculated using discounting table and then B/C ratio is calculated using the following formula.

$$B/C\ Ratio = \frac{Total\ Present\ worth\ of\ benefit}{Total\ Present\ worth\ of\ cost} \quad . \quad . \quad . \quad (1)$$

For each reach ten samples survey were conducted in the field. Based on this the summary of water prices and B/C ratios are as given in Table-3 for three different reaches of Paliganj distributary from which it is observed that for all the three reaches the average B/C ratios for Rice and wheat are 1.36 and 1.21 respectively. It is due to higher yield of rice than that of wheat.

Table 3 Comparison of Irrigation Water Price in the Study Area (Source: Tiwari, 2019)

Reach-1(Head)				
	Irrigation water price on the basis of applied irrigation (Rs/m^3)			B/C Ratio
	Max	Min	Average	
Rice	4.95	2.19	3.70	1.41
Wheat	7.20	2.32	4.18	1.23
Reach-2(Middle)				
	Irrigation water price on the basis of applied irrigation (Rs/m^3)			B/C Ratio
Rice	5.55	1.55	3.90	1.35
Wheat	7.00	1.21	4.19	1.21
Reach-3(Tail)				
	Irrigation water price on the basis of applied irrigation (Rs/$m^{3)}$			B/C Ratio
Rice	6.44	2.50	4.67	1.33
Wheat	7.00	3.21	5.94	1.20

From Table-3, it is evident that the average irrigation water price was Rs 3.70/$m^3$for rice and Rs 4.18/m^3 for wheat whereas B/C ratio was 1.41 for rice and 1.23 for wheat in Reach -1. For Reach-2, the average irrigation water price was Rs 3.90/m^3 for rice and Rs 4.19/m^3 for wheat, the B/C ratio was1.35 for rice and 1.21 for wheat. For Reach-3, the average irrigation water price was Rs 4.67/m^3 for rice and Rs 5.94/m^3 for wheat. Also, the B/C ratio was 1.33 for rice and 1.20 for wheat. Therefore, it can be concluded that it is more economical to grow rice compared to wheat in the study area. Also, from the Table-3 it is evident that the irrigation water price is maximum in Reach-3 i.e. tail reach for both the crops i.e. rice and wheat. This may be due to the reason that less water reaches the tail end during both the crop seasons. Therefore, tube well irrigation will be needed. The water price is less for rice compared to that for wheat in all the three reaches of the canal. This can be due to high yield of rice than that of wheat.

4. Conclusions

Based on the above results and discussion, it is recommended to have irrigation water price based on volumetric basis, so that it may help in water saving thereby increase in irrigated area. Apart from this, it will improve the process of assessment and collection of water dues

References

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About the author

Prof. Lal Bahadur Roy (Ph. D. in Water Resource) is currently working as Professor of Civil Engineering and Dean (R & C) at NIT Patna. He has over sixty publications in International and National journals, conferences and workshops. He has over thirty five years of experience in teaching, training, research and academic administration. He is a widely travelled person. He has also been associated with NIT Jamshedpur (1.5 years), WALMI Patna (10 years) and Arba Minch University Ethiopia (8.5 years). He has supervised five Ph.D. Theses and fifty M. Tech. Dissertations in the field of Water Resources and Geotechnical Engineering. His research areas of interest are irrigation water management, land drainage and flood control, participatory irrigation management, soil stabilization, swelling clays and soil- structure-interaction.