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CROP WATER REQUIREMENT DETERMINATION IN IRRIGATION SECTOR

N. A. Patel[1], H. B. Kevat[2], M. P. Vashi[3] , K.D. Uchdadiya[4]
B.E. student of Civil Engineering Department in SNPIT & RC, Umrakh, Gujarat, India[1]
B.E. student of Civil Engineering Department in SNPIT & RC, Umrakh, Gujarat, India[2]
Asst. Prof., Civil Engineering Department, SNPIT&RC, Bardoli, Gujarat, India[3]
Asst. Prof., Civil Engineering Department, SNPIT&RC, Bardoli, Gujarat, India[4]

Abstract: ***Water is becoming scarce resource as a result of growing demand in various purposes such as hydropower, irrigation, and water supply etc. In the irrigation system the water is most important factor so we find the design discharge for the crop growing in our study area near the Bardoli branch canal. By the values of delta and base period we find the duty and discharge of the canal and by adding the transition loss of 10% and by this we conclude that the design discharge is high then the actual discharge so we suggest the new cropping pattern for the design discharge.***

Keywords: **Crop water requirement, Design discharge, Irrigation System**

I. INTRODUCTION

A land irrigates growing a crop has to be supplied with water time to time. The plot is expected to receive water from rain but the distribution of water is uncertain in both in time and space. Hence, for proper crop growth the effective rain has to be supplemented by artificial applying water to the land by irrigation. Normally different crops may have different crop water requirement at different places of the same country depending upon the climate, type of soil, method of cultivation, rain etc. The cropping pattern in India underwent several changes with the advancement of modern agricultural technologies. From a generalized perspective, Indian agricultural is increasingly getting influence more and more by economic factor.

In our research study area is irrigate by KLBMC (Kakrapar Left Bank Main Canal). In past the mostly growing crop is vegetables and paddy so the crop water requirement is low and nowadays the perennial crops like sugarcane mostly growing in this region so crop water requirement is high. Hence, the cropping pattern is changed. So, we determine new crop water requirement for study area.

II. STUDY AREA

The study area is choosing as the study sites where small holder farmers practiced pumped irrigation system. Bardoli is the city in Surat region in the state of Gujarat, India. The longitude of Bardoli is 21.12^0N 73.12^0E. It has an average elevation of 22 meters (72 feet). The population density of the Bardoli division is 10000/km^2. The available water resource in

Bardoli division is Kakrapar Left Bank Main Canal (KLBMC). Kakrapar canal plays an important role in water supply to the residents of this area who practice farming in this region. The soil of this division is well drained, black cotton.In this region in different season different crops are grew. The Ravi crops are sugarcane, paddy, vegetables and other crop. The Kharif crops are sugarcane, wheat, vegetables etc.

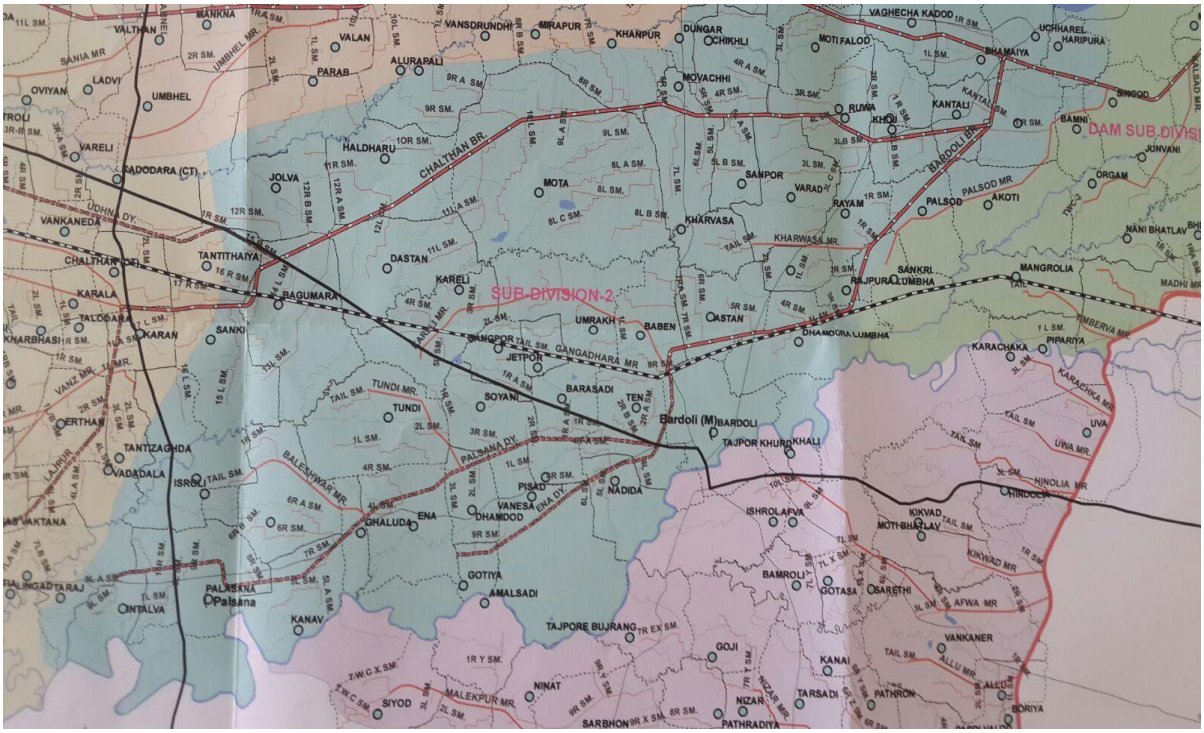


Fig. 1 Study area location map

III. METHODOLOGY

Base period is defined as the time period required for the first watering to last watering before showing to harvesting. Delta is defined as the total depth of water required by a crop during entire base period of crop. Duty of water may be defined as the irrigating capacity of a unit of water.

- If we take a field of area D hectares. water Supplied corresponding to the water depth Delta wiil be,

$$= D * Delta \text{ (hectare-metres)}$$
$$= D * Delta * 10^4 \text{ (cubic metres)} \quad \ldots\ldots\ldots\ldots (1)$$

- Further for the same field of the area D hectares. Water is supplied at the rate of 1 cumec for the entire base period of B days, then the total quantity of the water supplied to the field,

$$= 1 * B * 24 * 60 * 60 \text{ cubic metre}$$
$$= 8.64 * 10^4 * B \text{ cubic metre} \quad \ldots\ldots\ldots (2)$$

Equating (1) & (2),

$$D * Delta * 10^4 = 8.64 * 10^4 * B$$
$$D = 8.64*B/\Delta \quad \ldots\ldots\ldots (3)$$

Discharge, $Q = Area (A) / Duty(D)$ …… (4)

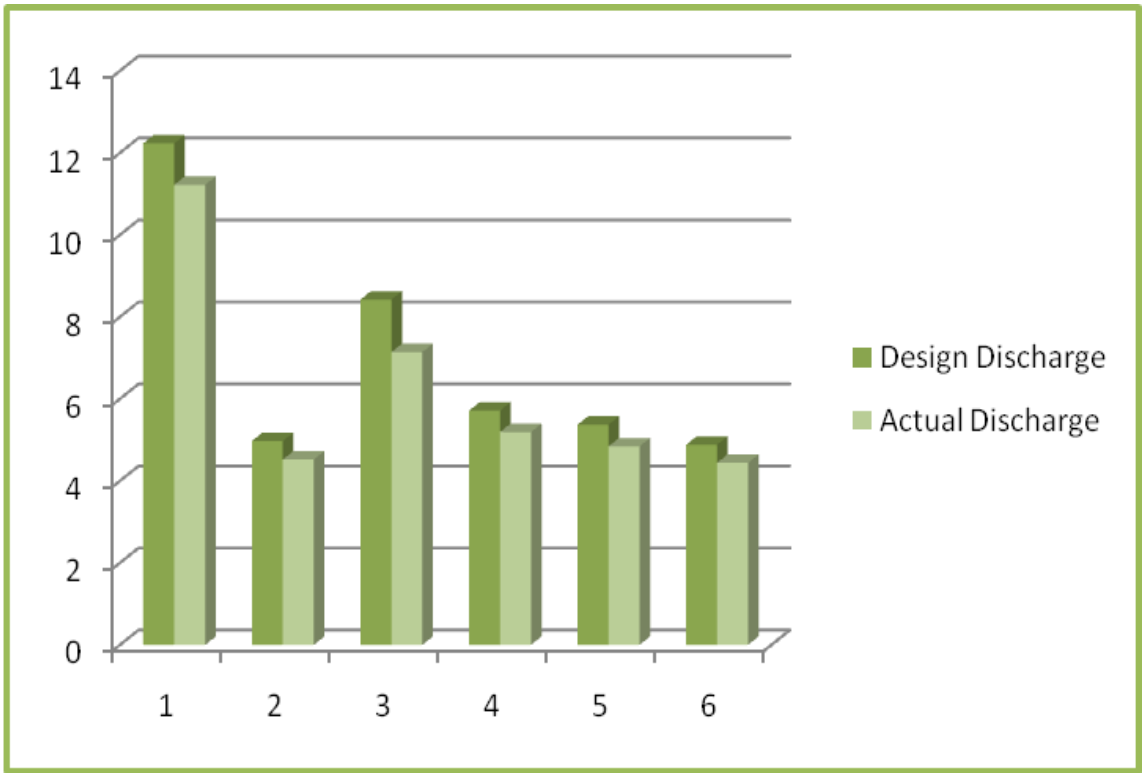
IV. RESULTS & ANALYSIS

From the data of crop water requirement of the Bardoli branch canal, delta and base period we find the duty from the above equation. By the values of duty and CCA (culturable commanded area) we find the discharge of the canal. Then, adding the transition loss which is taken as 10% of the discharge. After that the maximum discharge from the all three season rabi, kharif and summer is taken as the design discharge.

Then we find the design discharge of the sub minor branches of Bardoli branch 8L, 8L-A, 8L-B, 8L-C,9L and 9L-A. The values of design discharge of all this branches are below in the table.

Table 1: Design Discharge

Canal name	Design Discharge(cumecs)
8 L s/mr	12.23
8 L A-s/mr	4.97
8 L B-s/mr	8.42
8 L C-s/mr	5.71
9 L s/mr	5.37
9 L A-s/mr	4.88



Graph 1: Comparison between actual and design discharge

V. CONCLUSION

By the graph of comparison between actual and design discharge, we can conclude that the design discharge is high then the actual discharge of the canal so, by this we suggest new cropping pattern related to the design discharge.

REFERENCES

Research Paper:

[01] ChinkySangral(2015). “Changes in Cropping Pattern and Crop Diversification in Jammu and Kashmir.”

[02] Dr. Suman Rani (2014). "Green Revolution: Changing Village Land use and Cropping Patterns (A Case Study of Hisar District, Haryana)."

[03] MhaskePandurangHanumant (2012). “Demands of Changes in Cropping Pattern: A CaseStudy of AkoleTahasil (M.S, India).”

[04] P. Das (2006)."Cropping Pattern (Agricultural and Horticultural) in Different Zones, their Average Yields in Comparison to National Average/ Critical Gaps/Reasons Identified and Yield Potential."

[05] V. Kalaiselvi(2012). “Patterns of crop diversification in Indian scenario."

Books:

[01] R.P. Rethaliya (2014). “Irrigation Engineering”

[02] S.K. Gurge (2014). “Irrigation Engineering”

[03] B.C. Punmia (1992). “Irrigation and Water Power Engineering”