

Water Requirement for Crops in Barind Area-before and after Implementation of BIADP, Bangladesh

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Abstract

This project work was conducted in Rajshahi district under Barind area of Bangladesh to estimate the consumptive use (Cu) and crops irrigation water requirement (C.I.R) from irrigated rice and wheat fields. The work was carried out to compare the Cu and C.I.R at maximum and minimum temperature during pre (1964-1985) post (1986-2008) implementation of Barind Integrated Area Development Project (BIADP). From 1964 to 1985 the rainfall trend was decreasing and maximum, minimum temperature and sunshine hours was in increasing trend. For this result before implementation of the project consumptive use and crop water requirement was less. From 1986 to 2008 the rainfall was in increasing trend and maximum, minimum temperature and sunshine hours was in decreasing trend. For this result after implementation of the project consumptive use and crop water requirement was comparatively increased. The consumptive use and crop water requirement for individual year from 1975 to 1984 was not uniform. On the contrary from 1999 to 2008 these values were uniform.

Index terms— irrigation; consumptive use; irrigation requirements; BIADP.

1 Introduction

Among the various phenomenon climate change is manifested by temperature rise along with the changes in precipitation, evaporation and relative humidity etc. threatening impacts in natural, social and economic systems. With the climate change, these factors will affect agriculture most [1,2]. Bangladesh is an agriculture dependent country. Most of the people (more than 80%) are involved in agriculture profession. Hence agriculture and its related things such as water resource management, irrigation, drainage etc. are most important in Bangladesh [2]. Improper knowledge and lack of modern technologies, farmers improperly lift water without considerate ground sources. As a result water table declines in many areas of Bangladesh. Hence groundwater (GW) level declined substantially during the last decade causing threat to the sustainability of water use for irrigation in NW region of Bangladesh [2,3]. The northwest region is almost entirely dependent on groundwater for irrigation purpose. The region is highly developed agriculturally with the largest irrigated area of all regions supplied mainly by shallow tube wells. The number of Deep Tube wells (DTW) has been significantly increased during the recent past years. About 2100 Deep Tube Wells, 45,000 Shallow Tube Wells (STW) and other mode of irrigation wells are being used in the study area for irrigation [4,5]. It covers about 88% of the total cultivable area in the study area. The remaining irrigable area has been intended to cover by installation of additional DTWs under a specific project [5]. The Barind Integrated Area Development Project (BIADP) under the Barind Multipurpose Development Authority (BMDA) was started on late eighties century in the districts of Chapai Nawabganj, Naogan and Rajshahi with 25 upazilla for the improvement of agriculture in Barind area-northwest region of Bangladesh which covers an area of 7500 km² [7]. But in time considering for the better prospect of the project an expanded project area of 38 upazilla of an area of 9288 km² II.

2 DATA COLLECTION

has been undertaken recently [8]. For the future development of Barind area BIADP fixed objectives like poverty mitigation, human resource improvement, food safety etc. [6,8]. Availability of water is the key factor for growing any kind of agriculture crop [9]. The water requirements will vary with the crops as well as with the place [10]. In other words, different crops will have different water requirements, and same crop may have different crop requirements at different places of the same country; depending upon the climate, type of soil, method of cultivation, and useful rainfall, etc [11]. Ground water condition of an area is mainly depending on geology, hydrologic parameter, soil properties, recharge and discharge and hydraulic characteristics of aquifer [12]. An important component of water balance equation is ground water recharge. Estimation of recharge volume is very important in forecasting groundwater condition in present stage and its effect on future stage [4,12].

The monthly rainfall data in Rajshahi district within the Barind area was collected from Bangladesh Meteorological department, Dhaka. The maximum and minimum temperature ($^{\circ}\text{C}$) data for Rajshahi station was collected from Bangladesh Meteorological department,

3 RESULT AND DISCUSSION

Meteorological data analysis represents that before implementation of the project the rainfall was in decreasing trend and after implementation of the project it is increasing. Before implementation of the project maximum and minimum temperature was increasing this became in decreasing trend, after implementation of BIADP (Fig. ?? to 6).

Figure ?? represents that before 1985 the monthly sunshine hours was more than 10 hours in few months. On the contrary after 1985 the sunshine hour is less than 10 hours (Fig. ?? to 11).

The average value of Consumptive Irrigation Requirement (CIR) for IRRI rice during pre-project for maximum temperature for the month of February, March, April, May and June were 15.83 cm, 17cm, 16.52 cm, 6.22 cm and -15.81 cm respectively. The negative value indicates the excess of rainfall than Cu. On the contrary after implementation of the project for the same crops these values were 17.07 cm, 18.3 cm, 16.337 cm, 3.97 cm, and -13.02 cm respectively (Fig. ??8).

The average value of CIR for IRRI rice for Barind area during pre-project at minimum temperature for the month of February, March, April, May, and June were 10.93 cm, 12.01 cm, 11.77 cm, 2.73 cm, -17.46c m, respectively and after implementation of the project for the same crops these values were 11.14 cm, 12.09 cm, 10.33 cm, 0.23 cm, -14.88 cm respectively (Fig. ??9). For Wheat, the average value of CIR before implementation of project at maximum temperature in the month of November, December, January, and February for Barind area were 5.40cm, 10.60cm, 13.85cm, 6.25cm respectively where after implementation of the project these values were 5.21cm, 9.89cm, 13.60cm, 6.56cm respectively (Fig. ??0).

For Wheat, before implementation of project the average value of CIR value at minimum temperature for the month of November, December, January and February were 4.40cm, 7.44cm, 9.73cm, 4.10cm respectively where after implementation of the project at minimum temperature these values were 3.97cm, 6.53cm, 11.28cm, 3.97cm respectively (Fig. ??1).

V.

4 CONCLUSION

From the analysis of the meteorological data after implementation of BIADP the rainfall trend is increasing, maximum temperature and minimum temperature is decreasing and also a positive effect has been found for monthly sunshine hours.

The Consumptive use for rice and wheat was more before implementation of the project due to increased maximum, minimum temperature and sunshine hours which decreased after implementation of the project. The Consumptive Irrigation Requirement was decreasing at present due to increasing rainfall. ^{1 2}

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Figure 1: Figure 3 :Figure 4 :

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