ガモエかんがいシステム（ミャンマー）の水利用実態について

Assessing Water Utilization in Ngamoeyeik Irrigation System, Myanmar

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1. Introduction

Due to the high intensity of rainfall and moderate temperature, rice cultivation is very favourable in lower Myanmar. Rice is produced twice in a year as the rainy paddy grown by rainfed in monsoon (May to October) and the summer paddy by irrigation in pre-monsoon (November to April) during which no rain occurs. Even though the rainfall is sufficient for rainy paddy, irrigation is essential for the cultivation of summer paddy and other crops.

Ngamoeyeik Irrigation System is located in Hlegu, which is about 31 km northeast of Yangon. The catchment area of Ngamoeyeik reservoir is 414.5 km^2. Total irrigated area is about 22000 ha. It is a dentritic irrigation system shown as in Fig.1. It is divided into three sub-systems, Right Main Canal (RMC), Left Main Canal (LMC) and Distributary Canal of LMC (DY-2). The main purpose of Ngamoeyeik project is to store the rainwater during monsoon and to utilize the storage water in pre-monsoon for agriculture. Fig.2 shows the reservoir storage in monsoon and its utilization in pre-monsoon period for 4 Years, 1996-99.

2. Objectives

(1) Estimation of rainfall pattern and intensity for the reservoir storage during monsoon period for four years, 1996-99.

(2) Investigation of irrigation water use in main canal system for two years, 2000-01.

(3) Estimation of Evapotranspiration, ETo for reference crop during pre-monsoon period for the yield of crop.

3. Materials

(1) Daily rainfall data for 40 years of Hmawbi station located near to Hlegu were provided by Meteorology and Hydrology Department, Myanmar (M.H.D). Daily rainfall for Hlegu for 4 years, 1996-99 were provided by Maintenance Office Yangon Division, Irrigation Department, Myanmar (I.D).

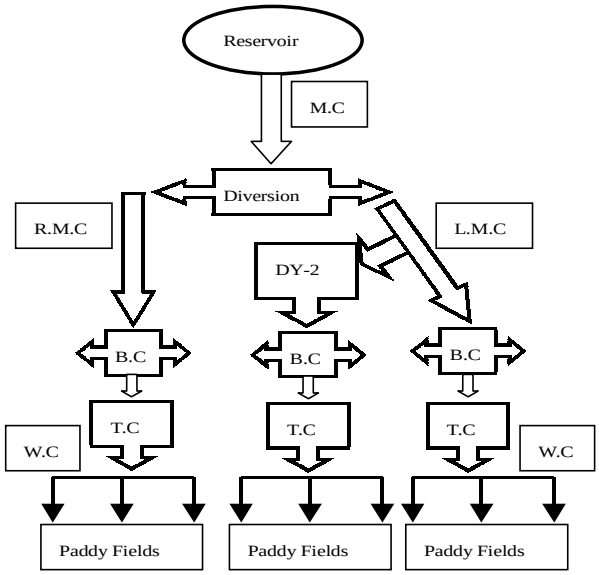

Fig.1 Layout of Ngamoeyeik Irrigation System

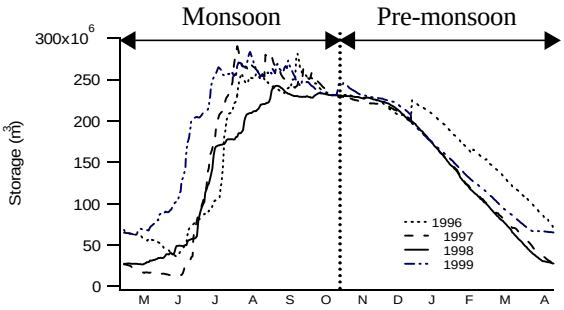

Fig.2 Storage Curve of Reservoir (1996~1999)

(2) Daily inflow and outflow of reservoir for 4 years,1996-99 and daily irrigation supply data for 2 years, 2000-01 were provided by I.D.

(3) Daily data of maximum and minimum temperature, relative humidity, wind speed, maximum sunshine hours and evaporation were provided by M.H.D.

4. Methods

(1) Estimation of Rainfall Pattern and Intensity for Reservoir Storage : Rainfall pattern and intensity during monsoon were estimated using daily data of Hlegu and Hmawbi stations based on average total rainfall of 10-day-period for monsoon season during 1996 through 1999.

(2) Investigation of Irrigation Water Distribution in Main Canal System : The flow patterns of main canal system were investigated using the daily discharge, Q and water depth, H data of main system. The total discharge through MC for the irrigation season of 2000-01 were shown in Table.1. These discharge data were measured at 2.3 km before bifurcation of RMC and LMC.

(3) Estimation of Evapotranspiration, ETo for Irrigation Requirement : The modified Penman-Monteith Method was applied to the estimation of daily evapotranspiration for reference crop, ETo using daily data of Hmawbi. The daily evaporation, Eva data were measured with Pan Type A. The average monthly ETo data provided by International Water Management Institute (IWMI) were used as reference. It was considered based on the mean value of 10-day-scale during irrigation period of 1994~1996.

5. Results and Discussion

(1) The correlation between Hlegu and Hmawbi stations was very high and rainfall patterns were similar in this time scale as shown in Fig.3. Total rainfall amount in 1998 was the smallest among the 4 years in both stations. There were 2 drought years in Hmawbi with the minimum rainfall of 1872 mm in 1957 and 2004 mm in 1998. Even in the drought year 1998, the sufficient water was stored up to the full level of reservoir when the accumulative rainfall reached 1640 mm. In other 3 years, the storage was full when total rainfall was about 1400 mm.

(2) The irrigation water utilization patterns of reservoir for pre-monsoon period of 4 years were very similar as shown in Fig.2. The distribution ratio for right and left main canal was almost same in 2000 and 2001. 43% of total discharge was diverted into RMC and 55% in LMC. The remaining 2% probably be conveyance loss and other losses for 2.3 km distance.

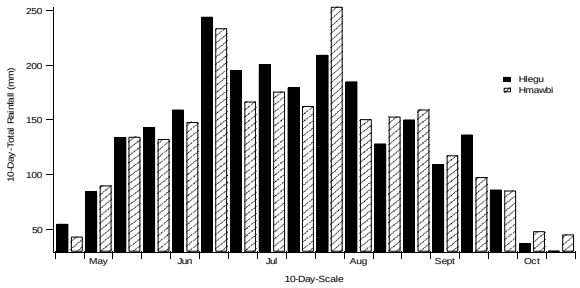

Fig.3 Rainfall Pattern of Hlegu and Hmawbi in 10-Day-Scale (1996~1999)

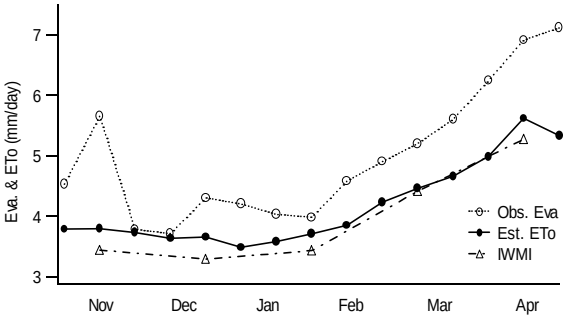

Fig.4 Mean Observed Eva and Estimated ETo for Hmawbi in 10-Day-Scale (1994~1996)

(3) The observed Eva is larger than estimated ETo as shown in Fig.4. The average maximum ETo is 5.5 mm ~ 6 mm while the observed Eva is 7 mm ~ 7.5 mm in April, the hottest month of year. The observed Eva data might be applied using relative coefficients for estimation of ETo for other stations, which have no enough meteorological data.

6. Conclusion

(1) The storage water was kept sufficiently when total rainfall reached 1640 mm even in the extreme drought year with minimum annual rainfall 1830 mm in Hlegu.

(2) The conveyance loss and other losses for main canal probably be 1% of total discharge for 1 km distance.

(3) The average maximum evapotranspiration for reference crop, ETo is 5.5~6 mm while observed maximum pan evaporation, Eva is 7 mm in April.

Table.1 Distribution of Irrigation Water in Main Canal System

Canal / Year	Main Canal	Right Main Canal	Percentage of Total (Q)	Left Main Canal	Percentage of Total (Q)
2000	1681.7	717.8	42.68	915.8	54.46
2001	1148.2	481.3	41.92	641.1	55.84

*The values are the discharge (Q) in m^3/s for one irrigation season