Measurement of Water Flow Rate Control in Ngamoeyeik Irrigation System, Myanmar

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1.Introduction

Irrigation is playing an important role in the agricultural economy of Myanmar. As practiced in many places, however, it is still based largely upon antiquated methods of distribution and application that fail to measure and optimize the supply of needed water to satisfy the hydraulic water requirement. The irrigation facility is believed to be reliable, however the water management is not reliable in most of farms in Myanmar. Flow measurements can provide important information about the actual performance of the irrigation system. In addition, it can be also useful for settling any disputes about the distribution of water.

2.Water distribution management in Myanmar

Most of the irrigation systems are technically reliable in Myanmar because the Irrigation Department is responsible for planning and designing of water distribution in all projects in accordance with the water available. Distribution of water is executed in groups of irrigation canals. Rotation calendar is drawn every year and water is diverted to groups of canals according to the turns. A group of canals receive water depending on the amount of water that flows in the river.

Equity and equality of water distribution could be seen in a village system. Every farmer contributes some portion of the cost and labor in the construction of diversion weir and canal network and their leader takes responsibility. He allocates the amount of water to be taken by each farmer according to the availability of water in the stream. Duty and responsibility is given to every group of farmers before the irrigation season. In case of flood damage in the system the assigned group do the necessary repair. If they fail or do not do according to predetermined assignment the water allocation for them will be stopped.

The water management is very effective among water user groups, however, it is not clear that the regulations on discharge or intake rates are strictly observed. For efficient utilization of irrigation project constructed and maintained by the Irrigation Department, it is necessary to establish the methods for quantitative water management, as well as for verification of hydraulic performance of constructed canals.

3.Outline and results of investigation

In order to use the irrigation water effectively, proper water distribution for the whole irrigation system is needed, however, the discharge is not measured in actual canals. Since the information about hydraulic performance of canals is essential for the water distribution management, discharge is measured in a test farm in the following way.

The test farm with Ngamoeyeik Irrigation system is located in Hlegu, which is about 31 km northeast of Yangon. The catchment area of reservoir is 414.5 km^2 and total irrigated area is about 22,000 ha. It is divided into three sub-systems such as Right Main Canal (RMC), Left Main Canal (LMC) and Distributary Canal of LMC (DY-2) as shown in Fig.1. Table 1 shows the designed outline of intake conditions in sub-canals.

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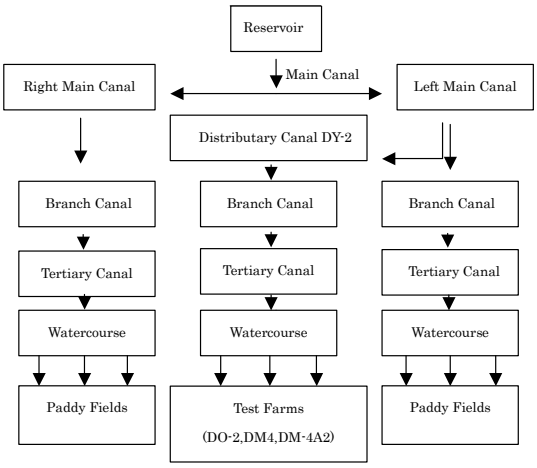

Fig.1 Layout of Ngamoeyeik Irrigation System

Table 1 Intake conditions in sub-canals

Item	DO-2	DM-4
Irrigable area in ha (10^4 m^2)	2.543	11.361
Irrigable area (2002-2003)	2.543	6.639
Standard discharge (m^3/s)	0.036	0.159
Standard discharge (m^3/s)	0.036	0.091
Beginning date of irrigation	16 Dec	30 Dec
Ending date of irrigation	22 Apr.	29 Apr.
Irrigation period (days)	128	121
Total discharge in irrigation period (m^3/s)	4.736	12.705
Average discharge (m^3/s)	0.037	0.105
Average discharge (mm/day)	12.5	13.6

In 2002-2003 summer season, to survey the water distribution conditions, a parshall-flume and auto level gauge were installed at the intake portion of Direct Outlet, DO-2, in intensive type test farm. In extensive type, two auto level gauges were installed at the intake portions of Direct Minor, DM-4. The measurement of water flow rate control by stage-discharge curve method and the daily average discharges were calculated with the equation of $Q= 1.0207(H-0.0113)^2$, where Q= discharge in a canal and H= water depth.

Standard discharge of each sub-canal is calculated based on Irrigation duty for summer paddy is 2446.6 m^3/day per 4047 m^2 and it is equivalent to the water requirement rate of 12.08 mm/day. The discharge of DO-2 of intensive type test farm and DM-4 of extensive type test farm were almost taken equal with standard discharge (12.08mm/day). Those were 12.5 mm/day and 13.6 mm/day respectively.

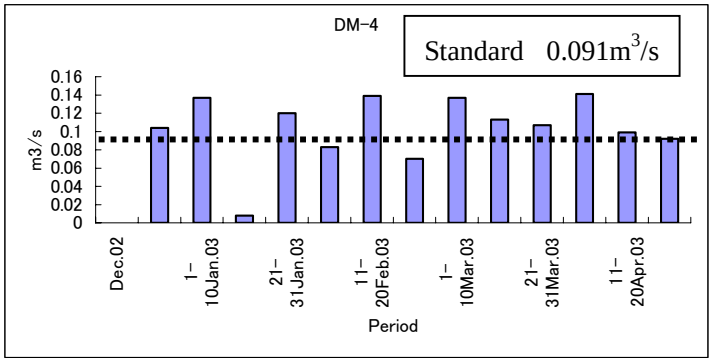

Fig.2 Average discharge in 10 days at DM-4

Fig.2 shows the average discharge of 10 days in DM-4 area. Since observed discharge is near to the standard one, the hydraulic performance is considered to be verified. Using similar but less expensive method, discharge can be measured and utilized for quantitative management of water distribution.

4.Conclusions

Water distribution conditions of the sub-canals and the watercourses in test farms were understood through the activities of water flow measuring. From the data above, the measured discharge is close to the standard discharge. Therefore, the irrigation facilities in the test farm are proved to be reliable. However, because many farmers participate in the construction of actual canals, their hydraulic performance should be verified. At the same time, since quantitative management of water discharge is not common in Myanmar, its introduction is important for the effective utilization of irrigation systems.

We can make tentative conclusion that this stage-discharge curve method can improve on the discharge control in the standard farms also.