

## ウガンダ国大規模水田灌漑地区における高生産性のための灌漑管理の分析

An analysis of water management  
for high productivity in large paddy irrigation schemes in Uganda

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### 1. Introduction

Raising agricultural productivity in an irrigation project as a whole requires equal or equitable water distribution in principle<sup>1)</sup>. In its setting, the upstream farmers are always at an advantage in water availability and usage. To realize equitable water distribution, the motivation for upstream farmers to accept the equal water distribution is necessary.

These requirements that facilitate equity have been realized in Japanese irrigation system as well as some other traditional irrigation systems in Southeast Asia<sup>2)</sup>. When considering improvement measures for irrigation systems in developing countries that face serious difficulties in water management, to find out the essential problems that hinder equitable water distribution is most important; while the number of case studies analyzing actual water management is not sufficient.

In this study, we conducted a comparative analysis of two large-scale paddy irrigation schemes with different water management methods in Uganda. In the analysis, we adopt an idea to understand water distribution as a process consisting of four functional components of decision making, operation, monitoring and feedback<sup>1)</sup>.

### 2. Method

Two irrigation districts (Doho 1000 ha, Lwoba 700 ha) near Mbale city were selected for the target areas of the analysis. All the beneficial farmlands in both area are paddy fields. They draw water to right and left bank from upstream of a common diversion weir on the River Manafwa, having the almost same conditions of irrigation area, beneficiary farmer composition and farming methods but contrastive water management methods of participatory and autocratic managements.

The authors visited the site from July to September in 2017 and conducted face-to-face questionnaire survey with the farmers, the numbers of which were 60 in the Doho area and 30 in the Lwoba area. The data on water conditions upstream

and downstream of the trunk, branch, terminal canals, cultivation, water management, yield, etc. were obtained. In addition, we interviewed the representatives of irrigation institutions in both areas and obtained data on the actual water management conditions. Local aerial photographs and maps were provided by NTC International Co., Ltd.

We analyzed the impacts of the water management methods on actual water distribution and yield, and tried to find the points to improve the participatory water management.

### 3. Details of the Study Area

Rice is a new commodity in Uganda; Uganda had little rice paddy rice farming until the period from 1990 to 2007 when production increased rapidly<sup>3)</sup>. This increase was due the promotion by the Government with the support of international organizations and currently large scale rice irrigation development projects are rapidly under way.

In the surveyed area, Lwoba was fully developed and managed by a private person; it started operation in 1982 and expanded gradually until the last block was opened in 2000. The land in Lwoba fully belongs to “Lwoba Holdings” who leases it to individual farmers on set terms.

Doho was developed by the Government and started operation in 1976. Initially the land belonged to the people who requested the Government to develop the infrastructure to control rampant flooding. The government compensated all the people and acquired the land. After development of the irrigation infrastructures there in 1984, the land was redistributed back to the peasants in the area, in which land were distributed according to family size.

In 2013 the Government carried out rehabilitation works in Doho Rice Scheme; and at the same time, a new diversion weir was built upstream of which both Doho and Lwoba can get water at the same point.

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The farmers cultivating rice in both Doho & Lwoba live together in a near by township located between 2 and 4 km from the fields; there is no relation between the allocation site of the farmland and the settlement colony of the farmer.

#### **4. Water condition and farming conditions**

In both schemes, the main canals feed the individual paddy fields through secondary, tertiary and quarterly waterways. A tertiary canal covers about 100 hectares in a water unit called block. The irrigation area of a quarterly waterway is about 8 ha consisting of 80 to 100 terminal paddy plots (standard paddy section is 1000 m<sup>2</sup> for Doho, 700 m<sup>2</sup> for Lwoba). Farmers cultivate 2 or 3 paddy plots in either area. Therefore, about 50 farmers are involved in a block of 4th canal.

Rice cultivation seasons correspond to the two rainy seasons, while even with the rains the available water decreases and many paddy fields suffer from water shortage in drought years.

According to the farmer questionnaire survey, the average yield is 2.4 t/ha for Doho and 2.7 t/ha for Lwoba. The land and irrigation fees in Lwoba are 32,700 Yen/ha/season and 7,300 Yen/ha/season in Doho. Both schemes grow same High Yielding Variety known as K98, but the amount of fertilizer used is smaller in Doho. According to the questionnaire, this high fertilizer use in Lwoba is mainly due to reliability of water supply.

#### **5. Water management method**

##### **5.1 Doho area**

The Ministry of Agriculture, Animal Industry & Fisheries employs three staff members (the production co-ordinator and two water guards) responsible for water management. The Operation of the Main headworks, the secondary canal and Tertiary canal gates are under the responsibility of the staff. Water to the blocks is distributed on a weekly rotational basis of 3 days water and 4 days outage. With the rotational system, fairness has been achieved at the block level

Within the blocks, one block leader for each block and one strip leader for each quarterly canal are elected by the member farmers. Farmer's water problems are channeled through strip leaders then to block leader to the production coordinator. Block leaders have the authority to adjust the water intake of each 4th waterway. However, it is unknown how much the block reader and the strip leader actually do the operation for the distribution adjustment.

##### **5.2 Lwoba area**

The landlord hires supervisors to perform the water distribution operation to the entrance of the tertiary canals like the production coordinator in Doho. In each block one block leader

is appointed by the landlord. Block leaders are responsible for fair distribution of water among blocks. When farmers suffer a shortage of water, farmers ask the block leader to solve the problem. Additionally a block leader is a subordinate of two supervisors and has an obligation to observe the order of the supervisors on water distribution.

In each block, the landowners' children are allocated cultivation areas, their role is to spy whether the block leaders are fairly distributing water, and to notify the landlord or two supervisors if there is a problem.

#### **6. Discussions**

In Doho, it is inferred that there is a problem in distribution management within the block. On the other hand, Lwoba has developed the monitoring system to check whether there is a problem with water distribution in the block, and the landlord who is the highest administrator can collect accurate information and is able to solve the problems. Therefore, it seems that equal water distribution is realized even within the block.

Lwoba has the single landowner as a factor that enabled such a system. Because the improvement of the total yield of the whole scheme by equal water distribution leads to the increase in the rental income of the owner, there is motivation for him to perform it. Also, he has a power for it since if the farmer does not follow his opinion, the tenancy relationship may be canceled.

In Doho, the motivation and authority of the production coordinator to achieve and maintain water equity within the blocks are weak.

When the landowner is involved in water management, the irrigation scheme becomes close to a large farm system, in which it is easier to realize equal water distribution compared with the joint management of small farmers, and the productivity of the whole irrigation project could increase. The issue is how to create an incentive for implementing equal water distribution and a mechanism that can properly implement monitoring and feedback in a small farmers' system.

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