

ウガンダ国における大規模谷地田の水利特性と生産性向上のための課題
 An analysis of Yachida paddy fields in Uganda from a view point of
 water management conditions and challenges for higher rice production

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1-Introduction

In Africa, the population growth rate is still high between 2-3%, thus creating concerns about food security. As the countermeasure for that, currently many Sub-Saharan countries are joining CARD and have started improving rice cultivation and paddy field development. International organizations and donors have taken keen interest, but it is still at an early stage.

Since hydro-topographical conditions of the upper Nile basin in Sub-Saharan Africa are quite different from those of the middle and downstream areas, characteristics of developed and developable paddy fields also differ. “Yachida”, paddy field in valley land, is one of the typical paddy fields in these areas.

In this study, we analyzed and clarified the current state of paddy field development centered on the Yachida, from the irrigation engineering perspective targeting the republic of Uganda which is upstream of the Nile River.

2-Methodology

Paddy rice cultivation in Yachida is usually carried out by using rain that falls in the catchment valley. Therefore, the irrigation and drainage conditions vary greatly depending on the area of the paddy field (A), area of the catchment (C) & its slope. These three factors combined to affect the farming method deployed and the yield of rice. Therefore; we selected a large-scale Yachida to be divided into 3 areas of upstream, middle-stream, and downstream,

then compared the actual conditions of rice cultivation with the indexes of ratio of (C/A) and slope in each area.

Naigombwa-Igogero large-scale Yachida of around 6000 ha, located in the sub-Catchment Mpologoma in the Lake Kyoga basin, spreading in the eastern of the lake in eastern part of Uganda was selected as the target area.

Data on water condition, farming methods yields, etc. were obtained by a face-to-face questionnaire survey within 8 villages in the Yachida (4 villages upstream, 2 middle and 2 downstream) and interview to representatives of the area agricultural cooperatives and the district's agricultural staff in March 2020. Local elevation, slope, catchment area, paddy field area, and layout of water use structures were obtained and processed using QGIS.

3. Outline of Paddy Field Development in Uganda and Study Area

Uganda's paddy field development began in the 1970s and the current paddy area is around 40,000 ha. They are mostly located in long and narrow swampy areas spreading out, like tree branches, around Lake Kyoga. In the swampy areas; The downstream part of the swampy area is a wetland where papyrus grows, and the upstream part is always undeveloped area where shrubs grow. While most of the plateau around swampy areas have been developed as fields for upland crops.

A part of Naigombwa-Igogero valley that is used as paddy has a total length of about 35 km, width of

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between 300- 800 m in the middle and lower reaches, and an elevation difference of 50 m. From the 1980s, farmers in this area started to gradually develop their own paddy fields by themselves rather than by a government project. Therefore, large-scale modern irrigation and drainage facilities have not been developed to date. Rice is a two-season crop of between March to July months and August to January months, which corresponds to the two rainy seasons. The average yield is as low as 800-1800 kg/ha/season, which varies widely from year to year.

4-Results and Discussions

1) Upstream area: It is a small-scale and high-sloping valley. Only the plateaus on both sides function as catchment areas, so flood damage is unlikely to occur. According to the results of the questionnaire, about 30% of the farmers planted a high-yielding variety (Winter 9) (vulnerable to floods), and 50% used chemical fertilizers. This is because this area is less susceptible to flood damage.

On the other hand, a serious water shortage occurs in the downstream part due to drought. This is because the C/A is small and available water is not enough for the whole area. Farmers here employ elevated ridges to store more water from floods and also build small reservoirs to supplement water during drought. However, because of limited storage capacity, the rice yield seems to decrease significantly in case the stored water runs out during the flowering seasons of rice plant.

2) Midstream area: A relatively large paddy area is spread there. Since several upstream valleys merge, the catchment area is increased and the slope of the area suddenly becomes gentle as well. For these reasons, the area is prone to flood damage. Most farmers plant low-yielding, flood-resistant varieties (Benenego) and do not use chemical fertilizers due to fear of flooding.

Additionally, in The upstream part of the area tends to suffer from water shortage since the

discharge from the upstream areas may be reduced during the flowering season, thus the farmers over there grow rice only once a year, while almost all the farmers in the downstream part do two times with no significant difference in 2 season yields.

3) Downstream area: It is an area where rice fields spread wide. The catchment area is extremely large since several medium-scale valleys joins together. The altitude is only between 1-2 m above the surface of Lake Kyoga with mild slope. As a result, it suffers severe flooding lasting for days to weeks. Therefore, the damage caused by high floods. All farmers plant Benenego and do not use chemical fertilizers, thus making the yield low. Drainage canals are artificially dug in most parts of the area, but the drainage is not very good because of the limited slope.

On the other hand, no serious water shortages occur. In preparation for a drought, farmers can have the drainage channel blocked and the paddy field with high ridges to maintain the wetland condition. However, it is conceivable that the yield of rice is low due to these wetland conditions. Safe drainage of upcoming floods and safeguarding against drought may be the biggest motivation for the farmers to well maintain the canals.

5- Summary and Recommendation

The major problem for the limited area of paddy in the upstream areas of the Yachida is water shortage. The middle and lower areas, which include major paddy fields, face problems of both drought and flood leading to the low rice yields.

In Uganda, the above discussed swamps are supposed to be the only areas available for paddy cultivation. In order to increase the rice production in Uganda, the first thing recommended to do is to increase the productivity of the existing paddy in the swamps through improving the water use/drainage conditions.