

Analyzing the Variability of Water Supply for Reliable Rice Production in Pursat River Basin, Cambodia

カンボジア国プルサット川流域におけるコメの安定生産に向けた水供給に関する分析

○SAO Davy¹, KATO Tasuku²

○サオ ダビー, 加藤 亮

I. Introduction

In Cambodia, over 80% of the total population lives in rural areas and most of them are relying in agricultural activities. Rice is the staple food in Cambodia accounting for more than 90% of the cropped area (ADB, 2014). Like other countries, population growth and rising incomes and urbanization are increasing demand for food. Hence, improving agricultural production is needed for food security. However, due to climate variability and poor irrigation management, rice production in Cambodia is prone to water related disasters such as flood and drought. Therefore, this study aims to analyze water supply and irrigation water demand in two irrigation districts, namely Bakan and Kandieng, in Pursat River Basin of Cambodia where most of the people in the area produces rice as their main economic income and to evaluate the impacts of the variability of water resources on rice production.

II. Materials and Methods

For the analysis purpose, the river basin was divided into 4 sub-basins (S1, S2, S3 and S4) and two irrigation districts (Bakan and Kandieng) as shown in Fig. 1. As only one monitoring station, Bak Trakuon, is available, this data is estimated daily specific discharge (mm/d), then the specific discharge was applied all sub-watersheds. For water demand, irrigation water requirement of rice production in both districts were calculated using the equation, $IWR = (ET_o \times K_c + SP + LP - ER)/IE$.

And then, water supply and demand was analyzed using water balance equation I and II for Bakan and Kandieng respectively. Finally, evaluation was made with regard to the impacts of water supply variability on planting and harvested area for both wet and dry season in both districts.

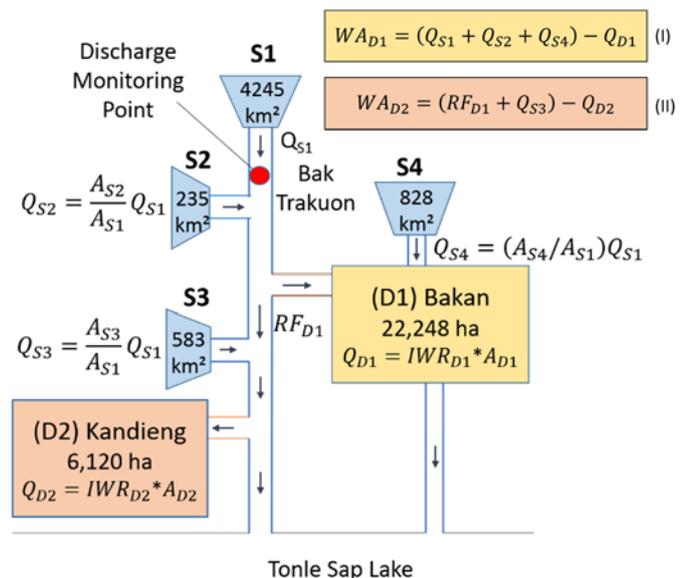


Fig.1 Computation diagram of water demand and supply

¹ 東京農工大学農学府 : Graduate school of Agriculture, Tokyo University of Agriculture and Technology ² 東京農工大学農学研究院 : Institute of Agriculture, Tokyo University of Agriculture and Technology

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III. Results and Discussions

Results show that water deficit occurs every year in both districts within the analysis period (2011-2015). In average, amount of water deficit during wet season rice (Apr - Nov) and dry season rice (Dec - Mar) production is 44.06 and 3.7 million m³ respectively for Bakan and 27.05 and 3.41 million m³ respectively for Kandieng. The change of wet season planting area in both districts is likely caused by water supply availability from June to August, but in Bakan there is a combination of the development and renovation of irrigation schemes in 2014. For dry season planting area, the change is mainly due to water supply availability in late November for Bakan and in December for Kandieng. However in both districts, harvested area of wet season rice is usually lessened by water deficit at the early season and water excess at the late season which damaged up to thousand hectares of rice, whereas it is not a case for dry season rice.

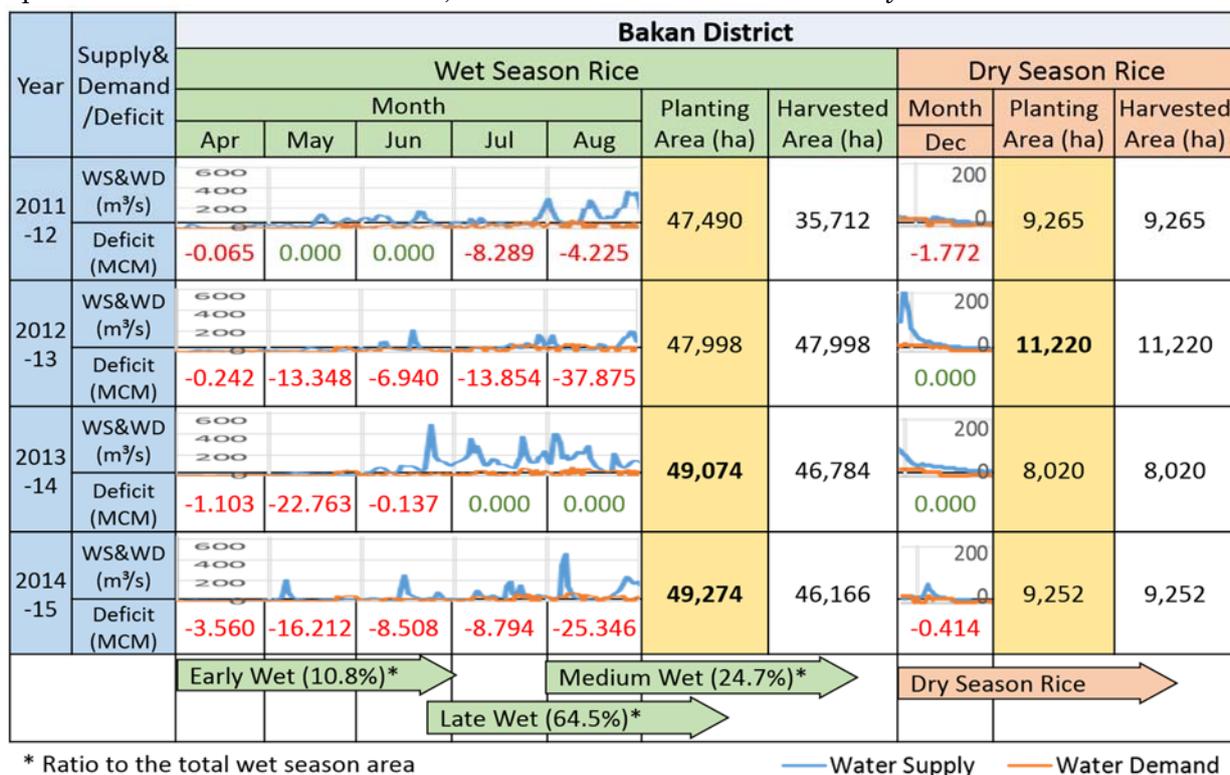


Fig.2 Results of water balance and the change of planting and harvested area in Bakan district.

IV. Conclusion

Water supply and irrigation water demand of rice were analyzed in Bakan and Kandieng irrigation districts of Pursat river basin from 2011 to 2015. Water deficit occurs yearly during the analysis period in both districts, and the change of wet and dry season rice planting area are likely caused by water supply availability at the beginning of each season. For harvested area in both districts, wet season rice is usually damaged by water deficit at the early season and water excess at the late season. Further study is needed to assess future climate variability and evaluate its implications together with dam development for sustainable rice production.

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