

Evaluation of the balance of water supply and demands in the Sangker River basin, Cambodia

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1. Introduction

The Sangker River basin is one of the largest agricultural production areas in the nation. It faces water-resource issues such as the increase of water demands and competitiveness among sectors and between upstream and downstream of the river system. An irrigation project has been implemented in this area, but improved management is required to solve the water-deficit problems. This study aimed to define the available stream water to the irrigation area and identify the extent to which the water supply of the system is in deficit and/or excess.

2. Materials and Methods

To assess the surplus and deficiency of irrigation water (IW), the balance between the available water supply from the river and the IW demand was analyzed at the headwork from 2014 to 2018 in which the available stream water was estimated by using SWAT model due to the absence of available data. The actual IW use was also evaluated by comparing the difference between the actual volume of water and the IW requirement from June 2018 to October 2019, whereas; the actual IW supplies were obtained from field measurement. The IW demands were computed based on crop water requirement of each rice variety corresponding to its cropping calendar with their irrigation areas.

3. Results and Discussion

SWAT model was successfully simulated the streamflow at the gauging station. Consequently, the flow rate at the headwork could be extracted from the database of model results.

1), Analysis of balance between available stream water and irrigation water demand

The balance between the available volume of stream water and the IW demand at the headwork showed that the possibility of supplying water was less than demand with 50–90% of shortage rate of the monthly requirement which mostly occurred during the April–May dry season every year from 2014 to 2017. If the water shortage is less than 10–20% of the monthly requirement, then the production losses are not very serious (Brouwer et al., 1992). However, in 2018 the stream water could meet the IW demand in a given area for the whole year because of heavy rain increased the streamflow volume.

2), Evaluation of actual IW use

The actual IW use during the study, was 52% and 41% have experienced the lack of water in the left and right main canals, respectively and water deficits occurred in September and October in both 2018 and 2019.

3), Cropping pattern

By modifying the area consistent with cropping pattern against the available IW, the result showed the gaps of water balance between available stream water and IW demand reduced from 20–100% between April and May (2014–2017), which was at the beginning of the irrigation season.

4. Conclusion

In this study, the available of streamflow was defined, and the extent of actual available and/or actual water supplies to the water demands was revealed. Thus, these results could be useful for policymakers and field technicians for irrigation planning and water resources management.