

## 千葉県印旛沼の循環灌漑地区における水収支解析 Analysis of water balance in circulated irrigation scheme in Inbanuma, Chiba

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### 1. Introduction

Circulated irrigation scheme for water environment is applied to Inbanuma basin, Chiba. Inbanuma is quite degraded water quality by drainage from watershed. One of source is agriculture. Ministry of Agriculture, Forestry and Fisheries are introduced circulated irrigation scheme from 2012, as 2<sup>nd</sup> term of Inbanuma Irrigation and Drainage Project. Through this project, irrigation water use is expected effectively by renewal of pipe line irrigation. Then, we start investigation on water balance analysis in Shiroyama-Jinbei irrigation district in North Inbanuma basin. Research objectives is to understand water balance and water use in paddy block in circulated irrigation district, Shiroyama Jinbei area.

### 2. Materials and Methods

Study area, Shiroyama-Jinbei district is located in North Inbanuma. Most of area is covered by paddy fields, 1,100ha. Irrigation water was intaked from North Inbanuma lake and drainage channels from circulated irrigation district. Water was temporarily stored in the storage tank adjacent to pump stations. Then, irrigation was conducted by pipeline with gravity energy.

As method for water balance, we divided two system boundaries. One is pump station and the other is irrigation block.

$$P = In + Qa + Qb - D \quad (1)$$

where P is withdrawal by pump, In is intake amount from Inba lake(recorded by Inba office), Qa and Qb is intake from drainage at Shiroyama and Jibeii (observed by ADCP), respectively, and D is evacuation amount to Inba by drainage pump(recorded by Inba office).

$$IRa,b = Qa,b + ET - R \quad (2)$$

Where IRa,b are irrigation amount to Shiroyama(a) or Jinbei(b), Qa,b are drainage from paddy district at Shiroyama(a) or Jinbei(b), ET is evapotranspiration and R is rainfall.

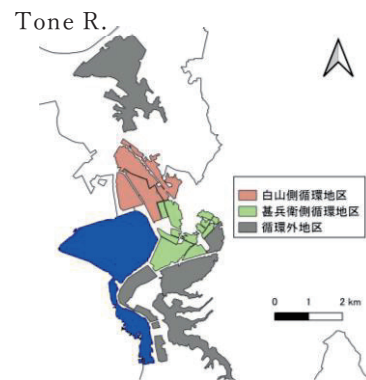


Fig.1 Shiroyama-Jinbei district and Pump station

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$$P = IRa + IRb + IR_{other} \quad (3)$$

Where  $IR_{other}$  is irrigation amount to not circulated command area.

Though  $P$ ,  $IRa$ ,  $IRb$  are not investigated, then, we defined through water balance equation and command area ratio inside of Shiroyama-Jinbei district.

### 3. Results

Water balance estimation is based on the period April 17 to August 22, 2021. Results showed  $9.0 \times 10^6 m^3$  irrigation water was supplied by pump. Also, Shiroyama and Jinbei circulated district received 587mm and 1200mm, respectively.

This means Jinbei district is somehow rough water management were conducted. Actually, we checked small drainage flow in Jinbei district. We found specific drainage water is estimated as same volume to measure main drainage channel observed by ADCP. This suggested that Jinbei area has better condition for paddy field drainage. Then, further, farmers should consider to efficient water use through irrigation period.

### 4. Conclusion

Our investigation was revealed the difference of irrigation condition, and it could be helpful to improve water use efficiency. Actually, in this area, pump energy cost is higher and Irrigation District is suffering from cost increase. And water conservation aspect, drainage reduction could be contributed water environmental conservation. Currently, in this project, water conservation for Inba lake is successful to reduce agricultural drainage. However, drainage water quality could be degraded by circulation use of water. This investigation should be conducted and integration of water use efficiency and water environment conservation is expected.

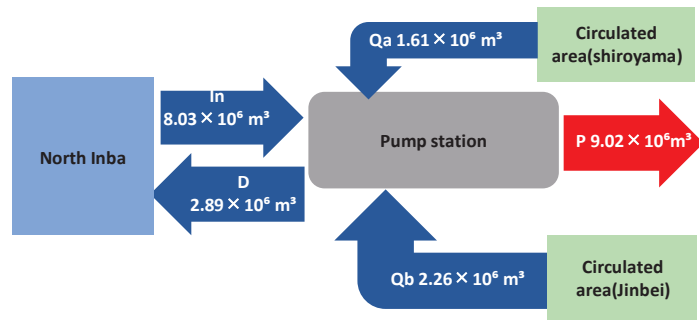


Fig.2 Water balance in pump station

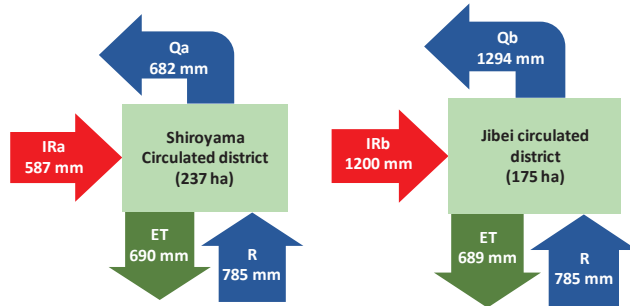


Fig.3 Water balance in irrigation district

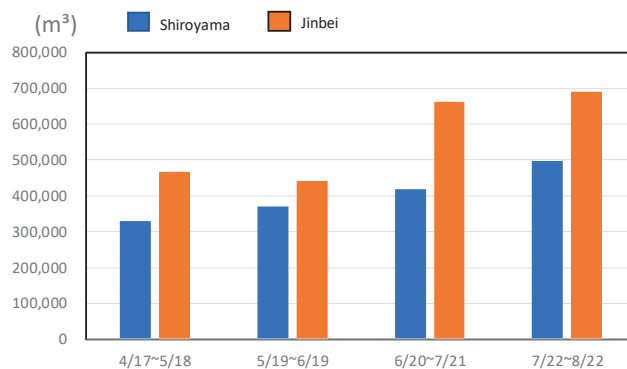


Fig.4 Comparison of drainage amount between Shiroyama and Jinbei block