Water Availability Analysis at Present Condition at Terantang Irrigation Unit in South Kalimantan, Indonesia

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1. Background and Purposes of This Study

Indonesia has high population growth as a country with the fourth largest population in the world. An estimated population of Indonesia in 2035 is about 305.6 million peoples (BPS, 2013). This condition will make the food security to serious. One of the efforts to overcome this problem is extensification of paddy field area. Indonesia have 33.4 million hectares of lowland area with 5.3% utilized as paddy field at present condition. Lowland provides a potential area to increase rice production. South Kalimantan of Indonesia has a lowland area with tidal influence along the Barito River. One of the tidal irrigation unit is Terantang in Barito Kuala regency. Terantang Irrigation unit was built in 1981, whose construction was equipped with 8.9 km primary canal, 47 left tertiary canal and 39 right tertiary canal. Schematic of irrigation network is shown in Figure 1.

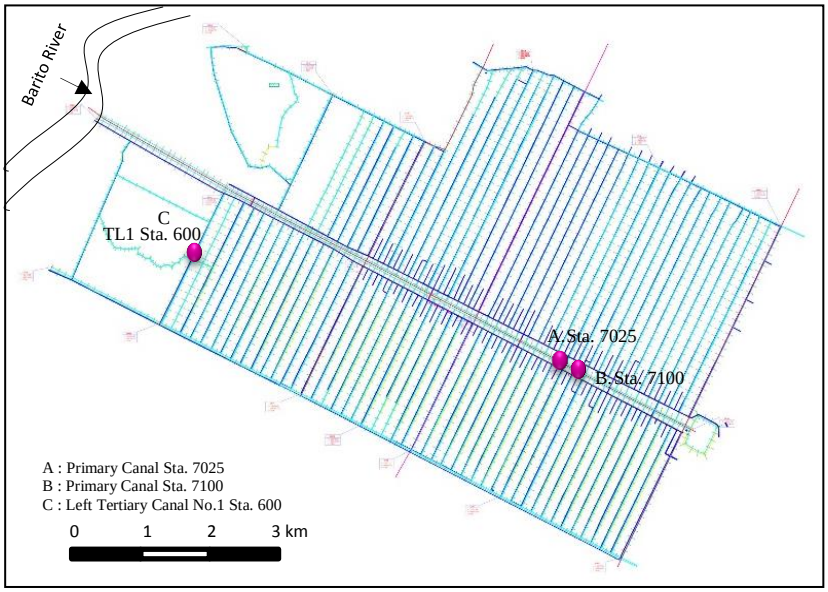

Figure 1. Terantang Irrigation Unit

Tidal irrigation in lowland area utilizes high tide and rainfall for irrigating the paddy field. At present condition in Terantang, some area water cannot reach the paddy field. This condition causes harvest yield of rice production not to be optimal due to the area of cultivation. The objective of this study is to analyze availability of water in the primary and tertiary canal at present condition.

2. Research Methodology

Data on the network canals and cross sections were obtained mainly from Ministry of Public Works Indonesia. Information of water level in wet season were collected by our laboratory and hydraulic laboratory of Lambung Mangkurat University, Indonesia in January 2018. Water management in Terantang tidal irrigation unit is analyzed by using MIKE 11 model. Computation in MIKE 11 used the Open channel flow- Saint Venant equations (1D), that is continuity equation (mass conservation) and momentum equation (fluid momentum conservation) (DHI,2011).

3. Result and Discussion

Barito Kuala Regency is a tropical region with dry season and wet season. Wet season start in October until April, January is the highest rainfall amount about 430 mm. Data in this research focus on January simulation of water level and discharge in the Terantang irrigation network. In January water requirement discharge for local paddy type and superior paddy type are 1.45 m^3/s and 3.25 m^3/s respectively. The water level requirement for rice cultivation is 0.0 – 0.25 m above the ground surface. At Terantang average ground surface is about 5 m from local benchmark.

The result of present condition simulation shows when the ebb tide occurred that shown in Figure 2 discharge at primary canal station 7025 decrease to 0.4 m^3/s. The water level at primary canal sta. 7100 becomes minimum value of 3.9 m as seen in Figure 3. Water level at tertiary canal left side number 1 station 600 has a minimum value of 3.6 m as shown in Figure 4. Based on the model, at present condition in Terantang irrigation network water cannot flow into paddy field because water level in tertiary canal is below the average elevation of paddy field. During the wet season in January 2018 maximum water level at primary canal is 4.8 m, which means below the water level requirement at 5 m although maximum value of discharge 18.2 m^3/s. Water management in tidal irrigation unit not only discharge value but also minimum water level requirement to irrigate the paddy field. Water availability at Terantang Irrigation unit in January insufficient due to water level requirement for paddy field. This result shows that in Terantang Irrigation Unit has to provide the hydraulic structure to manage the water level and discharge effectively in the network system.

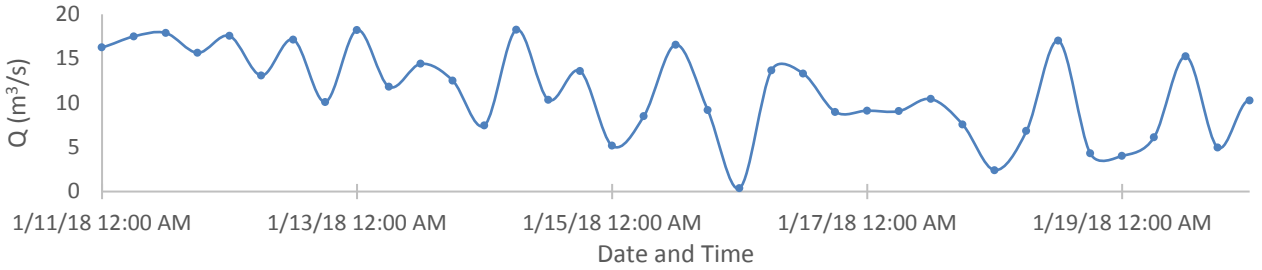

Figure 2 Discharge at Primary Canal Sta. 7025

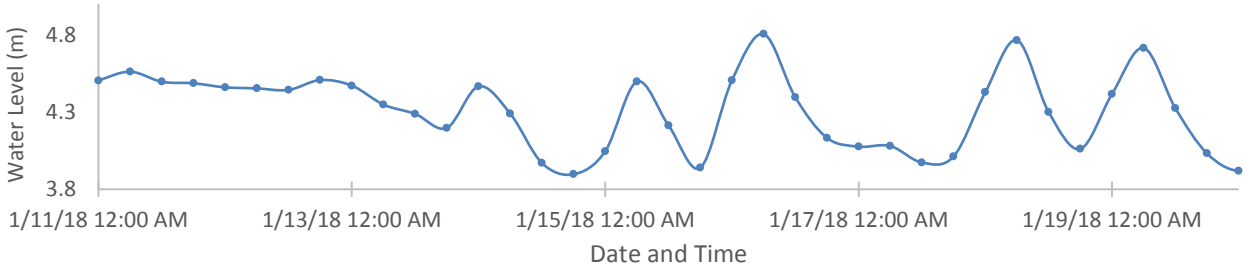

Figure 3. Water Level at Primary Canal Sta.7100

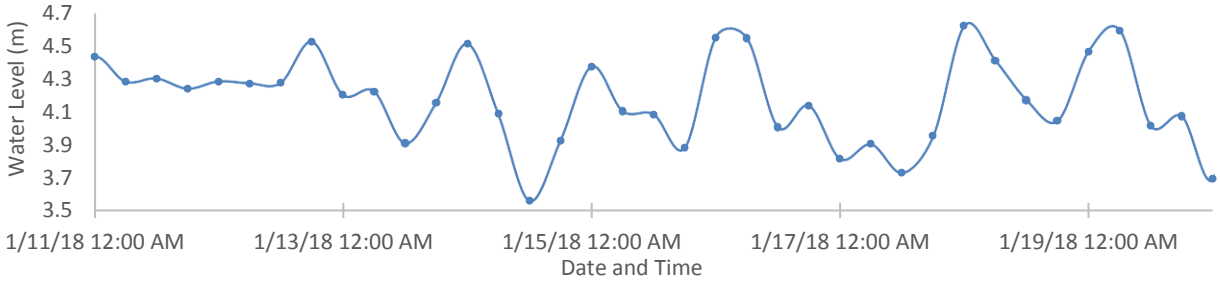

Figure 4. Water Level time series at Tertiary Canal Left Side Number 1 Sta. 600

4. Conclusion

The following conclusions are obtained :

1)Water availability at Terantang Irrigation unit in January is insufficient due to water level requirement for paddy field.

2)Terantang Irrigation Unit has to provide the hydraulic structure to manage the water level and discharge effectively in the network system.

5. References

BPS.2013, Statistic Catalogue Indonesia: Indonesia Population Projection, Indonesia

DHI.2011, A Modelling system for rivers and channels Volume I, Water resources Mike 11, Denmark.