

Propose groundwater abstraction scenarios in the Thorthongdaeng Irrigation Project, Thailand.

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Water and food security are among the most important pillars supporting socio-economic development of Thailand, particularly in response to climate and global change. In many of irrigation areas of Thailand improving water security cannot be done without enhancing the knowledge on one of the most abundant but at the same time poorly understood water sources, namely groundwater. The Thor Tong Daeng Irrigation Project (TTDIP) with the irrigation area of 61,400 hectares is in the Ping Basin of the Upper Central Plain of Thailand where farmers depended on both surface water and groundwater. In recent drought years, water storage in the Bhumibol Dam is inadequate to allocate water for agriculture and caused water deficit in the project. In order to meet the irrigation demand, farmers have to expand groundwater abstraction not only in the shallow aquifer but also in deep aquifers. This is the main season which causes storage depletion of the aquifer system in the area. For understanding the current situation of groundwater system, it is necessary to carry out the field survey to investigate groundwater abstraction and how groundwater abstraction impact on groundwater development in the irrigation area. Furthermore, by using groundwater modelling approaches, this study was conducted to assess the available or potential groundwater abstraction of TTDIP. Based on the criteria that the groundwater depth does not exceed 20 m from the ground surface as classified according to the water years (wet, normal and dry condition), each zone selects 02 control point to represent GWLs of the zone, and 01 control point in the hotspot area to observe the groundwater level simulation. According to the survey on groundwater use and permission of groundwater well data from BGR 7, groundwater consumption for zone 1, zone 2 and zone 3 of TTDIP area in 2020 were estimated about 24.0 MCM, 25.3 MCM and 41.8 MCM, respectively or 91.1 MCM in total. The groundwater flow model indicated that the groundwater level fluctuates from 50 to 70 m-MSL (5-13m from ground surface) except only a hotspot in the zone 3 (19 m depth from ground surface) where distributes high density of household as well as farms using groundwater. In order to maintain groundwater level at 20 m depth from ground surface, the annual available groundwater abstraction of TTDIP were estimated as 206, 173 and 134 MCM in the wet year, normal year and dry year respectively and the average annual value of all water years was 171 MCM. Therefore, farmers can increase the rate of groundwater abstraction almost two times in comparison with the current rate, however it is noted that in some hot spots of the irrigation zone 3 of TTDIP, the abstraction rate is high and induced groundwater level exceeded 20 m drawdown which will need to be monitored closely.

Key words: Irrigation project, groundwater model, groundwater abstraction