Potential of groundwater abstractions in the North Part of Lower Central Plain, Thailand.

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The north part of Lower Central Plain (LCP) constitutes a key area in the Central Plain agriculture and its economy as whole, with high water consumption. The achievement of a sustainable balance between water demand and water supply is a major challenge for management of water resources due to the general trend of increase in water demand from household, agriculture under limited renewable freshwater resources in the region. Because of water shortages in the dry seasons, farmers on the Lower Central Plain of the Chao Phraya River basin, Thailand, are increasingly using groundwater to meet their irrigation needs. To evaluate the possibilities of conjunctive water management in the area, the potential of groundwater abstractions (GWA) in the four upper aquifers of the north part of LCP were investigated. This study considered two concept of groundwater potential evaluation including sustainable GWA and available GWA. The sustainable criterion is proposed to enable the aquifer system to meet a new equilibrium state in time while the available GWA is defined as the amount of extractable groundwater through pumping wells that may cause the drawdown, on average, to drop not more than 20 m depth from ground surface. The simulation of groundwater flow from 2010 to 2021 indicated that groundwater levels inf four aquifers have a decreasing trend toward to North-South (Chai Nat to Ayutthaya province) due to higher density of groundwater wells. In some drought years as 2016, 2020, low groundwater recharge together with high GW abstraction led GWLs drop 4-6 m in comparison with average GWLs in 10 years. From developed regional groundwater model, available GWA estimation suggested that the north part of Lower Central Plain can sustain abstraction rates up to 197% (~1,002 MCM for four top aquifers), 158% (~804 MCM), 119% (604 MCM) of the current extraction rates in 2021 for a 20 m drawdown threshold. Overall, the groundwater potential of four aquifers in the north part of LCP is generally in good condition, however indicating a crisis may occur if uncontrolled use of groundwater of the basin is not properly managed. In order to meet the sustainable GWA of the north part of Lower Central Plain, current GWA in 2021 need to be reduced 8% in case of dry year or increased lightly from 10 to 15% in case of normal and wet years.

Key words: Lower Central Plain, groundwater model, potential groundwater abstraction