

Monitoring of groundwater fluctuation and safe utilization 2017-18

INTRODUCTION

Bangladesh is the fourth largest rice producer in the world. Though declining its arable land since 1971, increasing rice harvesting area (10 million ha in 1995 to 12 million ha in 2010) and increasing yield (2,7 t/ha in 1995 to 4,3 t/ha in 2010) raise the production with the help of expanding irrigation projects over the country. Especially, large abstraction of water by these irrigation projects has been causing a linear to exponential drop in groundwater level in north-western districts as well as major cities like Rajshahi, Dhaka and sub-urban areas where rice is produced extensively. Groundwater table is declining in those parts of the country in an unsustainable manner. There is growing concern in food security issue for satisfying demand for food over coming decades will be increasingly challenging. Even though diverse constraints during 2012-2013 Bangladesh has become self-sufficient in rice production. To keep continue this success of rice production, irrigation becomes a serious concern as the groundwater started receding in different parts of the country. Since groundwater is the main source of irrigation, it is necessary to know the fluctuation range of groundwater for proper assessment of the available groundwater resources.

Objective

1. To determine the fluctuation of groundwater level over time

MATERIAL AND METHODOLOGY

The study was conducted at BRRRI farm, Gazipur. Available water level recorder was used for measuring groundwater fluctuation. Data were recorded weekly. Collected weekly records were calculated to obtain monthly average.

RESULT AND DISCUSSION

Groundwater level in Gazipur

Monthly groundwater level fluctuations at Gazipur during 2017-18 are shown in Fig. 8. During this period maximum lowering of groundwater (41.94 m) was observed in April and minimum (37.08 m) in May. The rainy season started from March and the rising of groundwater observed. The fluctuation was within 4.86 m. The fluctuation was lower than the previous year due to early rainy season started.

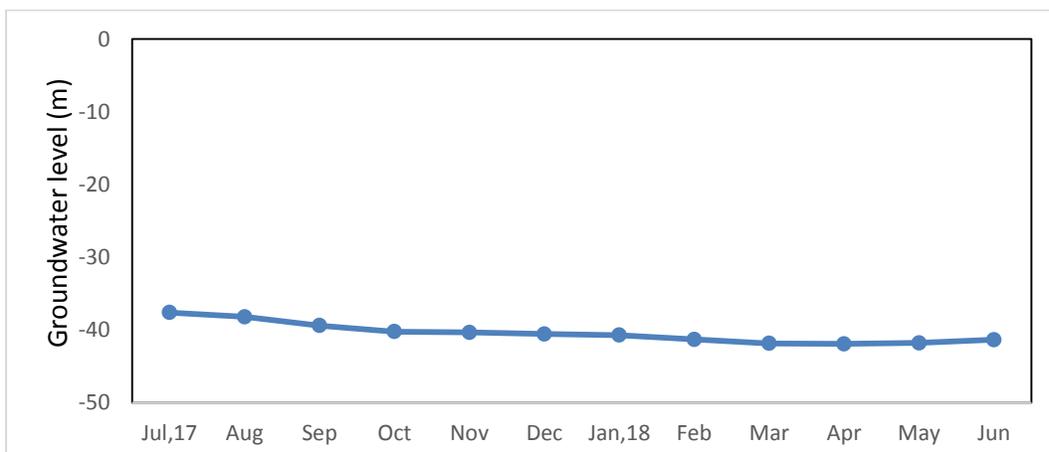


Fig. 8. Fluctuation of groundwater level at BRRRI farm, Gazipur during 2017-18

Declination of groundwater in Gazipur

Figure 9 shows the declination of groundwater level during 1998-2018. The results showed that maximum groundwater level at BRRRI farm Gazipur is declining day by day and it was not fully recharged after the monsoon. In 1998, the maximum groundwater level was about 11.68 m (Fig. 9) from

the ground surface which was 41.94 m in 2018. So, the lowering was about 30.26 m in 21 years. During the initial five years the lowering rate was not so high, and it was only 2.89 m (14.57-11.68 m). But during the last five years (2013- 2018) the lowering was about 9.46 m which is about more than 3 times of the initial declination rate. Recent declination rate (1.89 m/year) is very alarming. Here it is mentionable that the number of industries and factories are increasing day by day. Those factories are withdrawing huge amount of ground water which is causing sharp declination of groundwater level.

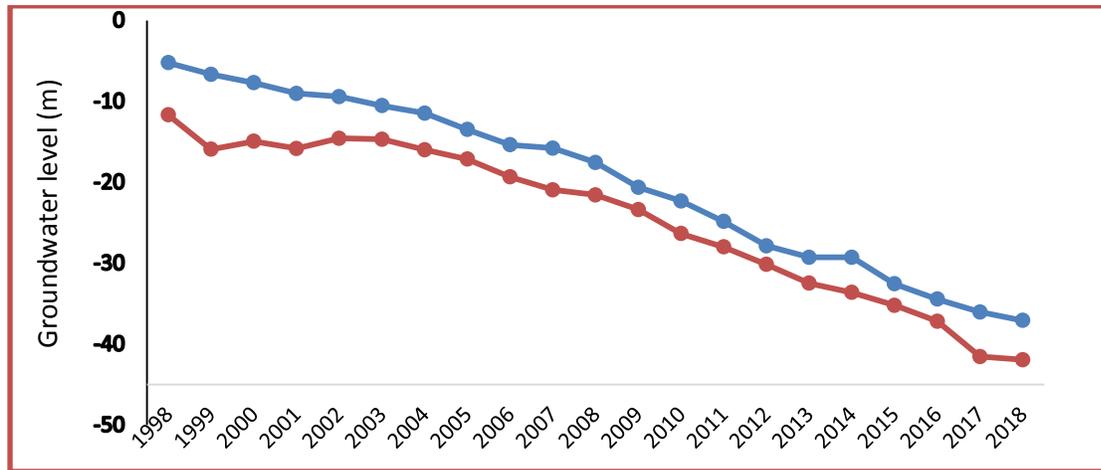


Fig. 9. Declination of groundwater level at BRRRI farm, Gazipur during 1998-2018

Groundwater level in BRRRI regional stations

During 2017-18, five regional stations ground water level were recorded. In Fig. 10(a), it was found that Rajshahi regional station ground water level went down maximum (9.73 m) in the month of May 2018. The level was far below the suction limit (8 m). The figure indicated that ground water was unavailable in that region during dry period for STW irrigation.

Recharge and withdrawal dynamics of groundwater for four regional stations are shown in Fig. 10 (b). Except Rajshahi regional station, no mentionable change in recharge and withdrawal dynamics has been observed. In Rajshahi, the minimum groundwater level shows that recharge is increasing over the last four years.

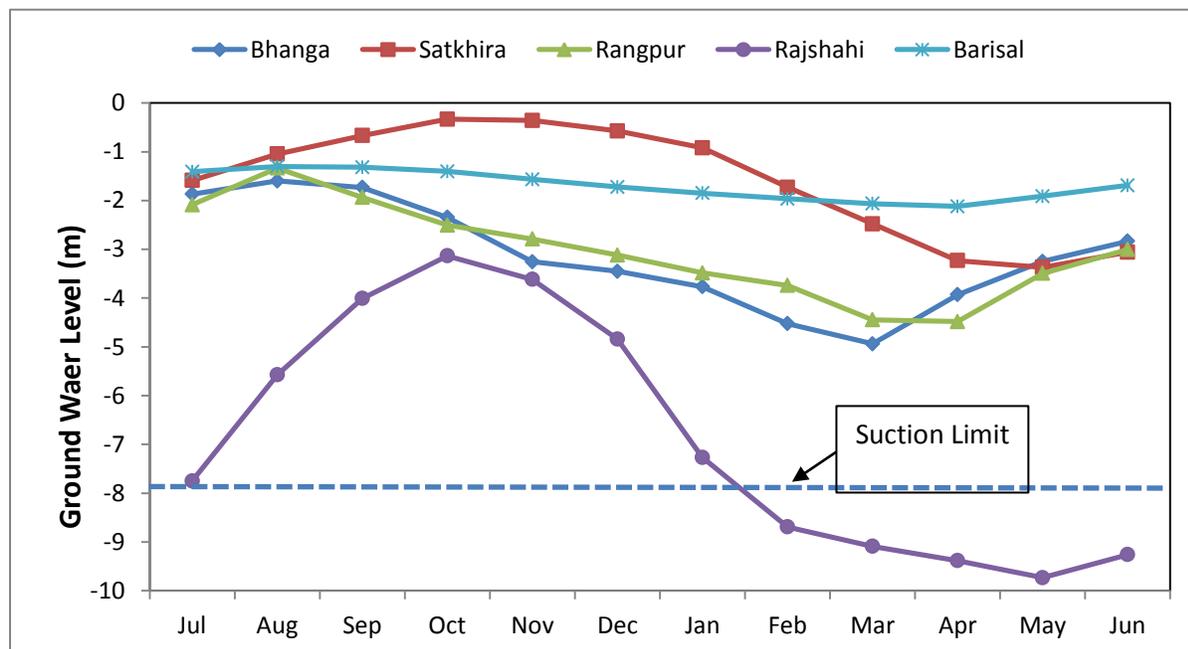


Fig. 10 (a). Groundwater level of different BRRRI regional station during 2017-18.

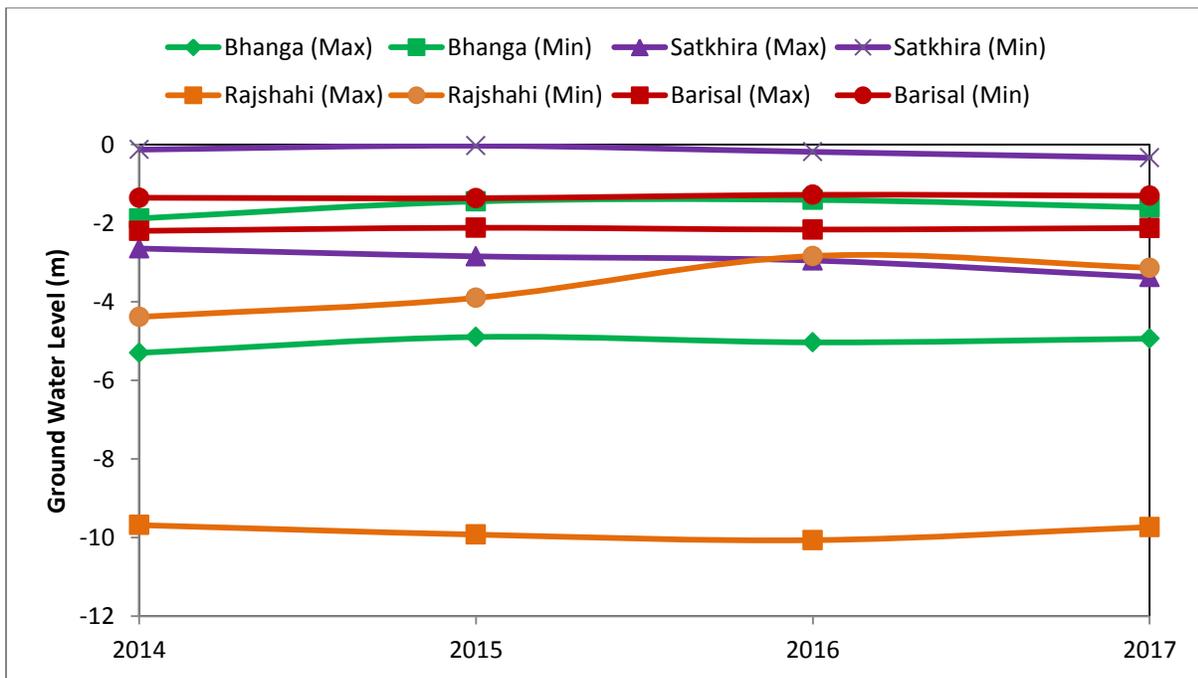


Fig. 10 (b). Maximum and minimum groundwater level of four BRRRI regional station during 2014-2017.

CONCLUSION

Maximum groundwater level at BRRRI farm Gazipur is declining day by day and it was not fully recharged after the monsoon. Declination of groundwater in Gazipur is very alarming.

During dry period, STW irrigation would not be functional in Rajshahi region, because ground water level would go down below suction limit. However, in last four years (2014-2017), the minimum groundwater level increased positively, which indicates more recharge in groundwater storage in that location.

Source: Irrigation and Water Management Division, BRRRI