Ground water depletion trends and the need for remediation in Punjab, India: 2000-2019

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Abstract Changes in the climate have influenced precipitation amounts, timings and intensity rates which directly affects surface and subsurface water resources. The groundwater level has been declining at a rapid rate (0.5 mbgl/year) due to excessive groundwater extraction from increased number of tube wells from 10.73 lac since 2000-01 to 14.76 lac in 2018-19. Erratic rainfall patterns have also affected the level of ground water recharge. The varying trends of rainfall being predominantly in the range of 400 to 700 mm/ year. In the past two decades, highest declines of 1.28mbgl and 1.47mbgl recorded in the year 2001 and 2016 respectively. However, immediate remedial measures are needed to reverse the declining trend of groundwater table. It is recommended that broader framework is needed on Integrated Water Resources Management for the state to align water use patterns with the needs and demands of different users taking the environmental changes into consideration for sustainable groundwater recharge and management.

Keywords: Climate Change, Groundwater remediation, Groundwater depletion, Water Resources Framework, Sustainable development.

Methods

- This study examines long-term changes in rainfall and groundwater level trends in the last two decades from 2000-2019.
- The yearly data on rainfall and groundwater level from 2000-2019 in the state of Punjab was obtained from Water Source Information System, India (India-WRIS).

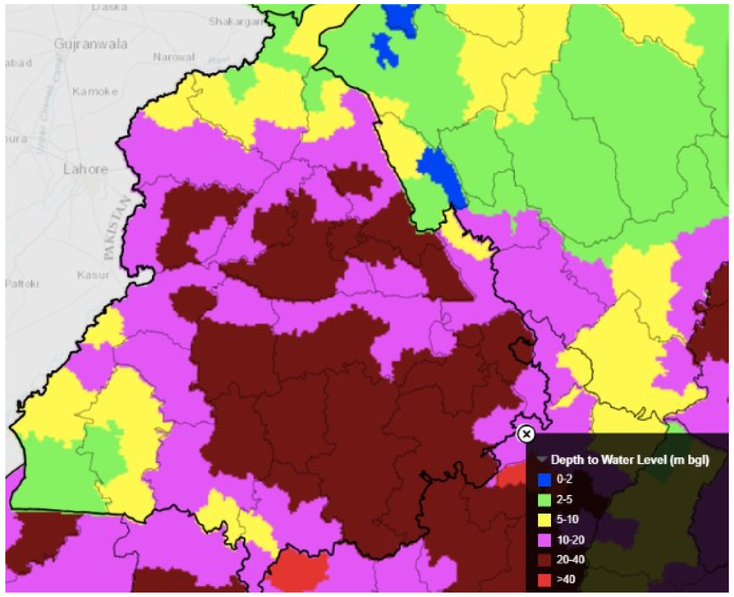
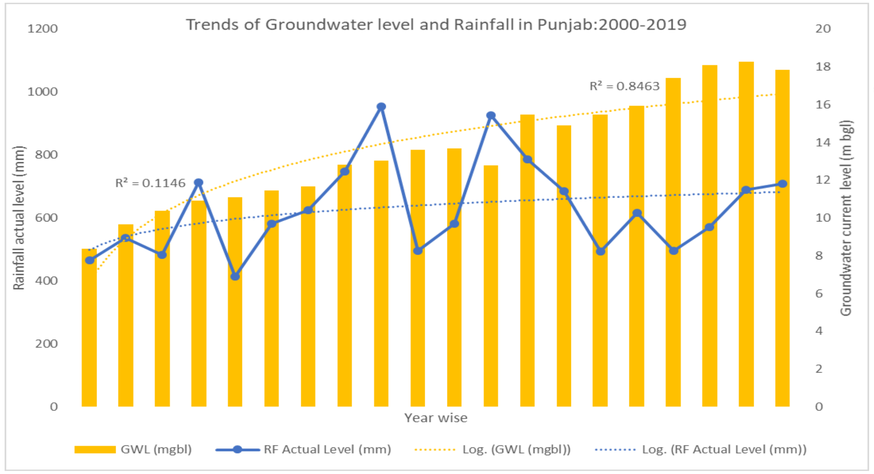


Figure 1: Current levels of Groundwater in cities in the State of Punjab (m bgl)

Results

- The data reveals that water table levels are in the range of 10 to 20 mbgl (Metres below Ground Level) in many parts of the state.
- Arround major cities in Central and Southern belt of state like Amritsar, Jalandhar, Ludhiana, Patiala, Barnala and Sangrur, water levels are 20 to 40 meters deep. (Figure 1)
- The trends of the state show a decline from the level of 8.35 mbgl in the year 2000 to 17.84 mbgl in the year 2019 with a lowest depth of 18.27 mbgl recorded in the year of 2018. (Figure 2).
- In the past two decades, highest declines of 1.28mbgl and 1.47mbgl recorded in the year 2001 and 2016 respectively.

Figure 2: Trends of changes in ground water levels in the state of Punjab: 2000-2019.



Conclusions

- The ground water is being exploited exceeding to limit at annual recharge to meet increasing demand of water for diverse purposes.
- When water tables exhibit long-term declines, this is commonly referred to as “mining the resource.”
- Although, Intense groundwater use has also contributed to improved livelihoods of millions of rural people, but it has also resulted in long-term aquifer depletion and groundwater pollution with heavy metals in the state.
- The current state of development and management of groundwater resources has serious implications for the future groundwater availability in the state.
- Collective efforts to conserve the water through protection of conventional water resources is needed.
- Integrated Water Resources Management Framework is recommended for the state to align water use patterns with the needs and demands of different users.

Bibliography

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