



## **Comparative study of groundwater trends and the factors affecting them in Mississippi River Watershed (USA) and Indo-Gangetic plains (India) from 2003-2015**

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With increase in urbanization and human needs, more pressure is now being exerted on groundwater resources to meet the increasing demands for public and domestic water supply, irrigation, and industrial uses. As a result, the groundwater level is declining in many parts of the world. Thus it is crucial to identify the regions where the groundwater level is declining as a response to anthropogenic impacts. In this study, we examined the trends in groundwater anomalies and investigated the influence of land use and land cover, crop types, and precipitation on the trends of groundwater levels in the entire Mississippi River Watershed, USA and Indo-Gangetic plains, India, respectively. Changes in regional groundwater storage were estimated from Gravity Recovery and Climate Experiment (GRACE) satellite data and monthly well-log data from United State Geological Survey (USGS) from 2003-2015. Depletion in groundwater level was obtained by removing the water storage as soil moisture, surface water, and snow from GRACE-derived terrestrial water storage changes. Similarly, trend analysis was carried out for changes in Land Use and Land Cover, Precipitation and Crops patterns in both study areas. The spatio-temporal analysis was carried out in three scales: (1) for the entire watersheds, (2) for the states constituting the watersheds, and (3) for the watersheds that constitute the study areas, which provided detailed insights about the groundwater trends in both smaller as well as larger spatial scales. The trends obtained in this study for the groundwater regimes of the states, sub-watersheds, and the entire watersheds in tandem with changes in spatial and temporal distribution of land use and land cover, crop types, and precipitation helped to identify trends of groundwater storage changes as a response to human activities in the watershed.