

## **Sustainability of a shallow aquifer in Yamuna-Krishni interstream region, Western Uttar Pradesh, India: a quantitative assessment**

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**Abstract** The Yamuna-Krishni interstream is part of the Central Ganga Plain, which is very fertile and is famous for sugarcane cultivation. Due to increasing demand to meet agriculture requirements the abstraction of groundwater has increased manifold in the last few decades. Although the area hosts potential aquifers, due to uncontrolled pumping the shallow aquifer is adversely affected. For proper management of any basin it is essential that careful water balance studies should be carried out. Keeping this in view, an attempt has been made to evaluate groundwater balance of the area. The Groundwater Resource Estimation Committee 1997 (GEC, 1997) methodology, with a few additions, is applied to compute the groundwater resources. Since subsurface horizontal flows significantly affect the input and output components in an alluvial aquifer, emphases have been given to precisely estimate various inflows and outflows. The river-aquifer interaction and other boundary flows were estimated using Visual MODFLOW Pro 4.1. The results of water balance show that the net recharge into the interstream region is 413.08 million m<sup>3</sup> and discharge is 477.33 million m<sup>3</sup>, leaving a deficit balance of 64.25 million m<sup>3</sup>. Therefore, the status of groundwater development is 116%, which puts it in the over-exploited category. This is also reflected by the continuously falling water level situation in the basin. Thus, the hydrogeological and water balance studies shows that the groundwater development has attained a critical state in the region.

**Key words** hydrogeology; groundwater budget; river-aquifer interaction; Yamuna-Krishni; interstream; India