

Isotope variations in groundwater-seawater interactions in Ganges river delta front aquifers

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Groundwater resource management requires profound understanding of interaction processes in seawater-groundwater along Bay of Bengal. Hence, the study has been initiated in shallow unconfined (0-25m) and deep confined (30-50m, 100-115m and ~ 330m) coastal aquifer by application of stable water isotopic composition ($\delta^{18}\text{O}$) and salinity. Results revealed that groundwater quality is changing rapidly with depth of 0-25m and 30-50m, in comparison to 100-115m and ~ 330m depth. Similarly, $\delta^{18}\text{O}$ of groundwater is more depleted in post-monsoon than that of pre-monsoon season for 0-25m depth, and gets enriched in depth of 30-50m in post-monsoon season. Range of isotopic signature and mixing model indicate local meteoric recharge or upstream freshwater flow influences the groundwater quality at 0-25m depth in post-monsoon season and salt water ingress is dominated within the depth of 30-50m in post-monsoon than pre-monsoon season. No significant change in isotopic composition of groundwater was observed in 110-115m, and ~330m depth which might be a source of paleo-recharge. Change in salinity and isotopic composition of groundwater is aggravated by the drawdown of water level up to the depth of 0-25m and 30-50m in pre-monsoon season, which again rose up in post-monsoon season. Therefore, better understanding of the dynamic system can provide an insight for sustainable management of coastal water resources under the influence of local hydrogeological variables and anthropogenic activities.

Keywords: Isotopic composition, Mixing model, Groundwater