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An Insight Into the Effective Distribution of Lineaments Over Sheared Terrains to Hydraulically Characterize the Shear Zones in Hard Rock Aquifer System

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Abstract : Identifying the water resource in hard crystalline rock terrain has been a huge challenge over the decades as it is considered a poor groundwater province area. Over the years, usage of satellite imagery for the delineation of groundwater potential zone in sheared hard rock terrain has been occasionally successful. In numerous circumstances, it has been observed that groundwater potential zone delineated by satellite imagery study has failed to yield satisfactory result on its own. The present study discusses the fact that zones having a high concentration of lineaments oblique to the general trend of shear fabric could be good groundwater potential zones within a shear zone in crystalline fractured rock aquifer system. Due to this fact, the density of lineaments and the number of intersecting lineaments increases over that particular region, making it a suitable locale for good groundwater recharge, which is mostly composed of Precambrian metamorphic rocks i.e., quartzite, granite gneisses, porphyroclastic granite-gneiss, quartzo-feldspathic-granite-gneiss, mylonitic granites, quartz-biotite-granite gneiss and some phyllites of Purulia district of West Bengal, NE India. This study aims to construct an attempt to demonstrate the relationship of the high amount of lineament accumulation and their intersection with high groundwater fluctuation zones, i.e., good groundwater potential zones. On the basis of that, an effort has been made to characterize the shear zones with respect to their groundwater potentiality. Satellite imagery data (IRS-P6 LISS IV standard FCC image) analysis reveals the bifurcating nature of North Purulia shear zone (NPSZ) and South Purulia shear zone (SPSZ) over the study area. Careful analysis of lineament rose diagrams, lineament density map, lineament intersection density map, and frequency diagrams for water table depths with an emphasis on high water table fluctuations exhibit the fact that different structural features existing over North and South Purulia shear zones can affect the nature of hydraulic potential of that region.

Keywords : crystalline hard rock terrain, groundwater recharge, hydrogeology, lineaments, shear zone, water table fluctuation
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