Applied Water Science (2019) 9:64
https://doi.org/10.1007/s13201-019-0941-9

ORIGINAL ARTICLE

Hydrogeomorphological mapping using geospatial techniques for assessing the groundwater potential of Rambiara river basin, western Himalayas

Rayees Ahmad Shah[1] · Suhail Ahmad Lone[2]

Received: 6 September 2018 / Accepted: 20 March 2019 / Published online: 30 March 2019

Abstract
Integration of geospatial techniques (remote sensing and geographical information system) for the identification of groundwater potential has become an important tool in evaluating, monitoring and conserving groundwater resources. Effective utilization of groundwater resources has become important due to changing climatic scenario. Hence, estimating the zones of potential groundwater recharge is extremely important for the protection and management of water quality of groundwater systems. In this study, Rambiara river basin, southern-eastern part of Kashmir valley, was examined to assess its groundwater resource potential. Geospatial techniques were used to assimilate five causative factors: lithology/geology, land use and land cover, lineaments, drainage, and slope. The factor weight contributing to the groundwater recharge was acquired using satellite image data, lithological/geological maps, and a land use/land cover database followed by field validations. Based on the results obtained, it was observed that the premier recharge potential zones are located down the slope of the river basin due to the dominance of alluvium and agricultural land. Hard rock lithology located towards upstream areas of the basin allows less water to infiltrate.

Keywords Geospatial · Landsat · Groundwater · Digital elevation model

Introduction

Groundwater is an important natural resource of fresh water for potable water supply in both urban and rural environment (Fashae et al. 2014; Lone et al. 2016). It plays a substantial role in human life, as well as that of some aquatic and terrestrial ecosystems. Presently groundwater contributes about 34% of total annual water supply in most parts of the India (Magesh et al. 2011). The snow and glacier melt waters sustain the surface water flow in Kashmir Himalayas (Lone et al. 2017). Climate change, change in form of precipitation and a decreasing trend in the snowfall and river flow (Lone et al. 2016), is leading to water shortage, which has laid more emphasis on groundwater resources. Continuous availability and easy accessibility with excellent natural quality of groundwater make it more important source of water supply for domestic usage around the world (Todd and Mays 2005). The groundwater makes up 97% of the liquid freshwater available on the earth's surface, used for drinking and other domestic usage (Foster 1998). However, mismanagement and overexploitation of the groundwater resource have led to water shortages and pollution (Tsakiris 2004; Nag and Ghosh 2013). Consequently, the overexploitation of groundwater particularly in developing countries is becoming a key concern (Todd and Mays 2005; Pinto et al. 2017). It is very important to make economically efficient usage of groundwater, since this resource is limited. Geospatial technologies (remote sensing and GIS) are very significant to constantly evaluate and monitor the groundwater resource (Jasmin and Mallikarjuna 2015; Mallick et al. 2015). Reliably base line information about factors (geology, land use, land cover, drainage, lineaments) controlling and effecting the occurrence and movement of groundwater can be quantified using satellite data and geospatial techniques (Bobba et al. 1992; Meijerink et al. 2000; Magesh et al. 2011). However, because of the non-availability of the

✉ Rayees Ahmad Shah
shahrayees04@gmail.com

[1] Department of Geology, Anna University, Chennai 600 025, India

[2] Department of Earth Sciences, University of Kashmir, Srinagar, Jammu and Kashmir 190 006, India