Arab J Geosci (2015) 8:2687–2698
DOI 10.1007/s12517-014-1406-y

ORIGINAL PAPER

Electrical resistivity tomography for assessment of groundwater salinity in west Delhi, India

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Received: 12 December 2013 / Accepted: 31 March 2014 / Published online: 16 April 2014

Abstract Indiscriminate use of agro-chemicals for intensive agriculture is mainly responsible for deterioration of groundwater quality in west Delhi of India. Geophysical and hydrochemical investigations were carried out to decipher subsurface geologic formation and assess groundwater salinity. Electrical resistivity tomography surveys revealed the presence of potential groundwater zones at 20–30 m below ground level. The groundwater quality was moderate to poor as evidenced from the low resistivity value of the potential aquifer. Only 20.2 % of the study area showed good quality groundwater potentiality, situated at few pockets in eastern, western, and northern parts of the study area. Low resistivity formation at southern part of the study area was due to infiltration of highly polluted drain water along with fertilizer rich surface water to the aquifer. Hydrochemical investigation also confirmed the result. The average electrical conductivity of groundwater was around 5,950 $\mu S\ cm^{-1}$. Longitudinal unit conductance and transverse unit resistance values were calculated and used for delineation of saline groundwater zones. A direct relationship between longitudinal unit conductance and groundwater salinity made it possible to develop empirical equations by which salinity can be predicted from computed longitudinal unit conductance value. It helps for periodic monitoring of the pollution level by spending less labour and money and benefits immensely the policy makers. The article suggests further study and research work that can lead to sustainable exploitation/use and management of groundwater resources in west Delhi.

Keywords Resistivity tomography · Groundwater salinity · Delhi · Hydrochemistry

Introduction

Proper assessment of groundwater quality and quantity is necessary for scientific planning and management of this important natural resource. Groundwater occurs in a wide range of rock types and usually requires little or no treatment. Deterioration of groundwater quality is related to anthropogenic activities like municipal garbage disposal (Parameswari and Mudgal 2013), industrial waste deposits (Arnous and El-Rayes 2013) and use of domestic sewage and indiscriminate spraying of pesticides and fer-