FLUORIDE RICH ROCKS AND ITS IMPACT ON GROUNDWATER QUALITY

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Groundwater pollution due to natural factors has been witnessed in many parts of the world. Arsenic, iron and fluoride are few of the ions which make the groundwater unsuitable for consumption due to natural conditions of a particular region. This study focused on assessing the probable reasons for the presence of higher or lower concentration of fluoride in groundwater of Nalgonda district, Andhra Pradesh, India. Groundwater samples were collected from March 2008 to January 2010 once every two months. Fluoride concentration in the groundwater samples was determined using ion chromatography. Nearly 500 groundwater samples were collected during this study. Groundwater in this region contained fluoride between 0.07 and 8.8 mg/L. Bureau of Indian Standards and World Health Organisation has put forth that the suitable range for fluoride for drinking is 0.6 to 1.5 mg/L. Fluoride concentration of up to 0.6 mg/l is required for human body as it will help to have stronger teeth and bones. But consumption of water with fluoride above 1.5 mg/L results in acute to chronic dental fluorosis and prolonged exposure will lead to skeletal fluorosis which causes weakness and bending of the bones. As per these standards, 20% of the groundwater samples were below 0.6 mg/L and 33% were above the maximum permissible limit of 1.5 mg/L. Earlier studies have shown that the granitic rocks of Nalgonda region possess fluoride content higher than that of world average of granitic rocks. Hence, weathering of these granitic rocks is the cause for the higher concentration of fluoride in groundwater of this area. Apart from these agrochemicals and evapotranspiration also contribute to some extent for high fluoride concentration. As ingestion of high fluoride has a long term effect on human health it is essential to monitor its concentration in groundwater used for drinking periodically and take measures to keep them within the permissible range of 0.6 to 1.5 mg/L. In this area, as the source is natural pertaining to inherent rocks of this region, it is better to adopt artificial recharge such as rainwater harvesting as a groundwater management measure to hold on to the fluoride concentration within the standard limits.

Keywords: fluoride, groundwater, granitic rocks