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Water Quality Mapping of Coastal Aquifers in Central Part of Penisular India Using Geographic Information System

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***Abstract**: The coastal tract of central Kerala, India comprises of Tertiary sediments and the phreatic aquifer here acts as an important source of drinking water. The most important climatic feature in the region is the monsoon, which has great influence on the quality of the groundwater. Water samples were collected during pre-monsoon and post-monsoon seasons from open wells and quality analyses including bacteriological studies were carried out. Groundwater quality maps were prepared based on GIS. The groundwater quality classification maps of the study area reflect the areal extent of each zone accurately and the variations in each parameter. Application of GIS further helped in delineating the potential potable groundwater zones of the area. The study revealed the inferior quality of groundwater in most of the coastal belt and also prevalence of E. coli in drinking water.*

***Keywords:** coastal aquifer, groundwater quality, GIS*

I. Introduction

Groundwater is one of the most important natural resources necessary for humanity. It is vital for the existence of mankind but faces acute shortage. Groundwater is that invisible supply of water that seeps beneath the surface of the ground, collects in natural underground reservoirs known as aquifers, and is the source of water in springs and wells. It provides almost a third of all freshwater on earth. It is threatened, however, by pollution, water mismanagement and exploding populations just as the world's remaining sources of freshwater are endangered. Groundwater resources are dynamic in nature as they grow with the expansion of irrigation activities, industrialization, urbanization etc. As it is the largest available source of fresh water lying beneath the ground it has become crucial not only for targeting of groundwater potential zones, but also monitoring and conserving this important resource. The expenditure and labour incurred in developing surface water is much more compared to groundwater, hence more emphasis is placed on the utilization of groundwater, which can be developed within a short time. Besides targeting groundwater potential zones it is also important to identify suitable sites for artificial recharge usage cycle. When the recharge rate cannot meet the demand for water, the balance is disturbed and hence calls for artificial recharge on a country wise basis (Sameena et. al. 2000). With the world's population explosion, increasing pollution and wide-scale mismanagement of freshwater supplies, a critical water shortage may occur within the next 50 years and hence counter-measures are essential. The slow penetration of pollutants has been called a "chemical time bomb." It threatens humankind. Another danger is that of saltwater intrusion: the displacement of fresh water in coastal aquifers by seawater. The problem is acute in some coastal regions and for small islands. India with its long coastline also faces this problem. Another important aspect is water quality. Improvements in existing strategies and the innovation of new techniques resting on a strong science and technology base will be needed to eliminate the pollution of surface and ground water resources, to improve water quality and to step up the recycling and re-use of water. Science and technology and training have also important roles to play in water resources development in general. Water is one of the most crucial elements in developmental planning. As the country prepares itself to enter the 21st century, efforts to develop, conserve, utilize and manage this important resource have to be guided by national perspectives.

The problems faced by the coastal zone of Kerala, where the present study area falls, are unique among all other states of India m mainly due to its high density of population and peculiar geological setting. The hydrogeological environment along this 560 km long coast with its backwater, lagoons, estuaries and barrier islands is complex in nature. The groundwater development along the coast has been increased many fold during the last four decades to meet the increase in requirements as a result of population growth, industrial development and change in lifestyle.

GIS is an effective tool for the integration of various data and hence has multifarious uses in geological studies. The GIS offers unique opportunities to integrate spatial data from different sources with the natural resources management models (Goodchild, 1993). GIS has been put to effective use in delineating groundwater potential zones in many earlier studies, Saraf and Choudhary,(1998); Sarkar et al., (2001); Khan and Moharana, (2002); Srinivasa et al., (2004). Application of GIS for groundwater resource assessment has also been reported