POTENTIAL FOR GROUNDWATER DEVELOPMENT IN HARD ROCKS A GIS APPROACH

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ABSTRACT

As the dry season approaches, the hand dug wells in Beliatta area, which is located in the south western corner of Hambantota District, gradually get dried up. The local people have to travel several kilometers to the nearest hand pump tube well which is drilled down to the fractured hard rock to satisfy their water requirement. Hence, it is evident that deep groundwater (the groundwater occurs at depth in rock) is the only reliable water source in this area and therefore the development of this resource is necessary to meet the year round water demand of the people in the area.

In this project an attempt was made to identify some of the favourable and unfavourable factors that affect deep groundwater quality and extractable quantity and then to demarcate the potential areas for future deep groundwater development for the drinking purpose of rural community. GIS and remote sensing techniques were used as the principal tool for data processing.

Using GIS application software packages, overlay operations were performed on available data to identify the linear effects of fracture density, distance from the fractures, distance from axial trace of folds, lithology and the distance from surface

water body on the yield of deep tube wells. The model prepared by the combination of all the identified effects has the accuracy of about 70%. The maps showing the distribution of electrical conductivity, fluoride, pH, hardness, total iron, calcium and total alkalinity of deep ground water were prepared. The effect of the presence of fracture/fault and fold on water quality and geology on water quality were analyzed manually. A simplified map showing the distribution of quality of deep groundwater in the area was prepared.

Finally, three 2-Dimensional maps, one showing the occurrence of deep groundwater in the area, another showing the distribution of quality of deep groundwater and finally the third map which is the combination of both showing the potential areas for future groundwater development, were prepared.

The results show that deep groundwater development potential in most parts of the area is high or moderate. It was also found that deep groundwater can be used for medium and small scale pipe borne water supply schemes covering around 50-200 households with or without treatment.