

Development of a Method for Water Resources Development Using GIS Technique

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The control and management of water resources, particularly for impaired areas, would require monitoring activities. The modeling alternative requires the description and understanding of several hydrologic phenomena with intrinsic spatial and temporal variation. Mathematical, hydrology-based, distributed parameter simulation models and GIS technology provide a potential synergy that appears to be the key feature for an effective understanding and interpretation of these complicated hydrologic processes. Management of natural resources like water needs a periodical review of the database. Generally, the conventional methods of exploration such as field-based hydrogeological and geophysical resistivity investigations do not always consider contribution from the diverse factors that control the occurrence and movement of groundwater. Majority of the South Indian terrain has been covered for water resources potential zone modeling adopted for this study. Dominant portion of this terrain is occupied by hard rock formations. The area chosen for the study is south India, lying between latitudes 8°–20°N and longitudes 73°–82°E. The study area falls in parts of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Maharashtra and Goastates and Pondicherry Union Territory of India. Water resources potential map of Peninsular India has been generated by integrating the multiple thematic maps by following the guidelines adopted for the GIS modeling. Thematic layers used for the GIS modeling are: (1) Geology, (2) Geomorphology, (3) Land cover, (4) Lineament, (5) Paleochannel, (6) Slope, (7) Maximum available soil moisture, (8) Major river density, (9) Precipitation and (10) Evapotranspiration. To generate a more realistic water resources potential map of the hard rock terrain, the relevant layers were integrated in Arc GIS 8.1 as ESRIGRID layers. The criteria for GIS analysis have been defined on the basis of water resources potential and appropriate weight has been assigned to layer according to the relative contributions. The water resources potential map prepared through this model was verified with the actual field data to ascertain the validity of the model. Since the GIS model was developed with the knowledge based logical conditions and reasoning, it can be applied to any similar terrain with appropriate changes to the model.

Keywords: GIS Model; Water Resources Development; Hard-rock terrain