C35 A MATHEMATICAL MODEL STUDY OF FRESH WATER LENS TYPE AQUIFER

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An analysis of "A Mathematical Model Study of Fresh Water Lens Type Aquifer" is developed. The Mathematical model is formulated, based on the Ghyben - Herzberg principle and continuity equation. The Ghyben - Herzberg principle helps in the study of conditions causing salt water intrusion in fresh water areas. This phenomenon occurs in sandy islands, or in peninsulas surrounded by, or in close contact with the sea. A Finite Difference Digital Computer model is developed to carry out a sensitivity analysis of a fresh water lens type aquifer in the Nothern part of Sri Lanka, where the Ghyben - Herzberg principle holds true. Results are shown for the Chunnakam source area in the Northern region. The aquifer material is a miocene limestone of reef facies containing sections with good hydraulic conductivity leading to the highly developed karstic system solution channels.

Values of hydraulic properties used in the model are: Transmissivity 475 to 2000 m*2/day and Porosity 0.12. Study area coincide with the area of heavy draw off for agricultural and domestic purposes. Digital computer model developed for the analysis is based on the assumptions that there is a sharp interface between fresh and salt waters and the fresh water lens floats on the sea moving up and down with its own internal dynamics unaffected. Model is calibrated against the past field records from 1979 - 1982. Calibration is based on the comparison of computed free water table elevations with measured free water table elevations of 20 observation wells. Sensitivity analysis is also carried out in the selected area. Numerical models require reliable data record of substantial length, which is not available in the selected area, Though the data base is extensive, its conformance to reliability standards of numerical

modelling is questionable.' Therefore one cannot entirely depend on this calibration and it cannot be used as a perfect managing tool for predictive purposes.

References

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