SIMULATION OF SALT WATER INTRUSION INTO THE COASTAL AQUIFERS OF KADALUNDI RIVER BASIN IN MALAPPURAM DISTRICT USING VISUAL MODFLOW

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ABSTRACT

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ABSTRACT

The study, simulation of salt water intrusion into the coastal aquifers of Kadalundi river basin in Malappuram district using Visual MODFLOW was to simulate the saline water intrusion in the coastal aquifers using Visual MODLOW and to predict the extent of saline water advancement in coastal regions of Kadalundi river basin. Coastal stretch of Tanur, Tirurangadi and Parappanangadi blocks of the Kadalundi river basin was selected as the study area which comprises of about 130 km^2 drainage area. The area lies in between $11^0$04'5" to $11^0$04'60" N latitude and $75^0$50'18" to $75^0$57'7" E longitude. In this study, Visual MODFLOW 2.8.1 integrated with MT3D software developed by Waterloo Hydrogeological Inc. was used for ground water modelling and contaminant transport modelling. The base map of the study area was imported into the model in BMP format and divided into 40 columns and 40 rows (1600 cells). Water level and water quality data of observation wells maintained by Central Ground Water Department in the study area was used as input to the model. Secondary data on hydrogeological parameters and aquifers properties were also used as the input parameters for the model.

Visual MODFLOW is regarded as an effective tool for groundwater resource modelling and contaminant transport modelling. The role of contaminant transport models in the field of ground water quality and pollutants transport in subsurface studies was fully affirmed. It was also observed that there was a chance of saline water intrusion in the coastal stretch of Tanur, Tirurangadi and Parappanangadi blocks of Kadalundi river basin. It was also predicted from the model study, there are chances of saline water intrusion to a lateral distance of 0.5 km to 1.9 km from the coast which extends 3.2 to 4.5 km along the coast from the northern boundary of Kadalundi river basin. Coconut retting, lime shelling and sand mining activities in Kadalundi river basin was a potential source of pollution and contaminant transport. Development of small industries, construction of buildings and agriculture activities in the coastal

stretch of river basin necessitated increased rate of pumping of ground water. This increased pumping of ground water lead to the entry of salt water into the fresh water aquifer formations. Global warming and sea level rise are also threatening problems in the current climate change scenario which is also a reason for saline water intrusion in to the coastal fresh water aquifers. Groundwater replenishment through natural and artificial recharge and sustainable development activities in the area are the main countermeasures to overcome this problem.