

CONTAMINANT TRANSPORT PREDICTION LINKING GIS AND MODFLOW.

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ABSTRACT

Groundwater is one of the most important resources in the world. In fact, the quantity of Groundwater is deteriorating in many parts of the world due to environmental externalities. Environmental externalities are inherent in economic activities. Groundwater pollution, a time – space problem, spread so slowly that the contamination of aquifer might remain undetected for long time. Therefore, preference should be given for the prediction and prevention, as well as to regular monitoring of groundwater quality for its proper control.

Geographical Information System (GIS) provides an integrated platform to manage, analyze and display incongruent data and can greatly facilitate modeling efforts and in the linking of GIS and groundwater modeling software MODFLOW would be beneficial in analyzing and predicting surface/subsurface interactions. The discharge of salt laden tannery effluent warranted the protection of the Groundwater of Palar, the only available resource to the social settings of Vellore District, Tamilnadu. GIS map based 3D contaminant transport modeling to ascertain, regulate, protect the ground water of the upper Palar basin, have been developed and applied to predict TDS concentration levels i.e. ground water contamination of upper Palar basin due to discharge of tannery effluents for six scenarios.

A three-layer groundwater model covering an area of 216 km² is used to construct the groundwater flow model in the weathered part of unconfined aquifer system. The simulations were carried out using Visual MODFLOW. The model prediction study results bare that even if the effluent discharge is permitted to the prescribed norms of 2100 mg/l, there will not be any palpable reduction in the TDS contamination level even in the year 2020. The effect of recharge of ground water up to 1.5 times is also not significant in the reduction of TDS contamination level in the aquifer of the study area. Further, the model results show that the effect of TDS contamination level will be radically reduced and will comply with the prescribed drinking water standards if the effluent discharge into the aquifer is restrained.