

# SPATIAL MODELLING OF GROUNDWATER QUALITY

*by*

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## *CERTIFICATE*

This is to certify that the thesis entitled "**SPATIAL MODELLING OF GROUND WATER QUALITY**" being submitted by K.R. SANTHANA KRISHNAN for the award of degree of **DOCTOR OF PHILOSOPHY**, is a record of original bonafide research work carried out by him. He has worked under my guidance and supervision and has fulfilled the requirements for the submission of his thesis. The results presented in this thesis have not been submitted in part or full to any other University or Institute for award of any degree/diploma.

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*In a very real sense, the story of water  
is the story of mankind...*

(Foth, 1984)

## ABSTRACT

Increasing dependence on near surface ground water has focussed the attention of prospective water users and legislators towards the quantitative and qualitative aspects of this fragile commodity. Assistance from several analytical, numerical and statistical models are being sought in recent times, to enable sound decision-making for sustainable water management practices.

The present study focusses on spatial modelling of near surface ground water quality an area in which concentrated research efforts are yet to be made. Modelling of water quality structure, which is formed of complex inter-relationship between constituent parameters, are not readily amenable to mathematical handling. In view of this, use of artificial neural networks (ANN), which do not demand formal mathematical relationship, has been attempted in the study. Necessary inputs from data on wells, topographical information and satellite imageries have been made use of.

The specific objectives of the study are : (1) to assess regional aspects of the water table ; (2) to develop model(s) to link water quality parameters; (3) to link water quality parameters to measurable inputs; (4) to explore use of inputs from remotely sensed data to study movement of salts and water; (5) to explore use of inputs from remotely sensed data as independent inputs in the model structure; and (6) to work out the methodology in a real-life case.

The models developed are compared with geo-statistical methods (kriging), which are extensively used in geo-scientific context. The emerging

results show that ANN promises to be a superior tool in modelling quality in the space domain. The entire study is done on a real life situation so as to make the methodology translatable to physical field conditions and to facilitate decision making in pollution management measures.

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