

Water pollution and environmental considerations

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Under this theme, 21 papers are included in the proceedings. These papers relate to water quality determination (surface water and ground water), water quality modelling, water treatment and papers related to environmental management. Almost all areas falling under the theme have been adequately covered by the 21 papers. A brief of main features of the papers is given below:-

1. The paper by Wong, Stenekes et. al. entitled "Risk Management to Improve Raw Water Quality" describes a case study of Johor Baru system giving an account of how the principles of the risk management can be applied for a successful ongoing raw-water improvement programme. The paper focuses on the risk assessment and management of raw water quality as a means of achieving better quality potable water as it may be more simple and cost effective than enhancing water treatment process. The importance of managing pollution upstream of the treatment plant is noted as a cost effective way of ensuring higher quality treated drinking water.
2. The paper by Shangle, Pateria & Pachauri entitled "Status of Pollution on Yamuna Waters and Remedial Measures for its Prevention" gives a critical analysis of the water quality data at Delhi, Mathura, Agra and Itawah and concludes that the water is unfit for human consumption. It has been decided that remedial measures be taken for making the Yamuna water suitable by increasing the flow or in the river and by preventing the incoming of highly polluted wastes/effluents. The conclusions drawn are true for any river, however, the availability of additional water for dilution has to be assessed.
3. The paper by Panu, Edmonds and Long entitled "Water Quality Control Measures in Urban Water Distribution Systems" provides the important aspects of chemical removal or reduction of lead and copper pollution. In the paper number of chemicals have been used and statistical methods and bootstrap techniques have been conducted. The data of Thunderbay, Canada have been utilised. A good attempt has been made to test chemicals to reduce lead and copper levels.
4. The paper by Dikshit, Babu and Dutta entitled "A Finite Element Programme for Groundwater Pollutant Transport and Simulation" utilises the finite element method

for groundwater pollutant transport. Two case studies have been described in the paper showing that the model is working satisfactorily and giving accurate results.

5. The paper by Dixit, Anand and Alam entitled "A Water Quality Simulation Model for River Systems" describes an interactive river water quality model for simulating the fate and transport of pollutants through river system. The model helps a user in predicting the variation of BOD, DO, Nitrogen, Phosphorous and Toxic substances through river systems. The model has been validated using theoretical data.
6. The paper by Jayasuriya & Siriwardhena entitled "Application of the Agricultural Non-Point Source Pollution Model (AGNPS) to Model Surface Water Quality when Data is Scarce" explains the process in the estimation of the model parameters in ungauged situation and demonstrates the capability of the model by applying it to water supply catchment in Australia. The study has revealed that the uncalibrated agricultural non-point source pollution (AGNPS) model with estimated parameters can be used for catchment management provided some key parameters are estimated accurately.
7. The paper by Inayathulla et. al. entitled "Modelling Pollutant Movement in the Unsaturated Aquifer" provides an analytical solution describing the transport of solute in the unsaturated porous media with an asymptotic distance - independent dispersion relationship. The solution has a dispersion function, which is linear near the origin (i.e. for short travel distance), and approaches an asymptotic value as the travel distance becomes infinite. The results were compared with experimental results and with finite difference numerical solutions. The comparison indicates that the theory is reliable and can be used with confidence.
8. The paper by Jacks, Bhattacharya et. al. entitled "Arsenic in Groundwater and Redox Conditions in the Bengal Delta - Possible in Situ Remediation" provides some possible in-situ remediation for the problem of arsenic in ground water in Bengal Delta based on the literature review and field observations. There seems to be possibility that remediation might be achieved by artificial infiltration, lifting the redox level above the presently dominating the ferric/ferrous or by lifting the strongly reduced redox conditions at depth by promoting sulphate reduction.
9. The paper by Bari & Anwar entitled "Effects of Irrigated Agriculture on Groundwater Quality in North-West Bangladesh" makes an attempt to assess the spatial and temporal variability of groundwater quality based on 40 observation (9 parameters) well data in Bangladesh. It is concluded that spatial variability appears to be more pronounced than temporal variability and based on limited time series data, it can be concluded that quality of ground water in North-West region of Bangladesh is presently adequate.
10. The paper by Sadashivaiah, Inayathulla et. al. entitled "Studies on Impact of Excessive Use of Fertilisers in Agricultural Areas - A Case Study" attempts to assess the mobility and accumulation of leached nitrates in laboratory and field. The obvious conclusion that soil physical properties play a significant role in conserving and sup-

plementing the applied nutrients to the plant growth alongwith other influencing factors has been drawn.

11. The paper by Babu & Gopalakrishna entitled "Treatability Study on Seafood Processing Industrial Wastewater Using Anaerobic Contact Filter and Rotating Biological Contractor" does not directly fall under the theme. The paper suggests a compact and economical effluent treatment system based on anaerobic contact filter and a rotating biological contractor for treating sea food processing industry. Number of alternative and efficient designs have been suggested.
12. The paper by Gurnadha Rao and Dhar entitled "Groundwater Transport Modelling for Assessment of Groundwater Contamination - A Case Study" illustrates the applicability of mass transport models for assessing the contaminant migration by describing three case studies of India. The authors advocate the need for periodical updating and recalibrating the model.
13. The paper by Jha, Ojha and Bhatia entitled "Development of Reoxygenation and Reaeration Rate Coefficients for a Small Tributary of River Hindon, U.P." proposes a method to estimate the reaeration rate and deoxygenation rate coefficients for a typical river of India. A predictive equation has been developed which assists in obtaining reaeration equation using a least square algorithm that minimises error estimates and improves correlation between observed and computed coefficients.
14. The paper by Shahul Hameed, Sony et. al. entitled "Groundwater Quality Deterioration Due to Clay Mining Industry in a Midland Region of Kerala" deals with the impact of mine effluent discharges on the ground water quality in open dug wells in Kerala. An attempt has also been made to use the stable isotope technique to identify the source of sulphate in the area.
15. The paper by Mutagaywa entitled "Rivers Network and Pollution Abatment (DRNPA) Project - A Case Study" gives an outline of a project to be taken up in Dar-Es-Salam for sustainability and pollution abatement. Some of the highlighted activities are planting of soil conserving trees, creating environmental awareness etc.
16. The paper by K. Shivanna, U.K. Sinha et. al. entitled "Isotope Hydrological Investigation in Arsenic Infested Areas of West Bengal" provides the details of environmental isotope techniques which have been applied to study the origin, source, residence time and dynamics of arsenic contaminated and uncontaminated aquifers in some selected districts of West Bengal which are faced with arsenic problem.
17. The paper by Sharma, Krishna et. al. entitled "Water Quality Modelling Studies of River Ganga in the Kanpur Stretch : Estimation of Non-point Sources" gives the use of QUAL-2E model for a stretch of 31 km. in river Ganga. It has been concluded that undefined non-point sources of pollution contribute a large quality of pollutants which affects the results of the model. Such non-point sources need to be controlled for achieving desired water quality levels.

18. The paper by I.A. Olomoda entitled "Environmental Impact of Water Hyacinth Proliferation and Control Along the River Niger" gives the details of Niger basin (Africa) and focuses on environmental problems of the basin especially water hyacinth and its impacts. The control strategies and bio-gas production by use of the hyacinth has been described.
19. The paper by Deshmukh and Pawar entitled "Impact of Irrigation on the Environmental Geochemistry of Groundwater from Sangamner Area, Ahmednagar District, Maharashtra" provides a case study of Maharashtra, India to evaluate the impact of irrigation and excessive use of fertilizers on the ground water quality. The paper concludes the evident remedy i.e. educating the farmers to adopt better farm management practices.
20. The paper by Monorma Thokchom and Asha Gupta entitled "Impact of Cultural Stresses on Lentic Water Bodies of Imphal, Manipur" provides a case study of selected waterbodies of an Indian State (Manipur). The study focuses on phytosociological characters, water and sediment analysis and concludes that economic activities are stressing the condition of water bodies which is evident conclusion.
21. The paper by Goel entitled "Hydrological Hazards, Need of Large Dams and Environment Management in Indian Himalayan Region - An Critical Overview" provides a comprehensive review of environmental management in Indian Himalayan region and advocates the urgent need of taking up large hydro projects. The author, realising the importance of large water projects, stresses the need for creating awareness and peoples' participation in this critical area.

The major recommendations which can be drawn from the above mentioned papers are the following :-

- Number of water quality models are available, however, there is an immediate need to apply these models to actual situation for maintaining or improving the water quality.
- There is a need to develop simple, easy to use, domestic type of water treatment facilities or kits.