

*Conservation*

*and*

*Restoration of Lakes*

*Proceedings of the National Seminar on “**Conservation and Restoration of Lakes (CAROL-08)**” organized by **National Institute of Hydrology, Roorkee** in collaboration with **National Environmental Engineering Research Institute, Nagpur** during October 16-17, 2008 at Nagpur.*

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# Conservation and Restoration of Lakes

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## Volume - II

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**National Institute of Hydrology**

**Roorkee-247 667 (Uttarakhand)**

**October, 2008**

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*Printed by:*

**Anubhav Printers and Packers**

15, Civil Lines, New Haridwar Road, Roorkee-247 667 (Uttarakhand)  
Tel: 01332-271237, 09719004321 e.mail: alok.app@rediffmail.com

## FOREWORD

Lakes/reservoirs hold about 90% of the world's fresh surface water. Lakes need special attention as they are quite often the catalysts in the development of the region by supplying water for variety of uses such as drinking, industrial, irrigation, aqua-culture, recreation and tourism etc. However, many lakes are reported to have undergone quantitative and qualitative degradation in the last few decades. Behaviour of the lake ecosystem depends to a large extent on its hydrological regime, understanding the hydrological regime of the lakes is pre-requisite to develop strategies for their conservation, management and rejuvenation.

The present National Seminar is a follow up action of the 68<sup>th</sup> meeting of the Governing Body of NIH held on 18<sup>th</sup> October, 2007 at New Delhi, where a need was felt to organize a National Seminar on Lakes. In pursuance of above, National Institute of Hydrology, Roorkee is organizing a two days National Seminar on "**Conservation and Restoration of Lakes (CAROL-2008)**" in collaboration with National Environmental Engineering Research Institute, Nagpur during October 16-17, 2008.

In this regard, total 86 papers received from different authors under relevant themes were critically reviewed by the various experts. Proceedings of the seminar have been brought out in two volumes after suitable editing by the editorial board. I thank all the authors who have contributed their valuable R&D works for this National Seminar.

Dr. V.K. Choubey, Sc. F & Head (EHD), Shri Omkar Singh, Sc. E1 and Dr. M.K. Sharma, Sc. B, were key officials from NIH, Roorkee to organize this joint activity along with NEERI, Nagpur. Dr. T. Chakrabarti, Director, Er. Prakash S. Kelkar, Dy. Director & Head (GEM) and Dr. Paras Ranjan Pujari, Scientist 'C', National Environmental Engineering Research Institute, Nagpur have taken keen interest and provided all logistic supports to jointly organize the present National Seminar at NEERI, Nagpur.

I hope that the research findings of the various authors would definitely be useful for conservation, restoration and management of the lakes which ultimately would be beneficial to the society. The proceedings would provide an excellent updated reference material in the area of lake water management.

*Raj Deva Singh*

Date: 29.9.2008  
Roorkee

(R. D. SINGH)  
Director

National Institute of Hydrology, Roorkee

## ACKNOWLEDGEMENTS

First of all, the editors are highly grateful to all the respective authors for providing their research contributions for the National Seminar. We place on record our sincere gratitude to all the institutions/ organizations where those valuable research works have been carried out, without which the present publication was impossible.

We are highly thankful to the following reviewers for critically reviewing the papers and providing their valuable comments for improvement of the quality of present publication:

1. Shri Prakash S. Kelkar, Dy. Director & Head (GEM), NEERI, Nagpur
2. Dr. Bishm Kumar, Scientist F & Head (HID), NIH, Roorkee
3. Dr. V. P. Verma, Prof. & DSW, Indira Gandhi Krishi Vishwavidyala, Raipur
4. Shri C. P. Kumar, Scientist E1, NIH, Roorkee
5. Dr. Sudhir Kumar, Scientist E1, NIH, Roorkee
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12. Dr. Ashish Pandey, Assistant Professor, WRDM, IIT, Roorkee
13. Shri S. D. Khobragade, Scientist C, NIH, Roorkee
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16. Dr. Rama Devi Mehta, Scientist C, NIH, Roorkee
17. Dr. Manohar Arora, Scientist B, NIH, Roorkee
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The editors are thankful to the administration and the finance section of the institute for their necessary support.

In the last but not the least, the editors are also thankful to Smt. Meenakshi Mishra, P.A.; Smt. Babita Sharma, R.A.; Smt. Beena Prasad, R.A.; Shri Rakesh Goyal, Tech.I and Shri Dayanand, Tech-II, NIH, Roorkee for rendering their assistance during editing stage.

Date: 29.9. 2008  
**NIH, Roorkee**

**Editors**

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**Dr. V.K. Choubey** did M.Sc in Applied Geology from Jabalpur University, D.I.I.T in Remote Sensing from I.I.T Bombay and Ph.D in Remote Sensing Applications in Water Quality from Jawahar Lal Nehru University, New Delhi. Presently he is working as Scientist-F and Head Environmental Hydrology Division of National Institute of Hydrology, Roorkee. He also holds the charge of Co-ordinator Hard Rock Regional Centre Belgaum. He has research & development experience of more than 28 years in different areas of Hydrology and Water Resources. He has published more than 75 research papers in the reputed International & National Journals, International & National Seminar/Symposia, Workshops, etc. He was awarded National Hydrology Award in 1993 in recognition of his significant and outstanding contributions in the area of Operational Hydrology. He received certificate of appreciation in recognition of his services in the field of Remote Sensing of Earth Resources by Rotary Club of Indore. He guided more than 5 M. Tech. dissertations. During his service at NIH, he has worked in consultancy projects for solving the real life hydrological problems. He visited USA and was associated with the project on Remote Sensing Applications in water-logging/salinity and water quality of CSIRO, Australia.



**Shri R.D. Singh** did B.E. in Civil Engineering and M.E in Hydraulics and Irrigation Engineering (Civil Engineering) from University of Roorkee. He obtained M.Sc. (Hydrology) degree from University College Galway, Ireland. Presently he is working as Director, National Institute of Hydrology, Roorkee. He also holds the charge of Nodal Officer, Hydrology Project-II which is a World Bank Funded Project currently under progress at NIH for Peninsular region of India. He has research & development experience of more than 26 years in different areas of Hydrology and Water Resources. He has published more than 150 research papers in the reputed International & National Journals, International & National Seminar/Symposia, Workshops, etc. He was awarded C.B.I.P. Medal for one of his papers presented in the CBIP R & D session. He received certificate of merit for one of his research papers contributed to the Journal of Institution of Engineers. He guided more than twelve M.E., M. Tech. and M. Phil dissertations. During his service at NIH, he has worked on more than eighteen consultancy projects for solving the real life hydrological problems. He has also worked for five International Collaborative projects. For three of the International Projects, he has been the Coordinator and Nodal Officer. He visited number of countries which include USA, UK, Ireland, Denmark, Sweden, Holland, France, Germany etc. Recently he visited Paris, France as a leader of Delegation and attended Inter Governmental Council (IGC) meeting of UNESCO.





**Shri Omkar Singh** did B. Tech. in Agricultural Engineering from College of Technology, G.B. Pant University of Agriculture and Technology, Pantnagar (Uttarakhand), and M.Tech. in Soil & Water Conservation Engineering from Indian Institute of Technology, Kharagpur (W.B.). Presently he is working as Scientist-E1, National Institute of Hydrology, Roorkee (Uttarakhand). He has research experience of more than 16 years in the area of Environmental Hydrology dealing with soil/water quality and hydro-meteorological aspects of the lakes and catchments. He has published more than 50 research papers in various Journals, Conferences and Edited books. He has prepared more than 30 technical reports in the Institute. He has been associated in organizing various training courses/brain storming sessions in the area of Watershed Management, Lake Hydrology and Water Quality. He visited University of Idaho, Moscow (USA) during 1996-97 for four months under UNDP assisted project. He is an associate member of the Institution of Engineers (India), Kolkata and member of the Indian Association of Hydrologists, Roorkee. He is also a member in the paper review committee of the Institution of Engineers (India) for Agricultural Engineering Division.



**Dr. M.K. Sharma** did Ph. D. in Hydrology with Specialisation in Environmental Hydrology from Indian Institute of Technology, Roorkee. He obtained M. Sc. (Physics) degree from Garhwal University, Shrinagar (Garhwal). Presently he is working as Scientist-B, Environmental Hydrology Division, National Institute of Hydrology, Roorkee. He also holds the charge of Water Quality Laboratory. He has research & development experience of more than 20 years in different areas of Hydrology and Water Resources. His main areas of research interest are ground water quality, surface water quality and pollutant remediation techniques and advanced water quality instrumentation. He has published about 50 research papers in the reputed International & National Journals, International & National Seminar/Symposia, Workshops etc. He has prepared more than 50 technical reports in the Institute. He has been associated in organizing various training courses in the area of Lake Hydrology and Water Quality. He is guiding three Ph.D. Scholars. He is the reviewer of many National Journals.