

Progress Reports of C. P. Kumar

**Brief Resume of Tasks by C. P. Kumar, Scientist,
National Institute of Hydrology, Roorkee – 247667 (Uttarakhand), India**

Year 2008-2009

[A] TECHNICAL STUDIES

1. Associated with the ongoing study “*Quantification of Impact of Rainwater Harvesting on Groundwater Availability in Aravalli Hills*”.
2. Collection and review of literature related to rainwater harvesting.
3. Attended the 9th and 10th meetings of “*R & D Advisory Committee on Ground Water Estimation*” on 9.5.2008 and 17.9.2008 respectively.
4. Review of eight technical papers received for publication in International Journal of Water, International Journal of Water Resources and Environmental Management, International Journal of Ecological Economics and Statistics, Current Science, and Hydrology Journal of Indian Association of Hydrologists.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P. and Sanjay Mittal (2008), "*Soil Moisture Retention Characteristics and Hydraulic Conductivity for Different Areas in India in Selected States*", Journal of Soil and Water Conservation, Soil Conservation Society of India, Volume 7, No. 2, June 2008, pp. 41-45.
2. Mittal, Sanjay and C. P. Kumar (2008), “*Determination of Soil Hydraulic Properties in Lokapavani Catchment using SOILPROP Software*”, Proceedings of 13th National Symposium on Hydrology with Focal Theme on ‘Inflow Forecasting during Extremes’, 28-29 August 2008, New Delhi.

[C] SPONSORED PROJECT

Associated with the project “*Hydrological and Hydrogeological Investigations to Assess Causes of Seepage from the Reservoir of Jaswant Sagar Dam in Jodhpur, Rajasthan*” referred by Water Resources Department, Government of Rajasthan.

- Computed the weighted average infiltration rates in Jaswant Sagar reservoir for the period 1973 to 2005 and prepared a brief write-up on “*Seepage Losses from Jaswant Sagar Reservoir*”.
- Computed the runoff volumes for Jaswant Sagar reservoir (through Excel spreadsheet) for rainfall events of 1987 to 1994.

[D] HYDROLOGY PROJECT (Phase – II)

1. Decision Support System (Planning)

Carried out following works as a member of “NIH Working Group on DSS (Planning)”.

- Visited Raipur during 27-30 April, 2008 to review and discuss the status of data availability and processing for Chhattisgarh state and attended the first meeting of IDEG (Inter-agency DSS Expert Group of Chhattisgarh state).
- Prepared a general report on Seonath Sub-basin (Chhattisgarh).
- Attended the “*Inception Workshop for DSS (Planning) Consultancy*” during 9-10 February, 2009 at New Delhi.
- Visited Gandhinagar on 11.2.2009 for discussion regarding preparatory activities for DSS (Planning) for Gujarat.

2. Purpose Driven Study (PDS)

Coastal Groundwater Dynamics and Management in the Saurashtra Region, Gujarat (Dr. Anupma Sharma & Mr. C. P. Kumar)

- Visited Gandhinagar on 11.2.2009 for discussion regarding the above PDS proposal.
- Field visit to the identified study area in Porbandar on 12.2.2009 for the above PDS proposal.

[E] IMPACT OF CLIMATE CHANGE

1. Collection and review of literature related to impact of climate change on groundwater resources.
2. Prepared a technical note related to effect of climate change on groundwater, as required by Standing Committee on Agriculture.

[F] TRANSFER OF TECHNOLOGY

Delivered a lecture on “*Groundwater Modelling Software – Limitations and Capabilities*” in short term course on ‘Planning, Analysis and Modeling of Groundwater in Hard Rock Areas’ conducted by Department of Hydrology, Indian Institute of Technology, Roorkee during 1-6 September, 2008.

[G] SYMPOSIUM ATTENDED

1. 13th National Symposium on Hydrology with focal theme on “*Inflow Forecasting during Extremes*” during 28-29 August, 2008 at New Delhi.
2. International Conference on “*Water, Environment, Energy and Society*” (WEES-2009) during 12-16 January, 2009 at New Delhi.

[H] WEES-2009

1. Reviewed 5 technical papers for the Conference.
2. Associated with organization of the Conference as Convener of the sub-committee on *Press and Publicity* (including Photography & Videography).
3. Acted as Rapporteur for the Technical Session on Ground Water (2).

[I] COMPUTER CENTRE

Carried out various activities as Head, Computer Centre (till 1.9.2008).

- Overall management of Computer Centre.
- Supporting Officer-in-Charge, Computer Centre regarding procurement of computers, peripherals, software etc; maintenance contracts; LAN, e-mail and internet services; maintaining NIH website; condemnation & auction process, and other related matters.
- Processing for re-designing of NIH website.

[J] MISCELLANEOUS

1. Acting as a member of “*Library Advisory Committee*”.
2. Contributing as an Associate Editor for “*International Journal of Water Resources and Environmental Management*” (IJWREM).
3. Attended the short course on “*Introduction to ArcGIS 9*” conducted by ESRI, India during 14-18 April, 2008 at New Delhi.
4. Conducted a debate competition as a part of ‘Hindi Week’ celebrations.
5. Presented the two episodes on “*Concepts of Groundwater Modelling*” for recording by Educational Multimedia Research Centre (EMMRC), Indian Institute of Technology, Roorkee.
6. Organized the “*World Water Day – 2009*” at National Institute of Hydrology, Roorkee.
6. Created the “*Yahoo! Groups - archydro*”, an e-mail discussion group on ‘ArcGIS – Geographical Information System’.
7. Moderated the following electronic discussion groups on Yahoo!:
 - hydforum (Hydrology Forum)
 - hydrologymodel (Hydrological Modelling)
 - gwmodel (Ground Water Modelling)
 - rhydrology (Roorkee Hydrology Group)
8. Downloading a number of useful softwares from the internet and their installation.

Year 2007-2008

[A] TECHNICAL STUDIES

1. Prepared the technical report entitled “*Modelling of a Coastal Aquifer using FEFLOW*”.
2. Review of four technical papers received for publication in Hydrogeology Journal, Journal of Environmental Monitoring and Assessment, International Journal of Water, and Hydrology Journal of Indian Association of Hydrologists.
3. Review of two project proposals received by DST and CSIR for funding.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P. (2006), "*Groundwater Flow and Contaminant Transport Models: An Overview*", Journal of Applied Hydrology, Association of Hydrologists of India, Volume XIX, No. 1 & 2, January & April 2006, pp. 94-110.
2. Kumar, C. P. (2007), "*Hydrology Discussion Groups on the Net*", Water Digest, Vol. II, Issue 1, March-April 2007, pp. 89-94.
3. Mittal, Sanjay and C. P. Kumar (2007), “*Karnataka Rajya Me Krishna Raja Sagar Command Ke Antargat Lokapavani Jalgrahan Kshetra Kee Mrada Jalaansh Sanchayak Vishishtaayen*”, Proceedings of National Conference on “*Bharatvarsh Ke Aviral Vikas Me Jal Sansadhno Kee Bhoomika*”, 26-27 September 2007, Roorkee, pp. 212-221.
4. Kumar, C. P., A. G. Chachadi, B. K. Purandara, Sudhir Kumar and Raju Juyal (2007), "*Modelling of Seawater Intrusion in Coastal Area of North Goa*", Water Digest, Vol. II, Issue 3, September-October 2007, pp. 80-83.

[C] SPONSORED PROJECT

Associated with the project “*Hydrological and Hydrogeological Investigations to Assess Causes of Seepage from the Reservoir of Jaswant Sagar Dam in Jodhpur, Rajasthan*” referred by Water Resources Department, Government of Rajasthan.

- Field visit to Jaswant Sagar Dam and Jodhpur during 26-27 September, 2007; discussion with various officials; and collection of required data.
- Computed the water loss rates (mm/day) for three gauge ranges for the years 1979 and 1980.
- Derived saturated hydraulic conductivity from soil texture at 9 locations.
- Prepared a note on measured soil characteristics for southern part of the water spread area of Jaswant Sagar dam (for Interim Report).
- Computed UTM coordinates corresponding to latitude-longitude of 16 infiltration test locations in Jaswant Sagar reservoir.

[D] HYDROLOGY PROJECT (Phase – II)

1. Decision Support System (Planning)

Carried out following works as a member of “NIH Working Group on DSS (Planning)”.

- Prepared a note on “Blueprint of Proposed DSS for Water Resources Planning”.
- Attended the second workshop on “*Preparedness Review for DSS (Planning) for Integrated Water Resources Development & Management*” held during 21-23 August, 2007 at National Institute of Hydrology, Roorkee.

2. Hydrologic Design Aids (Ground Water)

Attended the workshop for Hydrologic Design Aid (Ground Water) on 30.8.2007 at CSMRS, New Delhi.

[E] IMPACT OF CLIMATE CHANGE

Prepared a note on “*Impact of Climate Change on Groundwater*”, as a part of the document on ‘Climate Change and its Impact on Indian Water Resources’.

[F] TRANSFER OF TECHNOLOGY

Delivered a lecture on “*Groundwater Resources Estimation*” in the training course on ‘Sustainable Ground Water Management in Arid and Semi-Arid Region’ organized by National Institute of Hydrology, Roorkee during 23 April – 4 May, 2007.

[G] SYMPOSIUM ATTENDED

Attended “*National Ground Water Congress – 2007*” organized by Central Ground Water Board on 11.9.2007 at New Delhi.

[H] COMPUTER CENTRE

Carried out various activities as Head, Computer Centre.

- Overall management of Computer Centre.
- Supporting Officer-in-Charge, Computer Centre regarding procurement of computers, peripherals, software etc; maintenance contracts; LAN, e-mail and internet services; maintaining NIH website; condemnation & auction process, and other related matters.
- Processing for AMC of Personal Computers and Networking System.
- Updating the website of National Institute of Hydrology, Roorkee.
- Processing for re-designing of NIH website.
- Associated with auction process of VAX-11/780 system and its peripherals.

[I] MISCELLANEOUS

1. Associated with organization of training course on “*Sustainable Ground Water Management in Arid and Semi-Arid Region*” during 23 April – 4 May, 2007 at National Institute of Hydrology, Roorkee.
2. Presented the following episodes for recording by Educational Multimedia Research Centre (EMMRC), Indian Institute of Technology, Roorkee.
 - Seawater Intrusion in Coastal Aquifers
 - Modelling of a Coastal Aquifer using FEFLOW
 - Computer Security (3 episodes)
3. Acting as a member of “*Library Advisory Committee*” nominated vide Office Order No. 6/14/2003-NIH(Admn) dated December 01, 2003.
4. Conducted a debate competition as a part of ‘Hindi Week’ celebrations.
5. Created “*Directory of Groundwater Hydrologists*” in the Yahoo! Group – gwmodel (Ground Water Modelling).
6. Moderated the following electronic discussion groups on Yahoo!:
 - hydforum (Hydrology Forum)
 - hydrogymodel (Hydrological Modelling)
 - gwmodel (Ground Water Modelling)
 - rhydrology (Roorkee Hydrology Group)
7. Editing of the following web pages:
 - Kumar Links to Hydrology Resources
 - Hydrology Links of C. P. Kumar
 - Water Resources and Hydrology Journals
8. Downloading a number of useful softwares from the internet and their installation.

Year 2006-2007

[A] TECHNICAL STUDIES

1. The study “*Modelling of a Coastal Aquifer using FEFLOW*” was completed with the following works.
 - Study of FEFLOW 5.1 help files.
 - Data preparation and model setup.
 - FEFLOW simulation runs.
 - Sensitivity analysis for various parameters.
 - Analysis of simulation results.
 - Initiated write-up for technical report.

2. Regression analysis to find van Genuchten parameters at 18 locations in Lokapavani catchment.
3. Review of a technical paper received for publication in Journal of Spatial Hydrology and review of a project proposal received by DST.

[B] TRANSFER OF TECHNOLOGY

Delivered a lecture on “*Concepts and Modelling of Groundwater System*” in the training course on ‘Applications of Modern Techniques in Practicing Hydrology’ organized by National Institute of Hydrology, Roorkee during 9-13 October, 2006 under Hydrology Project, Phase-II.

[C] SYMPOSIUM ATTENDED

Attended the 12th National Symposium on Hydrology with focal theme on “*Groundwater Governance: Ownership of Groundwater and its Pricing*” organized by Central Ground Water Board and National Institute of Hydrology during 14-15 November, 2006 at New Delhi.

[D] HYDROLOGY PROJECT (Phase – II)

1. Associated with finalization of concept paper on “Hydrologic Design Aids (Ground Water)” by CGWB, NIH and CPCB.
2. Carried out following works as a member of “NIH Working Group on DSS (Planning)”.
 - Studied the draft document on “Request for Proposals for Selection of Consultants” and prepared observations/comments/suggestions.
 - Prepared proposed schedule and cost estimate for international trainings and study tours.
 - Studied and evaluated the Expression of Interest for “Consultancy Services: Development of Decision Support System (Planning) for Integrated Water Resources Development and Management” by Delft Hydraulics.
 - Revised the list of prioritized outputs for DSS module on “Conjunctive Use Planning for Surface Water and Groundwater”.

[E] SPONSORED PROJECT

Associated with the project “Regional Hydro-geological Studies around Kasnau-Matasukh Lignite Mines, Nagaur District (Rajasthan)” referred by Rajasthan State Mines and Minerals Limited.

[F] ENQUIRY OFFICER

Conducted departmental enquiry against Mr. Satendra Prasad, Staff Car Driver (Grade-II), Regional Centre, Sagar with reference to Order No. 5/2/88-NIH(Admn.) dated May 3, 2006 and submitted the report of the Enquiry Officer.

[G] COMPUTER CENTRE

Carried out various activities as Head, Computer Centre.

1. Overall management of Computer Centre.
2. Miscellaneous follow-up actions related to local area network; internet and e-mail services; annual maintenance contract with ERNET India.
3. Guiding Officer-in-Charge, Computer Centre regarding procurement of computers and accessories; annual maintenance contract for personal computers and networking system; and other related matters.
4. Updating the website of National Institute of Hydrology, Roorkee.
5. Processed BSNL broadband internet connectivity for Director and Heads of RCMU & scientific divisions.
6. Upgradation of LAN (local area network).
7. Procurement of Symantec Norton Anti-Virus 2006 software.

[H] MISCELLANEOUS

1. Studied/examined the on-going INCOH project proposal on “*Ground Water Recharge Studies in the Thar Desert Terrain of Rajasthan through Surplus Water*” and correspondence with Principal Investigator to monitor its progress.
2. Associated with organization of 12th National Symposium on Hydrology – editing of technical papers; co-convener of Invitation Committee; procurement of memento etc.
3. Acting as a member of “*Library Advisory Committee*” nominated vide Office Order No. 6/14/2003-NIH(Admn) dated December 01, 2003.
4. Acting as a member of “*IAH Executive Committee*” for the term 2005-2006.
5. Conducted a debate competition as a part of ‘Hindi Week’ celebrations.
6. Created “*Directory of Hydrologists*” in the Yahoo! Group – hydforum (Hydrology Forum).
8. Moderated the following electronic discussion groups on Yahoo!:
 - hydforum (Hydrology Forum)
 - hydrologymodel (Hydrological Modelling)
 - gwmodel (Ground Water Modelling)
 - rhydrology (Roorkee Hydrology Group)

9. Editing of the following web pages:
 - Kumar Links to Hydrology Resources
 - Hydrology Links of C. P. Kumar
 - Water Resources and Hydrology Journals
9. Downloading a number of useful softwares from the internet and their installation.

Year 2005-2006

[A] TECHNICAL STUDIES

1. The following actions were taken for the study “*Modelling of a Coastal Aquifer using FEFLOW*”.
 - Measurement of monthly groundwater level data (till August 2005).
 - Bi-monthly groundwater sampling and measurement of salinity in the laboratory (till June 2005).
 - Initial processing of collected and measured data.
 - Preparation of monthly groundwater level contour maps.
 - Resistivity profiling along 4 sections and vertical electrical soundings at 7 locations.
 - Studied the “FEFLOW 5.1 User’s Manual”.
2. Prepared powerpoint presentations on “*Modelling of Seawater Intrusion*” and “*Introduction to Groundwater Modelling*”.
3. Regression analysis to find an empirical relationship between saturated hydraulic conductivity and soil texture (percentages of clay, silt and sand) for 171 sets of soil data.
4. Review of a number of technical papers received for publication in Hydrology Journal of IAH (Paper Ref. 429, 441); Current Science Journal (Ref. No. N395, N55); and Journal of Spatial Hydrology.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P. (2005), “*Hydrology Resources on the Web*”, Seminar on Modern Trends in Groundwater Exploration, Conservation and Protection, 25-27 February 2005, Hyderabad, Abstracts Volume, pp. 42-46.
2. Purandara, B. K., N. Varadarajan and C. P. Kumar (2005), “*Modelling of Soil Moisture Movement and Solute Transport in an Agriculture Field – A Case Study*”, Journal of the Indian Society of Soil Science, Volume 53, Number 1, March 2005, pp. 41-45.

[C] BOOK CHAPTERS

1. Kumar, C. P. (2006), "*Groundwater Flow Models: An Overview*", In. Groundwater Modelling and Management (Eds. N. C. Ghosh & K. D. Sharma), Capital Publishing Company, New Delhi, pp. 153-178.
2. Kumar, C. P. (2006), "*Management of Groundwater in Salt Water Ingress Coastal Aquifers*", In. Groundwater Modelling and Management (Eds. N. C. Ghosh & K. D. Sharma), Capital Publishing Company, New Delhi, pp. 540-560.

[D] TRANSFER OF TECHNOLOGY

1. Delivered a seminar on "*Modelling of Seawater Intrusion*" on 17.6.2005 for scientists and scientific staff of National Institute of Hydrology, Roorkee.
2. Delivered a lecture on "*Introduction to Groundwater Modelling*" in the workshop on 'Groundwater Modelling with Special Emphasis on Management Issues' organized by National Institute of Hydrology, Roorkee during August 17-18, 2005.

[E] COMMUNICATION AND TELEPHONES (till September 2005)

1. Routine follow-up actions related to Communication division.
2. Editing of the telephone directory.
3. Modifications in the Tender Application Form for proposed "Digital EPABX System".
4. Procurement of push-button telephone instruments.
5. Proposal to 'Condemnation Committee' to declare the CDOT EPABX system obsolete.

[F] COMPUTER CENTRE (from November 2005)

Taken over the charge of Head, Computer Centre vide Office Order No. 6/14/2004-NIH dated Nov. 23, 2005.

1. Miscellaneous follow-up actions related to Computer Centre.
2. Updating the website of National Institute of Hydrology, Roorkee.
3. Correspondence with ERNET India and DCM Data Systems regarding internet connectivity and LAN problems.
4. Submission and processing of the following proposals:
 - Annual Maintenance Contract of personal computers and networking system
 - Permission of Ministry of Water Resources for procurement of messaging system
 - Payment of quarterly subscription charges for VSAT connectivity
 - Payment of quarterly charges for AMC of personal computers and networking system
 - Procurement of 3 laser printers
 - Procurement of 2 laptop computers

[G] MISCELLANEOUS

1. Examined the project proposal on “*Tsunami Impact (with special reference to water quality) in the Kanyakumari Coastal Aquifer, Tamil Nadu, India*” sent by CSIR to National Institute of Hydrology for review.
2. Nominated as a member of the committee constituted for identifying the scope of the content and the services related to Ministry of Water Resources for National Portal Project (to provide single window access to the information and online services being provided by various government departments).
3. Acting as a member of “*Library Advisory Committee*” nominated vide Office Order No. 6/14/2003-NIH(Admn) dated December 01, 2003.
4. Acting as a member of “*IAH Executive Committee*” for the term 2005-2006.
5. Moderated the following electronic discussion groups on Yahoo!:
 - hydforum (Hydrology Forum)
 - hydrologymodel (Hydrological Modelling)
 - gwmodel (Ground Water Modelling)
 - rhydrology (Roorkee Hydrology Group)
6. Editing of the following web pages:
 - (a) Kumar Links to Hydrology Resources
 - (b) Hydrology Links of C. P. Kumar
 - (c) Google Groups in Hydrology
 - (d) Hydrology Resources on the Web
7. Downloading a number of useful softwares from the internet and their installation.

Year 2004-2005

[A] TECHNICAL STUDIES

1. The following actions were taken for the study “*Modelling of a Coastal Aquifer using FEFLOW*”.
 - Field visit to the study area, Goa University and National Institute of Oceanography, Goa.
 - Technical discussions with Dr. A. G. Chachadi, Goa University.
 - Collection of relevant data, literature and maps.
 - Identification of 20 observation wells for monitoring groundwater levels and salinity.
 - Measurement of monthly groundwater level data.
 - Bi-monthly groundwater sampling and measurement of salinity in the laboratory.
 - Measurement of infiltration and hydraulic conductivity at 8 locations.

- Soil sampling at 8 locations and measurement of soil moisture retention characteristics in the laboratory.
 - Initial processing of collected and measured data.
 - Upgradation of FEFLOW software (FMH3) from v4.7 to v5.1.
 - Studied the “FEFLOW Demonstration Exercise”.
2. Prepared the Interim Report on “*Modelling of a Coastal Aquifer using FEFLOW*” (2004-2005).
 3. Review of a number of technical papers received for publication in Hydrology Journal of IAH (Paper Ref. 423, 425, 427, 429, 434).

[B] TECHNICAL PAPERS PUBLISHED

1. Jose, Mathew K., C. P. Kumar and A. K. Bhar (2004), “*Sustainable Use of Groundwater in North-West India: Database Requirements*”, Harvest Day Seminar on “Sustainable Use of Groundwater in North-West India” organized by Centre for Advancement of Sustainable Agriculture (CASA), 13th April 2004, New Delhi.
2. Kumar, C. P. (2004), “*Hydrology Discussion Groups on Internet*”, Special Article, Hydrology Journal, Indian Association of Hydrologists, Roorkee, Volume 27, Number 1-2, March-June 2004, pp. 117-120.
3. Kumar, C. P. (2004), “*Artificial Groundwater Recharge: A Perspective*”, National Conference on Resource Conserving Technologies for Social Upliftment, 7-9 December 2004, New Delhi.
4. Kumar, C. P. (2004), “*Groundwater Assessment Methodology*”, Electronic Proceedings (CD), XXIII Annual Convention of AHI and National Seminar on Water Resources Management & People's Participation, 10-11 December 2004, Baroda.
5. Kumar, C. P. (2004), “*Constraints in the Numerical Modelling of Salt Water Intrusion*”, Journal of Soil and Water Conservation, Soil Conservation Society of India, Volume 3, No. 3 & 4, December 2004, pp. 185-195.
6. Purandara, B. K., N. Varadarajan and C. P. Kumar (2004), “*Application of Chemical Mass Balance to Water Quality Data of Malaprabha River*”, Journal of Spatial Hydrology, Vol. 4, No. 2, Fall 2004.
7. Kumar, C. P. (2005), “*Basic Conceptions for Groundwater Modelling*”, National Conference on Sustainable Management of Water Resources, 28-29 January 2005, Junagadh (Gujarat), India.

[C] THE ENCYCLOPEDIA OF WATER

Article on “*Groundwater Balance*” (GW-1518) accepted for publication in ‘The Encyclopedia of Water’ to be published by John Wiley & Sons, Inc., New York.

[D] TRANSFER OF TECHNOLOGY

Delivered the following lectures in the Training Course on “*Mathematical Modelling of Groundwater Systems*” organized by Department of Hydrology, Indian Institute of Technology, Roorkee during the period 28 March to 8 April, 2005.

1. Groundwater Balancing
2. Groundwater Flow Models

[E] SEMINAR/WORKSHOP ATTENDED

1. Harvest Day Seminar on “*Sustainable Use of Groundwater in North-West India*”, 13 April 2004, organized by Centre for Advancement of Sustainable Agriculture (CASA) at Indian National Science Academy (INSA), New Delhi.
2. International Workshop on “*Creating Synergy between Groundwater Research and Management in South Asia*”, 8-9 February 2005, organized by IWMI at National Institute of Hydrology, Roorkee.

[F] ELEVENTH NATIONAL SYMPOSIUM ON HYDROLOGY

1. Conducted the technical sessions of 11th National Symposium on Hydrology with focal theme on Water Quality held at National Institute of Hydrology, Roorkee during 22-23 November, 2004.
2. Prepared and presented the ‘Rapporteur’s Report’ in the technical session on “Ground Water Hydrology” on 22.11.2004.

[G] INQUIRY OFFICER

Conducted departmental enquiry against Mr. Vedpal, Attendant, Meteorological Laboratory with reference to Order No. 15/17/2004-NIH(Admn) dated May 20/21, 2004 and submitted the report of the Inquiry Officer.

[H] COMMUNICATION AND TELEPHONES

1. Routine follow-up actions related to Communication division.
2. Editing of the telephone directory.
3. Replacement of console in telephone exchange.
4. Preparation of specifications and tender document (Tender Notice & Tender Application Form) for “Digital ISDN EPABX System”.
5. Installation of internal phones in every room.
6. Submission and processing of the following proposals:
 - Maintenance Contract of EPABX system
 - Procurement of digital ISDN EPABX system
 - Procurement of push-button telephone instruments

[I] MISCELLANEOUS

1. Examined the project proposal on “*Management of Groundwater Resources in Rural India through Scientific and Community Participation Approach*” sent by Department of Science and Technology (DST) to National Institute of Hydrology for review.
2. Acting as a member of “*Library Advisory Committee*” nominated vide Office Order No. 6/14/2003-NIH(Admn) dated December 01, 2003.
3. Elected as one of the Members of IAH Executive Committee for the term 2005-2006.
4. Moderated Yahoo! Groups: hydforum (Hydrology Forum), an electronic discussion group.
5. Created the following web pages:
 - (a) Software User Groups in Groundwater Modelling
 - (b) Google Groups in Hydrology
 - (c) Hydrology Resources on the Web
6. Editing of the following web pages:
 - (a) National Institute of Hydrology, Roorkee
 - (b) National Institute of Hydrology, Belgaum
 - (c) Kumar Links to Hydrology Resources
 - (d) Hydrology Links of C. P. Kumar
7. Downloading a number of useful softwares from the internet and their installation.

Year 2003-2004

[A] TECHNICAL STUDIES

1. Completion of the technical report entitled “*Experimental Determination of Irrigation Return Flow in a Hard Rock Region*” (2002-2003).
2. The study “*Modelling of a Coastal Aquifer using FEFLOW*” is under progress with extended scope. It was presented for in-house discussions.
3. Associated with preparation of the document on “*The Global and Indian Freshwater Crisis: A Perspective*” (S. K. Jain, Anupma Sharma, Rakesh Kumar, C. P. Kumar).
4. Study of the manual on “*Artificial Recharge of Ground Water*” (CGWB, 1994).
5. Review of a number of technical papers received for publication in Hydrology Journal of IAH.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P. (2003), "*Conceptualisation in Groundwater Modelling*", Journal of Applied Hydrology, Association of Hydrologists of India, Volume XVI, No. 1, January 2003, pp. 17-28.
2. Purandara, B. K. and C. P. Kumar (2003), "*Hydrologic Characteristics of Soils under Different Land Covers in Ghataprabha Basin*", Journal of The Institution of Engineers (India), Civil Engineering Division, Volume 84, May 2003, pp. 1-5.
3. Kumar, C. P. (2003), "*Estimation of Ground Water Recharge Using Soil Moisture Balance Approach*", Journal of Soil and Water Conservation, Soil Conservation Society of India, Volume 2, No. 1 & 2, June 2003, pp. 53-58.
4. Kumar, C. P. (2003), "*Pitfalls and Sensitivities in Groundwater Modelling*", Journal of The Institution of Engineers (India), Civil Engineering Division, Volume 84, August 2003, pp. 116-120.
5. Kumar, C. P. (2003), "*Basic Guidelines for Groundwater Modelling Studies*", ISH Journal of Hydraulic Engineering, Volume 9, No. 2, September 2003, pp. 11-21.
6. Jain, C. K., C. P. Kumar and M. K. Sharma (2003), "*Ground Water Quality of Ghataprabha Command Area, Karnataka*", Indian Journal of Environ. & Ecoplan., Volume 7, No. 2, pp. 251-262.
7. Jain, C. K., C. P. Kumar and M. K. Sharma (2003), "*Irrigation Water Quality of Ghataprabha Command Area, Karnataka*", Indian Journal of Environ. & Ecoplan., Volume 7, No. 2, pp. 409-420.
8. Mittal, Sanjay and C. P. Kumar (2003), "*Hindon Nadi Jalgrahan Kshetra Ke Upri Bhag Kee Mrada Jalaansh Vishishtaayen*", Proceedings of National Conference on "Jal Sansadhan Ke Kshetra Me Bhavi Chunutian", 16-17 December 2003, Roorkee, pp. 255-265.
9. Kumar, C. P. and B. K. Purandara (2003), "*Modelling of Soil Moisture Movement in a Watershed using SWIM*", Journal of The Institution of Engineers (India), Agricultural Engineering Division, Volume 84, December 2003, pp. 47-51.
10. Kumar, C. P. (2004), "*Ground Water Balance*", Proceedings of National Seminar on "Effective Conservation of Water and Sustainable Management Techniques", 2-3 January 2004, SASTRA Deemed University, Thanjavur, pp. 18-38.

[C] BOOK ON GROUNDWATER MODELLING AND MANAGEMENT

Prepared the following chapters for the proposed book on "*Groundwater Modelling and Management*" to be edited by Dr. K. D. Sharma and Dr. N. C. Ghosh, National Institute of Hydrology, Roorkee.

1. Groundwater Flow Models - An Overview
2. Management of Groundwater in Salt Water Ingress Coastal Aquifers

[D] RESEARCH PROJECT

Associated with formulation and submission of a research proposal on “*Development of Technologies for Augmenting Groundwater Reservoirs through Artificial Recharge in Hydrologically Critical Areas of Indo-Gangetic Basin*” (CN 156) for competitive grant funding under the Challenge Program on Water and Food.

[E] TRANSFER OF TECHNOLOGY

Delivered the following lectures in the Training Course on “*Groundwater Assessment and Modelling*” organized by National Institute of Hydrology at Roorkee for U.P. Ground water Department during 9-19 February, 2004.

1. Groundwater Assessment Methodology
2. Groundwater Flow Models
3. Groundwater Modelling Errors

[F] CONFERENCE ATTENDED

Attended the National Conference on “*Jal Sansadhan Ke Kshetra Me Bhavi Chunotian*” held at National Institute of Hydrology, Roorkee during 16-17 December 2003 and presented report of the technical session on “*Satahi Jal Evam Bhujal Uplabdhatta*”.

[G] COMMUNICATION AND TELEPHONES

Taken over the charge of Officer-in-Charge, Communication & Telephones (w.e.f. 1.1.2004) vide Office Order No. 6/14/2003-NIH(SAO) dated December 29, 2003.

1. Routine follow-up actions related to Communication division.
2. Editing of the telephone directory.
3. Submission and processing of the following proposals:
 - Procurement of push-button telephone instruments
 - Annual Maintenance Contract of EPABX system
 - Procurement of digital ISDN EPABX system

[H] MISCELLANEOUS

1. Transferred from Hard Rock Regional Centre, Belgaum to Headquarters (Roorkee) vide Office Order No. 6/14/92-NIH(SAO) dated 24/26.02.2003. Accordingly joined at Roorkee on 4.4.2003.
2. Suffered with ‘disc slip’ and stayed on medical leave during the period 30 July to 25 September, 2003 (58 days).
3. Acting as a member of “*Library Advisory Committee*” nominated vide Office Order No. 6/14/2003-NIH(Admn) dated December 01, 2003.

4. Nominated as *Associate Editor-in-Chief* for "Journal of Spatial Hydrology" (an international electronic journal available via internet) – ISSN: 1530-4736.
5. Created the "Yahoo! Groups India - hydrologymodel", an e-mail discussion group on 'Hydrological Modelling'.
6. Editing of the following web pages:
 - (a) National Institute of Hydrology, Roorkee
 - (b) Kumar Links to Hydrology Resources
 - (c) Hydrology Links of C. P. Kumar
 - (d) Publications of C. P. Kumar
7. Downloading a number of useful softwares from the internet and their installation.

Year 2002-2003

[A] TECHNICAL STUDIES

1. Completion of the technical report entitled "*Simulation of Solute Transport in Saline Areas of Ghataprabha Command*" (2001-2002).
2. The study "*Experimental Determination of Irrigation Return Flow in a Hard Rock Region*" (2002-2003) is under progress.
3. The study "*Modelling of a Coastal Aquifer using FEFLOW*" (2002-2003) has been initiated and will be continued in 2003-2004.
4. Supervision of technical studies of Hard Rock Regional Centre, National Institute of Hydrology, Belgaum.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P. (2002), "*Modelling of Unsaturated Flow*", Proceedings - National Conference on "Modern Trends in Water Resources Development and Environmental Management", 7-8 March 2002, Vellore Institute of Technology, Vellore (Tamil Nadu), pp. 1-9.
2. Durbude, Dilip G. and C. P. Kumar (2002), "*Application of GIS for the Determination of Morphological Characteristics of Watershed*", Proceedings - National Conference on "Modern Trends in Water Resources Development and Environmental Management", 7-8 March 2002, Vellore Institute of Technology, Vellore (Tamil Nadu), pp. 11-17.
3. Kumar, C. P. (2002), "*Numerical Simulation Models for Seawater Intrusion*", Journal of Indian Water Resources Society, Volume 22, Number 3, July 2002, pp. 125-130.

4. Kumar, C. P. and Shilpa S. Ratnoji (2002), "*Modeling of Solute Transport in Agricultural Fields using SWIM*", Hydrology Journal, Indian Association of Hydrologists, Roorkee, Volume 25, No. 2 & 3, September 2002, pp. 21-32.
5. Kumar, C. P. and P. V. Seethapathi (2002), "*Assessment of Natural Ground Water Recharge in Upper Ganga Canal Command Area*", Journal of Applied Hydrology, Association of Hydrologists of India, Vol. XV, No. 4, October 2002, pp. 13-20.
6. Kumar, C. P. (2002), "*Modelling of Groundwater Flow: A Perspective*", Proceedings of Hydro-2002 Conference on Hydraulics, Water Resources and Ocean Engineering, 16-17 December 2002, Mumbai, pp. 158-162.
7. Kumar, C. P., B. K. Purandara and B. Venkatesh (2002), "*Variation of Soil Moisture Characteristics in a Part of Malaprabha River Catchment*", Proceedings of International Conference on "Hydrology and Watershed Management", 18-20 December 2002, Hyderabad, Volume-I, pp. 522-526.
8. Bhosale, Dipanjali D. and C. P. Kumar (2002), "*Simulation of Seawater Intrusion in Ernakulam Coast*", Proceedings of International Conference on "Hydrology and Watershed Management", 18-20 December 2002, Hyderabad, Volume-II, pp. 390-399.

[C] HYDROLOGY PROJECT

Associated with the R & D proposal "Estimation of Irrigation Return Flow in Lokapavani Area in Krishnarajasagar Command, Karnataka".

[D] WORKSHOP ORGANISED

Organised a workshop on "*Remote Sensing and GIS Applications in Hydrology*" at Belgaum during the period 23-25 September, 2002.

[E] TRAINING ATTENDED

Attended the end user training on "*Ground Water Estimation & Management System*" (GEMS) at Central Ground Water Board, Faridabad during the period 25.11.2002 to 5.12.2002.

[F] MISCELLANEOUS

1. Monitoring (as Head) the various activities of Hard Rock Regional Centre, National Institute of Hydrology, Belgaum.
2. Conducted (as Member Secretary) the 13th meeting of Regional Coordination Committee (RCC) for Hard Rock Regional Centre at Hyderabad on 10.4.2002.
3. Continued in Editorial Board (as one of the consulting editors) of "Journal of Spatial Hydrology" (an electronic journal available via internet) – ISSN: 1530-4736.

4. Editing of the following web pages:
 - (a) Kumar Links to Hydrology Resources
 - (b) National Institute of Hydrology, Belgaum
 - (c) National Institute of Hydrology, Roorkee
5. Downloading a number of useful softwares from the internet and their installation.

Year 2001-2002

[A] TECHNICAL STUDIES

1. Completion of the technical report entitled "*Simulation of Soil Moisture Movement in a Hard Rock Watershed using SWIM Model*" (2000-2001).
2. Collection of literature, visit to the study area (Cambolin, Goa) and ground water sampling for the study "*Modelling of Sea Water Intrusion in a Coastal Aquifer*" (2001-2002).
3. Study of FEFLOW Users Manual.
4. Visit to soil and water conservation structures in Ralegan Siddhi (Ahmadnagar district) for the study "*Assessment of Temporal Changes in the Land Use/Cover due to Micro-Watershed Development*" (2002-2003).
5. Supervision of technical studies of Hard Rock Regional Centre, National Institute of Hydrology, Belgaum.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P. (2001), "*Simulation of Sea Water Intrusion and Tidal Influence*", ISH Journal of Hydraulic Engineering, Volume 7, No. 1, March 2001, pp. 1-11.
2. Kumar, C. P., B. K. Purandara and B. Soni (2001), "*Variation of Soil Moisture Characteristics in Malaprabha and Ghataprabha Sub-basins*", Hydrology Journal, Indian Association of Hydrologists. Roorkee, Volume 24, No. 1, March 2001, pp. 27-36.
3. Kumar, C. P., Digamber Singh and Sanjay Mittal (2001), "*Determination of Saturated Hydraulic Conductivity in Upper Part of Hindon River Catchment*", Hydrology Journal, Indian Association of Hydrologists, Roorkee, Volume 24, No. 2, June 2001, pp. 55-62.
4. Kumar, C. P., Sanjay Mittal and S. L. Srivastava (2001), "*Soil Moisture Retention Characteristics at RD 838 of I.G.N.P. Stage-II*", Journal of Applied Hydrology, Association of Hydrologists of India, Vol. XIV, No. 2 & 3, April & July, 2001, pp. 17-21.

5. Kumar, C. P., Vijay Kumar and Vivekanand Singh (2001), "*Soil Moisture Characteristics in Upper Part of Hindon River Catchment*", Journal of Applied Hydrology, Association of Hydrologists of India, Vol. XIV, No. 4, October 2001, pp. 1-9.
6. Kumar, C. P. (2001), "*Common Ground Water Modelling Errors and Remediation*", Journal of Indian Water Resources Society, Volume 21, Number 4, October 2001, pp. 149-156.
7. Purandara, B. K., N. Varadarajan and C. P. Kumar (2001), "*Simulation of Soil Moisture Movement and Solute Transport in a Field Soil*", International UNESCO-IHP Workshop on Modelling in Hydrogeology, 3-7 December 2001, Centre for Geoscience and Engineering, Anna University, Chennai, India.
8. Kumar, C. P. and S. M. Seth (2001), "*Derivation of Soil Moisture Retention Characteristics from Saturated Hydraulic Conductivity*", Journal of the Indian Society of Soil Science, Volume 49, Number 4, December 2001, pp. 653-657.

[C] HYDROLOGY PROJECT

Associated with the R & D proposal "Estimation of Irrigation Return Flow in Lokapavani Area in Krishnarajasagar Command, Karnataka".

[D] MISCELLANEOUS

1. Monitoring (as Head) the various activities of Hard Rock Regional Centre, National Institute of Hydrology, Belgaum.
2. Follow-up actions for twelfth meeting of RCC for Hard Rock Regional Centre, NIH, Belgaum.
3. Continued in Editorial Board (as one of the consulting editors) of "Journal of Spatial Hydrology" (an electronic journal available via internet) – ISSN: 1530-4736.
4. Created the "Yahoo! Groups – gwmodel", an e-mail discussion group on 'Ground Water Modeling'.
5. Editing of the following web pages:
 - (e) Kumar Links to Hydrology Resources
 - (f) National Institute of Hydrology, Belgaum
6. Subscribed the various Hydrology-related e-mail discussion groups.
7. Downloading a number of useful softwares from the internet and their installation.

Year 2000-2001

[A] TECHNICAL STUDIES

1. Derivation of van Genuchten model parameters, plotting of soil moisture retention curves for 32 sites, and completion of the technical report entitled "*Spatial Variation of Soil and Hydrological Characteristics of Selected Watersheds in Hard Rock Region*" (1999-2000) – BKP, CPK, BV, PRR.
2. Completion of the technical report entitled "*Ground Water Quality in Malaprabha Representative Basin, Karnataka*" (2000-2001) – CKJ, KKS, CPK, BKP.
3. Visit to Barchi watershed in Karwar district (Karnataka) and computerization of daily rainfall and evaporation data of Barchi (1996 to 1999) for the study "*Simulation of Soil Moisture Movement in a Hard Rock Watershed using SWIM Model*" (2000-2001).
4. Study of HST3D documentation, preparation of notes, test run of HST3D (DOS version) for example problem and examination of Argus MeshMaker Demo.
5. Supervision of technical studies of Hard Rock Regional Centre, National Institute of Hydrology, Belgaum.

[B] TECHNICAL PAPERS PUBLISHED

1. Kumar, C. P., Manohar Arora and S. L. Srivastava (2000), "*Soil Moisture Retention Characteristics in Upper Part of Hindon River Catchment*", Journal of Indian Water Resources Society, Volume 20, Number 2, April 2000, pp. 76-83.
2. Purandara, B. K. and C. P. Kumar (2000), "*Simulation of Soil Moisture Movement in a Forested Watershed*", ICIWRM-2000, Proceedings of International Conference on Integrated Water Resources Management for Sustainable Development, 19-21 December, 2000, New Delhi, India, pp. 833-839.

[C] HYDROLOGY PROJECT

1. Associated with the R & D proposal "Estimation of Irrigation Return Flow in Lokapavani Area in Krishnarajasagar Command, Karnataka".
2. Visit to Lokapavani command area and six field observation (V-notch and tensiometer) plots, and derivation of soil moisture characteristics (h- θ and K-h relationships) for 14 locations in Lokapavani area through non-linear regression analysis.

[D] WORKSHOP ORGANISED

Organised the workshop on "*Modelling of Hydrologic Systems*" at Hard Rock Regional Centre, National Institute of Hydrology, Belgaum during the period 4-8 September, 2000.

[E] TRANSFER OF TECHNOLOGY

Delivered the following lectures in the workshop on “Modelling of Hydrologic Systems” organised by Hard Rock Regional Centre, National Institute of Hydrology at Belgaum during the period 4-8 September, 2000.

1. Ground Water Balance
2. Modelling of Unsaturated Flow
3. Modelling of Sea Water Intrusion

[F] AWARD

The Institution of Engineers (India) awarded the Certificate of Merit for the paper entitled "*Modelling of Soil Moisture Movement*" published in the Journal of the Institution (Twenty-first day of December, 2000).

[G] SUPERVISION OF M.TECH. DISSERTATION

Supervision (as co-guide) of the M.Tech. (Environmental Engineering) dissertation "*Modelling of Soil Moisture Movement and Solute Transport in an Agricultural Field using SWIM*" (2000-2001) by Miss Shilpa S. Ratnoji of K. L. E. Society's College of Engineering and Technology, Belgaum.

[H] MISCELLANEOUS

1. Monitoring (as Head) the various activities of Hard Rock Regional Centre, National Institute of Hydrology, Belgaum.
2. Arranged the “National Technology Day” celebration on 11.5.2000 (Theme: Technology for Advancement of Science).
3. Edited the brief write-up covering the studies (statewise) carried out by Belgaum regional centre since its inception, as required for the 21st Annual General Meeting of NIH Society on 2nd December, 2000.
4. Prepared the agenda notes for twelfth meeting of RCC for Hard Rock Regional Centre, NIH, Belgaum.
5. Included in Editorial Board (as one of the consulting editors) of "Journal of Spatial Hydrology" (an electronic journal available via internet) – ISSN: 1530-4736.
6. Created the web page “Kumar Links to Hydrology Resources” (<http://www.angelfire.com/nh/cpkumar/hydrology.html>).
7. Created the “Hydrology Forum” (an e-mail discussion group) in ‘Topica’.
8. Subscribed the various Hydrology-related e-mail discussion groups.
9. Downloading a number of useful softwares from the internet and their installation.