

## MINUTES OF THE 34<sup>TH</sup> MEETING OF WORKING GROUP OF NIH HELD AT NIH, ROORKEE, DURING APRIL 7-8, 2011

The 34<sup>th</sup> meeting of the Working Group of NIH was held at NIH, Roorkee, during April 7-8, 2011 under the Chairmanship of Director, NIH. The list of the participants of the meeting is given in **Annexure-I**.

### ITEM NO. 34.1: OPENING REMARKS BY THE CHAIRMAN

The Chairman, WG welcomed the Working Group members and the Scientists of the Institute. At the outset he welcomed Dr V C Goyal as the new Member-Secretary and thanked Dr N C Ghosh for ably conducting the meetings during the past few years. The Chairman then mentioned about the new tools of performance evaluation, such as Result Framework Document (RFD), which require strict discipline among the government organizations, including NIH.

The Chairman stated that 2011-12 will be the last year of the XIth 5-year Plan. He informed that the Institute is expected to take a leading role in carrying out various R&D studies under the 'National Water Mission' launched by the Ministry of Water Resources, Govt. of India. Thereafter, the Chairman requested the Working Group members to give their general observations, suggestions and remarks on the scientific activities of the Institute. These are summarized below:

S N	Member	Suggestion(s)
1	Er Rishi Srivastava	Integrated water management studies for large basin (say larger than 1000 km <sup>2</sup> ) by accounting for climate change impact
2	Er N.N. Rai	<ul style="list-style-type: none"> <li>▪ Ungauged catchment hydrology studies</li> <li>▪ Water availability studies for small hydro power projects with specific emphasis to North-East region</li> <li>▪ Integrated hydrological modeling approach in estimation of design flood</li> <li>▪ Research studies on sediment yield analysis including field measurements</li> </ul> Er Rai agreed to provide a note on his suggestions.
3	Prof. B.P. Singh	<ul style="list-style-type: none"> <li>• Project on impact of nuclear waste on the surface and ground water quality</li> <li>• Possible impact studies for Narora Power Plant</li> <li>• Need to provide more emphasis on the fundamental research</li> <li>• Heat effect on isotope studies</li> </ul>
4	Sh S.K. Mittal	<ul style="list-style-type: none"> <li>• Emphasized on Society based research</li> <li>• Need to preserve and protect ground water resources</li> <li>• Possible research areas: impact of climate change studies, geothermal studies, ground water quality,</li> </ul>

		surface water quality and sustainable water resources management
5	Dr. S.K. Gupta	<ul style="list-style-type: none"> <li>▪ Good blend of basic and applied research should be carried out</li> <li>▪ Research projects on water quality issue need to be undertaken</li> <li>▪ Need to focus on the water productivity</li> </ul>
6	Dr. V.V.S. Gurunadha Rao	<ul style="list-style-type: none"> <li>• Need to utilize the results of the research studies for welfare of society</li> <li>• Aquifer mapping</li> <li>• Need to follow innovative way for acquisition of data, mapping and their dissemination</li> </ul>
7	Dr. M.M. Kimothi	<ul style="list-style-type: none"> <li>• Need of efficient mechanism to transfer technology to common users and stakeholders</li> <li>• Linkage between line departments and NIH to identify the needs</li> <li>• Effective dissemination of results of ongoing studies</li> </ul>
8	Prof. K.V. Jayakumar	<ul style="list-style-type: none"> <li>• Expressed reservation on NIH deviation from research oriented studies to more implementation based studies</li> <li>• Need to focus research studies on urban water management and climate change impact</li> </ul>
9	Dr. R.P. Singh	<ul style="list-style-type: none"> <li>• Planning and management of surface and ground water resources should be at basin scale</li> <li>• Study for deeper aquifer</li> <li>• Thrust should be on management of aquifer</li> <li>• Methodologies to recharge deeper (confined) aquifer</li> </ul>
10	Er N K Sharma	<ul style="list-style-type: none"> <li>• Seek international funding- e.g. IHP programme does not have a single station in South Asia region, and NIH should work in this direction</li> <li>• Harnessing of tidal energy</li> </ul>
11	Sri N Y Apte	<ul style="list-style-type: none"> <li>• NIH should bring out documentation of international quality (e.g. WMO)</li> <li>• Data from different studies/projects should be entered in a single database (e.g. SWDES, HYMOS)</li> </ul>

The Chairman informed that the composition of the Working Group has been revised by the Chairman, GB, and now there will be a single Working Group for the Institute. He mentioned that in the new composition, members have been drawn to cover the various fields of expertise, including members from nongovernmental organizations and independent experts. He further informed that composition of the nominated members in the TAC has also been revised.

After introduction by the members and the invitees, the Chairman asked the Member-Secretary to take up the agenda items.

**ITEM NO. 34.2: CONFIRMATION OF THE MINUTES OF THE 33<sup>rd</sup> MEETING OF THE WORKING GROUP**

The 33<sup>rd</sup> meeting of the Working Group was held during October 7-8, 2010. The minutes of the meeting were circulated to all the members and invitees vide letter No. NIH/GWD/WG/10 dated November 12, 2010. No comments were received on the circulated minutes. As no comments were received from any member, the minutes were confirmed.

**ITEM NO. 34.3: ACTION TAKEN ON THE DECISIONS/ RECOMMENDATIONS OF THE PREVIOUS WORKING GROUP MEETING**

Dr. V. C. Goyal gave a brief account of the actions taken on the recommendations/decisions of the 33<sup>rd</sup> working group meeting.

**ITEM NO. 34.4: PRESENTATION AND DISCUSSION ON THE STATUS AND PROGRESS OF THE WORK PROGRAMME FOR THE YEAR 2010-2011**

The Member-Secretary made a brief presentation outlining account of the previous year work programme (2010-11) including number of studies completed and ongoing concluded during the year, and also the proposed work programme for the year 2011-12 under two categories: (i) internally funded projects, and (ii) sponsored/consultancy projects, including purpose driven projects under HP-II.

Division-wise summary of the studies undertaken at the Institute during 2010-11 is given below:

Division	Completed		Ongoing		Total
	Internally funded	Sponsored (including HP-II)	Internally funded	Sponsored (including HP-II)	
Environmental Hydrology	02	01	02	01	<b>06</b>
Ground Water Hydrology	0	01	02	01	<b>04</b>
Hydrological Investigations	0	0	03	07	<b>10</b>
Surface Water Hydrology	01	01	08	0	<b>10</b>
Water Resources System	05	0	03	03	<b>11</b>
<b>Total</b>	<b>08</b>	<b>03</b>	<b>18</b>	<b>12</b>	<b>41</b>

**ITEM NO. 34.5: PRESENTATION AND FINALIZATION OF THE WORK PROGRAMME FOR THE YEAR 2011-12**

Division-wise summary of the studies proposed at the Institute during 2011-12 is given below:

Division	New		Ongoing		Total
	Internally funded	Sponsored (including HP-II)	Internally funded	Sponsored (including HP-II)	
Environmental Hydrology	01	0	02	01	<b>04</b>
Ground Water Hydrology	02	0	02	01	<b>05</b>
Hydrological Investigations	02	0	03	07	<b>12</b>
Surface Water Hydrology	02	0	07*	0	<b>09</b>
Water Resources System	02	01	03	03	<b>09</b>
RCMU	01	0	0	0	<b>01</b>
<b>Total</b>	<b>10</b>	<b>01</b>	<b>17</b>	<b>12</b>	<b>40</b>

\*One study was dropped from the previous year's programme.

Approved work programme of different Divisions for the years 2010-11 and 2011-12, as recommended by the Working Group, is given in the next section. Suggestions/comments of the members on each study/project presented are indicated against respective item in the tables.

## ENVIRONMENTAL HYDROLOGY DIVISION

### Work Programme for 2010-11

SN	Title of the Project/Study	Recommendations/suggestions
1	Modelling of Pesticide Transport in Ground Water – a case study of Metropolitan City – Vadodara Team: M.K. Sharma, V.K. Choubey, A.K. Keshari, (IIT-D) DOS: Oct 2007 DOC: Mar 31, 2011	Completed study.
2	Impact of Kumbha Mela 2010 on water quality of surface water and ground water resources in and around Hardwar City Team: V K Choubey, M K Sharma, Omkar Singh, D.G. Durbude DOS: Jan 2010 DOC: Mar 31, 2011	Completed study. In absence of the PI, Dr M K Sharma briefed about the study.
3	Spatial Variability of Ground Water Quality in Kandi, Sirowal and Shiwalik Belts of Jammu Region, J&K (India) Team: Omkar Singh, V K Choubey, D.G. Durbude, M K Sharma DOS: Apr 2010 DOC: Mar 2011	Scheduled date of completion was 31-3-11. On request of the PI, extension of 6 months was granted. The revised DOC for this study would be Sep 2011.
4	Environmental Flow Requirement of a River: A case study of Hemavathi River Team: Dilip G. Durbude, V.K. Choubey, Omkar Singh, M.K. Sharma DOS: Oct 2009 DOC: Sep 2012	
<b>Sponsored/Consultancy Projects</b>		
5	Assessment of Ground Water Quality in 25 Class I Cities of India – Phase II (Chandigarh, Panjim, Gandhinagar, Shrinagar, Ranchi, Thiruvananthapuram, Imphal, Pondicherry, Kavaratti, Daman, Silvassa, Ratlam, Bilaspur) Team: V.K. Choubey, M.K. Sharma DOS: Oct 2008 (Ph-I), Apr 2010 (Ph-II) DOC: Mar 31, 2011	Completed study. In absence of the PI, Dr M K Sharma presented the study.
6	Impact of sewage effluent on drinking water sources of Shimla city and suggesting ameliorative measures Team: V.K. Choubey, R.P. Pandey, Omkar Singh, D.G. Durbude, M.K. Sharma, Rajesh Singh DOS: Apr 2009 DOC: Mar 2012	Ongoing PDS under HP-II. In absence of the PI, Sri Omkar presented the study.

## Work Programme for 2011-12

SN	Title of the Project/Study	Recommendations/suggestions
1	Spatial Variability of Ground Water Quality in Kandi, Sirowal and Shiwalik Belts of Jammu Region, J&K (India) Team: Omkar Singh (PI), V K Choubey, D.G. Durbude, M K Sharma DOS: Apr 2010; DOC: Mar 2011 Revised DOC: Sep 2011	Continuing study.
2	Environmental Flow Requirement of a River: A case study of Hemavathi River Team: Dilip G. Durbude (PI), V.K. Choubey, Omkar Singh, M.K. Sharma DOS: Oct 2009 DOC: Sep 2012	Continuing study.
3	Development of low cost media for fluoride removal from drinking water of fluoride affected areas Team: Rajesh Singh (PI), V K Choubey, Omkar Singh, M K Sharma DOS: Apr 2011 DOC: Mar 2013	New study. <ul style="list-style-type: none"> <li>▪ Dr. N.C. Ghosh advised to publish the research papers after obtaining the patent of the developed media for removal of fluoride from drinking water.</li> <li>▪ Dr. V. C. Goyal suggested referring 'Terafil' water filter developed by IMMT-Bhubaneswar.</li> </ul>
<b>Sponsored/Consultancy Projects</b>		
4	Impact of sewage effluent on drinking water sources of Shimla city and suggesting ameliorative measures Team: V.K. Choubey (PI), R.P. Pandey, Omkar Singh, D.G. Durbude, M.K. Sharma, Rajesh Singh DOS: Apr 2009 DOC: Mar 2012	Continuing PDS under HP-II. In absence of the PI, Sri Omkar presented the study.

### Division's Scientists Involvement Chart for 2011-12

S N	Scientist	S-1	S-2	S-3	P-4
1	V K Choubey	√ CPI	√ CPI	√ CPI	√ PI
2	Omkar Singh	√ PI	√	√	√
3	D G Durbude	√	√ PI		√
4	M K Sharma	√	√	√	√
5	Rajesh Singh			√ PI	√
	Other Division's/ RCs scientists				RPP (CPI)

RPP- Dr R P Pandey, SWH

## GROUND WATER HYDROLOGY DIVISION

### Work Programme for 2010-11

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	Impact of Climate Change on Dynamic Groundwater System in a Drought Prone area Team: Surjeet Singh (P.I.), C. P. Kumar Anupma Sharma, Rajan Vatsa DOS: Apr 2009; DOC: Mar 2012	Ongoing study.
2	Quantification of impact of rainwater harvesting on groundwater availability in Aravalli Hills- Part II: Mathematical Modelling Team: Anupma Sharma (P.I.), C P Kumar, N C Ghosh, Sudhir Kumar, Rajan Vatsa, Shobha Ram, Sanjay Mittal DOS: Apr 2010; DOC: Mar 2012	Ongoing study. <ul style="list-style-type: none"> <li>▪ Members enquired about the fluctuations in groundwater levels during pre- and post-monsoon period. It was informed that the maximum groundwater level fluctuation is about 6-7 m.</li> <li>▪ Dr Deepak Kashyap enquired about the values of parameters assigned in the model for computing water flux through unsaturated zone. It was informed that presently, only test runs with typical range of parameter values have been taken. Mr. C. P. Kumar added that model runs with field values would be taken after getting the results of soil samples tests from the laboratory analysis.</li> </ul>
<b>Sponsored/Consultancy Projects</b>		
3	Study of Rising Ground Water Table in Jodhpur City, and to Evolve a Management Plan to contain the Rising Trend Team: N.C. Ghosh (PI), C.P. Kumar, Sudhir Kumar, Anupma Sharma, Surjeet Singh, Rajan Vatsa 1yr 6m (9/2009-3/2011)	Completed project. <ul style="list-style-type: none"> <li>▪ Dr. Ghosh informed that all scientific analysis except groundwater modeling and remedial options scenarios have been completed, and that the report will contain 14 sections covering various hydrological and hydro-geological analyses.</li> <li>▪ Dr. Ghosh further informed that a time extension up to May 15, 2011 for submission of the final report has been sought.</li> </ul>
4	Coastal Groundwater Dynamics and Management in the Saurashtra Region, Gujarat Team: N.C. Ghosh (Co-ordinator), Anupma Sharma (P.I.), C P Kumar, A.D. Gohil, C.K. Jain, Sudhir Kumar, D.S. Rathore, Surjeet Singh, Rajan Vatsa 2 years 8 m (10/2009 – 06/2012)	Ongoing project. Dr. B. P. Singh enquired about the coastal erosion in the study area. It was informed that at present, coastal erosion in Minsar Basin is not being investigated, but such a study may be taken up in future.

## Work Programme for 2011-12

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	Impact of Climate Change on Dynamic Groundwater System in a Drought Prone area Team: Surjeet Singh (P.I.), C. P. Kumar Anupma Sharma, Rajan Vatsa DOS: Apr 2009; DOC: Mar 2012	Continuing study.
2	Quantification of impact of rainwater harvesting on groundwater availability in Aravalli Hills- Part II: Mathematical Modelling Team: Anupma Sharma (P.I.), C P Kumar, N C Ghosh, Sudhir Kumar, Rajan Vatsa, Shobha Ram, Sanjay Mittal DOS: Apr 2010; DOC: Mar 2012	Continuing study.
3	Groundwater Fluoride Contamination in different parts of India and study severity of Fluorosis in a drought prone area Team: A.K. Dwivedi (P.I.), Shobha Ram N C Ghosh, Anupma Sharma, Sumant Kumar, Sanjay Mittal, Ramachandra DOS: Apr 2011 DOC: Mar 2014	New study. <ul style="list-style-type: none"> <li>▪ In response to a query, Sri Dwivedi informed that the study will have two components: (i) preparation of a position document on groundwater fluoride contamination in India (2011-12), and (ii) to study variability and severity of fluorosis in a selected region (drought prone area) (2012-13).</li> <li>▪ Dr V C Goyal suggested that contents of the position document should be prepared and sent to the members for their comments.</li> <li>▪ Also, it was suggested that presence of Boron, which is found where fluoride is in excess, should be studied for any possible relationship.</li> </ul>
4	Management of Aquifer Recharge (MAR) and Aquifer Storage Recovery (SAR) Team: Sumant Kumar (PI), Rajan Vatsa, N.C. Ghosh, C P Kumar, Surjeet Singh, Sanjay Mittal DOS: Apr 2011; DOC: Mar 2014	New study. In response to a query, Dr N C Ghosh informed that the Institute is expecting a sponsored R & D project to be funded by European Research Institute, in which MAR will be targeted for specific study areas.
<b>Sponsored/Consultancy Projects</b>		
5	Coastal Groundwater Dynamics and Management in the Saurashtra Region, Gujarat Team: N.C. Ghosh (Coordinator), Anupma Sharma (P.I.), C P Kumar, A.D. Gohil, C.K. Jain, Sudhir Kumar, D.S. Rathore, Surjeet Singh, Rajan Vatsa 2 years 8 m (10/2009 – 06/2012)	Continuing PDS under HP-II.



Division's Scientists Involvement Chart for 2011-12

S N	Scientist	S-1	S-2	S-3	S-4	P-5
1	N C Ghosh		√	√	√	√
2	C P Kumar	√ CPI	√ CPI		√	√ CPI
3	Anupama Sharma	√	√ PI	√		√ PI
4	Surjeet Singh	√ PI			√	√
5	A K Dwivedi			√ PI		
6	Rajan Vatsa	√	√		√ CPI	√
7	Sumant Kumar			√	√ PI	
	Other Division's/ RCs scientists		SK			CKJ SK DSR

CKJ- Dr C K Jain, CFMS-Guwahati

SK- Dr Sudhir Kumar, HI

DSR- Sri D S Rathore, WRS

## HYDROLOGICAL INVESTIGATIONS DIVISION

### Work Programme for 2010-11

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	SW and GW Interaction at Selected Locations Along River Yamuna in NCT, Delhi: Phase-II Team: Sudhir Kumar (PI), M. S. Rao, P. K. Garg DOS: 4/2009; DOC: 3/2012	Ongoing study. Dr Sudhir Kumar informed that a mathematical model for estimating the induced recharge shall be developed during the year 2011-12.
2	Study of Variability of Snow and Glacier Contribution in Melt Water of Gangotri Glacier at Goumukh using Isotopic Techniques Team: S.P. Rai (PI), Manohar Arora, Bhishm Kumar, Rakesh Kumar and Naresh Kumar DOS: 4/2010; DOC: 3/2013	Ongoing study.
3	Identification of Recharge Zones of Some Selected Springs of Uttarakhand Using Isotopes Team: S. D. Khobragade (PI), Bhishm Kumar, Sudhir Kumar, S. P. Rai, Pankaj Garg, Uttarakhand Jalsansthan DOS: 04/2010; DOC: 03/2012	Ongoing study. <ul style="list-style-type: none"> <li>▪ Dr. Gurunadha Rao suggested that hydro-geological aspects, such as groundwater availability, should be considered for selecting the recharge area.</li> <li>▪ Dr. P. R. Ojswii enquired if it was possible to determine the residence time of the water using the isotope method. He also enquired how the size of the recharge area would be decided.</li> <li>▪ Dr. G.C. Mishra opined that the depletion time of springs should be taken into account for the calculation of recharge area.</li> </ul>
<b>Sponsored/Consultancy Projects</b>		
4	National programme on isotope fingerprinting of waters of India (IWIN) Team: M.S. Rao (PI), B. Kumar, Sudhir Kumar, S.P. Rai, S.K. Verma, Pankaj Garg + other 13 organizations DOS: 07/2007; DOC: 06/2012	Ongoing project. Sh. N. Y. Apte suggested to analyze correlation between meteorological data at Jammu and other stations with isotopic data.
5	Impact Assessment of Landuse on the Hydrologic Regime in the selected Micro-watersheds in Lesser Himalayas, Uttarakhand Team: S.P. Rai (PI), Bhishm Kumar, J.V. Tyagi DOS: 04/2008; DOC: 03/2013	Ongoing project.

6	Development of Spring Sanctuaries in an Urban and Rural Watershed in District Pauri Garhwal, Uttarakhand Team: Dr. S.P. Rai (PI), Bhishm Kumar, Sudhir Kumar, Suhas Khobragade, Pankaj Garg DOS: 04/2010; DOC: 03/2013	Ongoing project.
7	Assessment of Groundwater Resources & Development Potential of Yamuna Flood Plain, NCT, Delhi Team: Sudhir Kumar (PI), Vijay Kumar + IITD,DU,CGWB, IARI, CWC,DJB DOS: 02/2010; DOC: 01/2011	Ongoing consultancy project. The PI informed that survey for groundwater draft was conducted in the month of June 2010. A conceptual model has been prepared and steady state simulations are being carried out to calibrate the model.
8	Hydrogeological studies of Jhamarkotra Mines, Udaipur, Rajasthan Team: Sudhir Kumar (PI), M.S.Rao, S.K. Verma, Pankaj Garg DOS: 07/2010; DOC: 12/2011	Ongoing consultancy project.
9	Groundwater Dynamics of Bist-Doab Area, Punjab Using Isotopes Team: M.S. Rao (PI), Bhishm Kumar, Sudhir Kumar, S.K. Verma, PankajGarg+CGWB Officials DOS: 07/2009; DOC: 6/2012	Ongoing PDS under HP-II. Dr. Gurunadha Rao suggested that the water quality data should also be presented in conventional graphical forms. He also informed that NGRI has placed large amount of data and maps on website, which can also be used in the present study.
10	Groundwater Management in Over-Exploited Blocks of Chitradurga and Tumkur Districts of Karnataka Team: Sudhir Kumar (PI), J.V. Tyagi, Vijay Kumar, B.K. Purandara, S.P. Rai, M.S. Rao + DMG, Karnataka DOS: 07/2009; DOC: 6/2012	Ongoing PDS under HP-II. 16 infiltration tests indicated that the infiltration rates are high in the catchment (sandy soils, infiltration rate 10-15 mm/hr) and low in the tank bed (clayey soil, Infiltration rate=1-2 mm/hr)

### Work Programme for 2011-12

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	SW and GW Interaction at Selected Locations Along River Yamuna in NCT, Delhi: Phase-II Team: Sudhir Kumar (PI), M. S. Rao, P. K. Garg DOS: 4/2009; DOC: 3/2012	Continuing study.
2	Study of Variability of Snow and Glacier Contribution in Melt Water of Gangotri Glacier at Goumukh using Isotopic Techniques Team: S.P. Rai (PI), Manohar Arora, Bhishm Kumar, Rakesh Kumar and	Continuing study.

	Naresh Kumar DOS: 4/2010; DOC: 3/2013	
3	Identification of Recharge Zones of Some Selected Springs of Uttarakhand Using Isotopes Team: S. D. Khobragade (PI), Bhishm Kumar Sudhir Kumar, S. P. Rai, Pankaj Garg, Uttarakhand Jalsansthan DOS: 04/2010; DOC: 03/2012	Continuing study.
4	Hydrological Assessment for Artificial Recharge and Water Management in Ghar Area, Saharanpur District, U.P. Team: P.K.Garg (PI), Sudhir Kumar, Tanveer Ahmad, Rajesh Agarwal, V C Goyal, Bhishm kumar DOS: 04/2011; DOC: 03/2013	New study. Dr R P Singh enquired whether the study area lies in the Kandi Belt to which Dr Bhishm Kumar replied in confirmation.
5	Assessment of Radon Concentration & Identification of Paleo Groundwater in Punjab State Team: S K Verma (PI), Sudhir Kumar, M S Rao, Bhishm Kumar DOS: 04/2011; DOC: 03/2013	New study. <ul style="list-style-type: none"> <li>▪ Dr. Gurunadha Rao suggested that title of the study should be modified as “Assessment of Radon Concentration in Waters and Identification of Paleo-groundwater in Punjab State”.</li> <li>▪ Dr. Rao also suggested that the area near Narora Power Plant may also be investigated for radon concentrations in groundwater, river water etc.</li> </ul>
<b>Sponsored/Consultancy Projects</b>		
6	National programme on isotope fingerprinting of waters of India (IWIN) Team: M.S. Rao (PI), B. Kumar, Sudhir Kumar, S.P. Rai, S.K. Verma, Pankaj Garg + other 13 organizations DOS: 07/2007; DOC: 06/2012	Continuing project.
7	Impact Assessment of Landuse on the Hydrologic Regime in the selected Micro-watersheds in Lesser Himalayas, Uttarakhand Team: S.P. Rai (PI), Bhishm Kumar, J.V. Tyagi DOS: 04/2008; DOC: 03/2013	Continuing project.
8	Development of Spring Sanctuaries in an Urban and Rural Watershed in District Pauri Garhwal, Uttarakhand Team: Dr. S.P. Rai (PI), Bhishm Kumar, Sudhir Kumar, Suhas Khobragade, Pankaj Garg DOS: 04/2010; DOC: 03/2013	Continuing project.

9	Assessment of Groundwater Resources & Development Potential of Yamuna Flood Plain, NCT, Delhi Team: Sudhir Kumar (PI), Vijay Kumar +IITD,DU,CGWB, IARI, CWC,DJB DOS: 02/2010; DOC: 01/2011	Continuing consultancy project.
10	Hydrogeological studies of Jhamarkotra Mines, Udaipur, Rajasthan Team: Sudhir Kumar (PI), M.S.Rao, S.K. Verma, Pankaj Garg DOS: 07/2010; DOC: 12/2011	Continuing consultancy project.
11	Groundwater Dynamics of Bist-Doab Area, Punjab Using Isotopes Team: M.S. Rao (PI), Bhishm Kumar, Sudhir Kumar, S.K. Verma, Pankaj Garg +CGWB Officials DOS: 07/2009; DOC: 6/2012	Continuing PDS under HP-II.
12	Groundwater Management in Over-Exploited Blocks of Chitradurga and Tumkur Districts of Karnataka Team: Sudhir Kumar (PI), J.V. Tyagi, Vijay Kumar, B.K. Purandara, S.P. Rai, M.S. Rao + DMG, Karnataka DOS: 07/2009; DOC: 6/2012	Continuing PDS under HP-II.

#### Division's Scientists Involvement Chart for 2011-12

S N	Scientist	S-1	S-2	S-3	S-4	S-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12
1	Bhishm Kumar		√	√ CPI	√	√	√ CPI	√ CPI	√ CPI			√ CPI	
2	Sudhir Kumar	√ PI		√	√ CPI	√ CPI	√		√	√ PI	√ PI	√	√ PI
3	S P Rai		√ PI	√			√	√ PI	√ PI				√
4	Suhas Khobragade			√ PI					√				
5	M S Rao	√ CPI				√	√ PI				√ CPI	√ PI	
6	S K Verma					√ PI	√				√	√	
7	Pankaj Garg	√		√	√ PI		√		√		√	√	
	Other Division's/ RCs scientists		MA (CPI) RK		VCG			JVT		VK (CPI)			JVT (CPI) VK BKP

MA- Dr M Arora, SWH; RK- Rakesh Kumar, SWH; VCG- Dr VCGoya, RCMU;  
VK- Dr Vijay Kumar, WRS; JVT- Dr J V Tyagi, SWH; BKP- Dr B K Purendra, RC Belgaum

## SURFACE WATER HYDROLOGY DIVISION

### Work Programme for 2010-11

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	<p>Snow Melt Runoff Modeling Using Fuzzy Logic Team: A.K. Lohani (PI), Sanjay K. Jain, Rakesh Kumar DOS: Apr 2009 DOC: Mar 2011</p>	<p>Completed study.</p> <ul style="list-style-type: none"> <li>▪ Dr. K.V. Jayakumar enquired about the computational efficiency and requirements of the model. The PI informed that the performance of the fuzzy based models for snow melt runoff modelling is better than the conceptual snow melt model.</li> <li>▪ Dr S K Mittal mentioned the possibility of comparing the results with the SASE's model.</li> </ul>
2	<p>Data book - hydro-meteorological observatory 2001-2008 Team: Digambar Singh (PI), A. R. S. Kumar, Manohar Arora DOS: Apr 2009 ; DOC: Mar 2011 Revised DOC : Sep 2011</p>	<ul style="list-style-type: none"> <li>▪ Dr V V S Gurunadha Rao and Mr. N. Y. Apte suggested to carry out basic statistical analysis after the entry of the data.</li> <li>▪ Dr. Rakesh Kumar suggested use of HYMOS for correcting and analyzing the data. Members suggested preparation of format for the data-book.</li> <li>▪ The PI requested for extension of the study by 6 months, which was granted. The revised DOC would be Sep 2011.</li> </ul>
3	<p>Study on integrated water resources management of sub-basin to cope with droughts Team: R.P. Pandey (PI), Ravi V. Galkate, Surjeet Singh, L.N. Thakaral DOS: Dec 2008 DOC: Dec 2012</p>	<p>Ongoing study.</p> <ul style="list-style-type: none"> <li>▪ PI reported that the strategic water resources in the basin are being demarcated for their utilization during drought.</li> <li>▪ Dr. K.V. Jayakumar suggested exploring the use of 'IWRM Tool Box', which is available on the internet.</li> </ul>
4	<p>Snow Melt Runoff Modelling in Sultej Basin Team: A.R. S. Kumar (PI), Manohar Arora, A. Agarwal, D.S.Rathore, Digambar Singh DOS: Apr 2009 DOC: Mar 2012</p>	<p>Ongoing study.</p> <ul style="list-style-type: none"> <li>▪ Dr V V S Gurunadha Rao suggested to predict one period value of streamflow and check it with BBMB.</li> <li>▪ Dr. Jayakumar suggested to remove the outliers and run the ANN models again.</li> </ul>
5	<p>Snowmelt Runoff Modeling and Study of the Impact of Climate Change in part of Brahmaputra River Basin Team: Archana Sarkar (PI), R.D. Singh, Rakesh Kumar, Sanjay K. Jain DOS: Apr 2010 DOC: Mar 2013</p>	<p>Ongoing study.</p> <ul style="list-style-type: none"> <li>▪ Sh. N.Y. Apte enquired whether the MODIS data gives depth of snow. Mrs Sarkar informed that the MODIS data gives only the areal extent of snow cover and not the depth of snow.</li> <li>▪ Sh R.D. Singh suggested use of GCM output instead of hypothetical scenarios to study the impact of climate change, to be carried out in the third year of the study.</li> </ul>

6	Monitoring and modelling of streamflow for the Gangotri Glacier Team: Manohar Arora (PI), Rakesh Kumar DOS: Apr 2008; DOC: Long-term study	Ongoing study. The PI informed the house that the data collected for the ablation period of 2008 to 2010 has been analysed and the report has been submitted.
7	Climatic Scenarios Generation for Satluj Basin using Statistical Downscaling Techniques Team: Manohar Arora (PI), Rakesh Kumar DOS: Apr 2010; DOC: Mar 2013	Ongoing study. The PI informed that statistical downscaling will be performed and an inter-comparison of the downscaled output will be done on the basis of scoring.
8	Climatic variability analysis and its impact on Himalayan watershed in Uttarakhand Team: A Agarwal (PI), Manohar Arora R K Nema DOS: Nov 2010 DOC: Oct 2013	Ongoing study. Dr V C Goyal pointed out that the objectives of the study and statement of the problem do not corroborate the title of the study, and should be revised keeping in view the emphasis on 'climatic variability analysis'. The methodology and results of 'climatic variability analysis' may be presented in the next meeting.
9	Impact of climatic change on evaporation Team: N.K. Bhatnagar (PI), A. Agarwal DOS: Oct 2009 DOC: Sep 2011	On request of the Div. Head, the study was dropped.
<b>Sponsored/Consultancy Projects</b>		
10	Integrated Hydrological Study for Sustainable Development of two Hilly Watersheds in Uttaranchal Team: A. Agarwal (PI), R.K.Nema DOS: Jul 2005 DOC: Jun 2010 (extended upto Dec 2010)	Completed project. <ul style="list-style-type: none"> <li>▪ Corrections were suggested on rainfall-runoff relationships derived and on the values plotted on the graphs; to be suitably incorporated before finalization of the report.</li> <li>▪ Director, NIH, stated that he will discuss the draft report with the PI.</li> </ul>

### Work Programme for 2011-12

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	Data book - hydro-meteorological observatory 2001-2008 Team: Digambar Singh (PI), A. R. S. Kumar, Manohar Arora DOS: Apr 2009 ; DOC: Mar 2011 Revised DOC : Sep 2011	Continuing study.
2	Study on integrated water resources management of sub-basin to cope with droughts Team: R.P. Pandey (PI), Ravi V. Galkate, Surjeet Singh, L.N. Thakaral DOS: Dec 2008; DOC: Dec 2012	Continuing study.

3	<p>Snow Melt Runoff Modelling in Sultej Basin  Team: A.R. S. Kumar (PI), Manohar Arora, A. Agarwal, D.S.Rathore, Digambar Singh  DOS: Apr 2009; DOC: Mar 2012</p>	Continuing study.
4	<p>Snowmelt Runoff Modeling and Study of the Impact of Climate Change in part of Brahmaputra River Basin  Team: Archana Sarkar (PI), R.D. Singh, Rakesh Kumar, Sanjay K. Jain  DOS: Apr 2010; DOC: Mar 2013</p>	Continuing study.
5	<p>Monitoring and modelling of streamflow for the Gangotri Glacier  Team: Manohar Arora (PI), Rakesh Kumar  DOS: Apr 2008; DOC: Long-term study</p>	Continuing study.
6	<p>Climatic Scenarios Generation for Satluj Basin using Statistical Downscaling Techniques  Team: Manohar Arora (PI), Rakesh Kumar, Naresh Kumar  DOS: Apr 2010; DOC: Mar 2013</p>	Continuing study.
7	<p>Climatic variability analysis and its impact on Himalayan watershed in Uttarakhand  Team: A Agarwal (PI), Manohar Arora, R K Nema  DOS: Nov 2010; DOC: Oct 2013</p>	Continuing study.
8	<p>Impact of Climate Change on Glaciers and Glacial Lakes: Case Study on GLOF in Tista basin  Team: A.K. Lohani (PI), Sanjay K. Jain, Rakesh Kumar  DOS: Apr 2011; DOC: Mar 2013</p>	<p>New study.</p> <ul style="list-style-type: none"> <li>▪ The study stresses on the impact of climate change on glacial lakes and the impact of glacial lake outburst floods (GLOFs) in Tista basin.</li> <li>▪ The members appreciated the proposed study in view of its usefulness for the upcoming projects.</li> </ul>
9	<p>Hydrological Studies for Upper Narmada Basin  Team: Jagdish P. Patra (PI), Rakesh Kumar, Pankaj Mani, T R Sapra  DOS: Apr 2011; DOC: Mar 2014</p>	<p>New study.</p> <ul style="list-style-type: none"> <li>▪ The study focus on dam break analysis of Bargi dam and resulting flood inundation mapping up to barmangath with a drainage area of 26, 453 km<sup>2</sup>.</li> <li>▪ Title of the study seems to be too general, and may be suitably modified keeping in view the statement of the problem and objectives.</li> <li>▪ Dr. N. C. Gosh suggested to refer previous studies of NIH on Narmada basin, and to check availability of data from previous studies. Dr. N.Y. Apte raised concern about implication of results of this study particularly the dam break flooding.</li> </ul>



Division's Scientists Involvement Chart for 2011-12

S N	Scientist	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9
1	Rakesh Kumar				√	√ CPI	√ CPI		√	√ CPI
2	A Agarwal			√				√ PI		
3	J V Tyagi									
4	A K Lohani								√ PI	
5	R P Pandey		√ PI							
6	A R S Kumar	√ CPI		√ PI						
7	Sanjay Kumar									
8	Archana Sarkar				√ PI					
9	M Arora	√		√ CPI		√ PI	√ PI	√ CPI		
10	D Singh	√ PI		√						
11	J P Patra									√ PI
	Other Division's/ RCs scientists		RVG (CPI) SS LNT	DSR	RDS (CPI) SKJ				SKJ (CPI)	PM

RVG- Sri R V Galkate, RC-Sagar; SS- Dr Surjeet Singh, GWH; LNT- Sri L N Thakral, WRS; DSR- Sri D S Rathore, WRS; RDS- Sri R D Singh, Director; SKJ- Dr S K Jain, WRS; PM- Sri Pankaj Mani, CFMS-Patna

## WATER RESOURCES SYSTEM DIVISION

### Work Programme for 2010-11

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	NIH_ReSyp-A software for Reservoir Analysis (Ver.-I) Team: M.K. Goel (PI), D. Chalisgaonkar DOS: 4/2010; DOC: 3/2011	Completed study. <ul style="list-style-type: none"> <li>▪ In response to a query from Mr. NN Rai, the PI informed that spillway rating curve is used in the analysis which is performed for ungated spillways only. A separate module is being added in the software to account for variable spillway release capacity at different reservoir levels.</li> <li>▪ Mr. O. P. Gupta and Mr. R. R. Yadav asked about the procedure to find the inflow series for a reservoir. MKG explained that inflow series is generally input to the software. Mr Yadav also enquired if the losses are considered in the software.</li> <li>▪ On query from the Chairman, the PI informed that user manual for the first version of the software will be completed by the end of April, 2011. He informed that newer modules for spillway gate regulation and reservoir sedimentation analysis will be added after completion of the basic development of the software.</li> <li>▪ A training programme will be organized for field engineers in Nov 2011.</li> </ul>
2	Prediction of dispersion coefficient of Streams using Kriging technique Team: Vijay Kumar (PI), S.K. Singh DOS: 4/2010; DOC: 3/2011	Completed study. Dr Jaykumar suggested reference of an IHP report on the Krigging method.
3	GIS based dams and drought information system Team: D.S. Rathore (PI), Deepa Chalisgaonkar, R.P. Pandey, Yatveer Singh, Tanveer Ahmad DOS: 10/2009; DOC: 3/2011	Completed study. In absence of the PI, Mrs Deepa Chalisgaonkar presented the study. <ul style="list-style-type: none"> <li>▪ Many members opined that the study team should discuss with dam organizations in the States.</li> <li>▪ Drought indices at district level should be carefully checked before uploading on web.</li> </ul>
4	Computationally simple functions for approximating normal and log-normal distributions Team: S K Singh DOS: Apr 2010; DOC: Mar 2011	Completed study. Sri RR Yadav and Sri O. P. Gupta suggested that the proposed method and its practical utilities need to be disseminated to field engineers.
5	A simple IUH model for runoff modeling Team: S K Singh DOS: Apr 2010; DOC: Mar 2011	Completed study. Sri S. K. Mittal suggested organizing training for field engineers on the proposed method and its

		practical utilities.
6	Application of a distributed hydrological model for river basin planning and management Team: M.K. Goel (PI), Vijay Kumar, D.S. Rathore, D. Chalisgaonkar, Rama Mehta DOS: 10/2009; DOC: 3/2012	Ongoing study. <ul style="list-style-type: none"> <li>▪ Dr. M. M. Kimothi suggested that higher resolution data can be used in the analysis. MKG opined that analysis for a river basin involves very large area and a higher resolution grid size will multiply the dimensions of the analysis manifold.</li> <li>▪ Dr. Jaya Kumar suggested comparing the results with a lumped model. MKG opined that a number of models have already been planned for application and additional model applications will be taken up depending on the availability of time for the study.</li> </ul>
7	Web based Information System for Major and important Lakes in India Team: D. Chalisgaonkar (PI), Suhas Khobragade DOS: 4/2010; DOC: 3/2012	Ongoing study. <ul style="list-style-type: none"> <li>▪ Dr Kimothi informed that MOEF has prepared a comprehensive inventory of wetlands.</li> <li>▪ Dr Kimothi suggested that major hydrological problems of the lakes should be included in the information system. Dr Khobragade informed that it is not possible or practical to physically visit the lakes and find out the problems, but available information will definitely be incorporated.</li> <li>▪ Dr. Gurunadha Rao opined that information about the lake catchment, such as catchment map, should also be included in the system.</li> <li>▪ Dr. Jayakumar informed that a lot of information has been compiled for seven lakes of Kerela by the CWRDM, Kozhikode. The PI was asked to contact CWRDM.</li> <li>▪ Sri N Y Apte suggested providing metadata information in the system.</li> </ul>
8	Analysis of water management scenarios in Tapi River basin using MIKE Basin Team: Rama Mehta (PI), M.K. Goel, Vijay Kumar, D.S. Rathore DOS: 4/2010; DOC: 3/2013	Ongoing study. The PI informed that hydrological data for Tapi basin has been received from NTBO, Surat, and a request for reservoir (existing in this basin) details and working tables is in progress with concerning agencies in Maharashtra and Gujarat.
<b>Sponsored/Consultancy Projects</b>		
9	Integrated approach for snowmelt runoff studies and effect of anthropogenic activities in Beas basin Team: Sanjay K. Jain (PI), Bhisim Kumar Vijay Kumar, S.P. Rai, Renoj Theyyan DOS: 4/2009 ; DOC: 3/2012	Ongoing PDS under HP-II.
10	Assessment of Effects of Sedimentation on the capacity / Life of Bhakra Reservoir (Gobind Sagar) on River Satluj and Pong	Ongoing PDS under HP-II. Mr. N.N. Rai said that MIKE 11 model can also be used for sedimentation rate in the reservoir.

	Reservoir on River Beas Team: Sanjay K. Jain (PI), S.K. Jain, Vijay Kumar, J.V. Tyagi, Rama Mehta DOS: 4/2009; DOC: 3/2012	Mr. B.P. Singh enquired about the capacity of the Bhakra reservoir.
11	Hydrological Assessment of Ungauged Catchments (Small Catchment) Team: P.K.Bhunya (PI), Rakesh Kumar, Vijay Kumar, D.S. Rathod, Sanjay Kumar, P.C. Nayak, Y.R.S. Rao DOS: May 2009; DOC: May 2012	Ongoing PDS under HP-II.

### Work Programme for 2011-12

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	Application of a distributed hydrological model for river basin planning and management Team: M.K. Goel (PI), Vijay Kumar, D.S. Rathore, D. Chalisgaonkar, Rama Mehta DOS: 10/2009; DOC: 3/2012	Continuing study.
2	Web based Information System for Major and important Lakes in India Team: D. Chalisgaonkar (PI), Suhas Khobragade DOS: 4/2011; DOC: 3/2012	Continuing study.
3	Analysis of water management scenarios in Tapi River basin using MIKE Basin Team: Rama Mehta (PI), M.K. Goel, Vijay Kumar, D.S. Rathore DOS: 4/2010; DOC: 3/2013	Continuing study.
4	Development of analytical equation for alternate depths for flow in rectangular channels Team: S K Singh DOS: Apr 2011; DOC: Mar 2012	New study.
5	A transfer function model for event based runoff Team: S K Singh DOS: Apr 2011; DOC: Mar 2012	New study.
<b>Sponsored/Consultancy Projects</b>		
6	Integrated approach for snowmelt runoff studies and effect of anthropogenic activities in Beas basin Team: Sanjay K. Jain (PI), Bhishm Kumar Vijay Kumar, S.P. Rai, Renoj Theyyan DOS: 4/2009 ; DOC: 3/2012	Continuing PDS under HP-II.
7	Assessment of Effects of Sedimentation on the capacity / Life of Bhakra Reservoir (Gobind Sagar) on River Satluj and Pong	Continuing PDS under HP-II.

	Reservoir on River Beas Team: Sanjay K. Jain (PI), S.K. Jain, Vijay Kumar, J.V. Tyagi, Rama Mehta DOS: 4/2009; DOC: 3/2012	
8	Hydrological Assessment of Ungauged Catchments (Small Catchment) Team: P.K.Bhunya (PI), Rakesh Kumar, Vijay Kumar, D.S. Rathod, Sanjay Kumar, P.C. Nayak, Y.R.S. Rao DOS: May 2009; DOC: May 2012	Continuing PDS under HP-II.
9	Vetting of Water Availability studies of the Gulf of Khambhat Development Projects (Kalpasar Project) Team: M.K. Goel (PI), Vijay Kumar DOS: 4/2011; DOC: 10/2011	New consultancy project. <ul style="list-style-type: none"> <li>▪ Mr. N. N. Rai informed that vertical resolution of SRTM data is better than the ASTER data and same may be utilized in the study.</li> <li>▪ The PI was advised to consult IMD for PMP.</li> <li>▪ Dr Gurunadha Rao suggested for ascertaining creek water availability.</li> </ul>

#### Division's Scientists Involvement Chart for 2011-12

S N	Scientist	S-1	S-2	S-3	S-4	S-5	P-6	P-7	P-8	P-9
1	S K Singh				√ PI	√ PI				
2	Sanjay Jain						√ PI	√ PI		
3	D S Rathore	√		√					√	
4	M K Goel	√ PI		√ CPI						√ PI
5	Deepa Chalisgaonkar	√	√ PI							
6	Vijay Kumar	√ CPI		√			√	√	√	√ CPI
7	P K Bhunya								√ PI	
8	R D Mehta	√		√ PI				√		
9	L N Thakral									
	Other Division's/ RCs scientists		SKh (CPI)				BK (CPI) SPR RT	SKJ (CPI) JVT	RK (CPI) SanK PCN YRSR	

SKh- Dr Suhas Khobragade, HI; BK- Dr Bhishm Kumar, HI; SPR- Dr S P Rai, HI; RT- Dr Renoj Theyyan, RC-Jammu; SKJ- Prof S K Jain, IIT-Roorkee; JVT- Dr J V Tyagi, SWH; RK- Dr Rakesh Kumar, SWH; SanK- Dr Sanjay Kumar, SWH; PCN- Dr P C Nayak, RC-Kakinada; YRSR- Dr Y R S Rao, RC-Kakinada

## RESEARCH COORDINATION & MANAGEMENT UNIT (RCMU)

### Work Programme for 2011-12

SN	Title of the Project/Study, Study Team & Duration	Recommendations/suggestions
1	Recession Flow Analysis for Evaluation of Spring Flow in Indian Catchments Team : Ravindra V. Kale (PI), V. C. Goyal DOS: Apr 2011 DOC: Mar 2013	<ul style="list-style-type: none"><li>▪ Dr N C Ghosh suggested element of innovation in carrying out the study.</li><li>▪ Dr V C Goyal clarified that the study essentially aims at developing a generic technique for assessing the reliability of spring flow by analyzing the flow characteristics.</li></ul>

### ITEM NO. 34.6: ANY OTHER ITEM WITH PERMISSION OF THE CHAIR

While concluding the two-day deliberations, the Chairman informed that the next meeting of the TAC is scheduled shortly and the Divisional Heads should expedite sending the draft minutes of their respective divisions to the Member-Secretary. He made the following observations for compliance by the scientists and staff of NIH:

1. The PI should take care that salient details of the study (e.g. title, study team, date of start and completion, objectives, action plan) do not change from those provided in the previous meetings. No deviations are acceptable except when decided (and recorded in the minutes) of the Working Group and/or TAC.
2. Study team as mentioned in the agenda and as shown in the presentation is many times different. The PI should take care of this.
3. The PI (or the Co-PI, if the PI is not present) should present the study.
4. Long study teams should be avoided. The role of each member of the team should be defined in the study writeup in form of an activity chart, and provided in the agenda.
5. Final draft report for completed studies/projects and interim (part) report for ongoing studies should be submitted by April 30, 2011.

The Chairman thanked the members for their valuable contributions during deliberations in the Working Group meetings in the last few years.

The meeting ended with vote of thanks to the Chair.

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**ANNEXURE-I****List of participants of the 34<sup>th</sup> Working Group Meeting:**

1	Shri R.D. Singh Director, NIH	<b>Chairman</b>
2	Prof. G. C. Mishra WRDM, IIT Roorkee	Member
3	Prof. D. Kashyap Deptt. of Civil Engg., IIT Roorkee	Member
4	Prof. K.V. Jayakumar ED, CWDRM, Kerala	Member
5	Prof. B.P. Singh, Gurgoan	Member
6	Dr. M.M. Kimothi, Director, USAC, Dehradun	Member
7	Dr. V.V.S. Gurunadha Rao Scientist G, NGRI, Hyderabad	Member
8	Dr. S.K.Mittal Scientist G, C.S.I.O, Chandigrah	Member
9	Dr. R.P. Singh RD I/C, CGWB, Dehradun	Member
10	Dr. S.K. Gupta Project Coordinator, CSSRI, Karnal	Member
11	Shri N.Y. Apte DDGM(H), IMD, New Delhi	Member
12	Dr. P.R. Ojasvi CSWCRTI, Dehradun	Member
13	Er Rishi Srivastava Director (RO), CWC, New Delhi	Member
14	Er N.N. Rai Director (HSO), CWC, New Delhi	Member
15	Er. M.Sampathkumar, Chief Engineer, PWD, Chennai	Member
16	Er. G. Dhanaraju, Supdt. Engineer, PWD, Chennai	Invitee
17	Sh. R.R.Yadav, Director, Dam ID & R, Jaipur	Member
18	Sh. O.P. Gupta Dam ID & R, Jaipur	Invitee
19	Er N.K. Sharma S.E., IRI, Roorkee	Member
20	Shri Vinod Kumar Research Officer (Basic Res. Div.),UPIRI, Roorkee	Member
21	Dr. Pratibha Naithani Project Specialist, USAC, Dehradun	Invitee
22	Dr. V. C. Goyal Scientist F & Head, RCMU, NIH	Member-Secretary

### Scientists from National Institute of Hydrology, Roorkee

1. Dr. Bhishm Kumar, Sc.F & Head, HI Division
2. Dr. V K Choubey, Sc.F & Head, EH Division
3. Dr. N.C. Ghosh, Sc.F & Head, GWH Division
4. Dr. Rakesh Kumar, Sc.F & Head, SWH Division
5. Dr. S.K. Singh, Sc.F
6. Shri C.P. Kumar, Sc. 'F'
7. Dr. Sanjay Kr. Jain, Sc.E2
8. Dr. Avinash Agarwal, Sc.E2
9. Dr. J.V. Tyagi, Sc.E2
10. Dr. Sudhir Kumar, Sc.E2
11. Dr. M.K. Goel, Sc. E2
12. Smt. Deepa Chalisgaonkar, Sc.E1
13. Dr. A K Lohani, Sc.E1
14. Dr. Vijay Kumar, Sc.E1
15. Dr. R P Pandey, Sc.E1
16. Shri Omkar Singh, Sc.E1
17. Shri S.D. Khobragade, Sc.E1
18. Dr. P K Bhunya, Sc.E1
19. Dr. S.P. Rai, Sc.E1
20. Shri A R Senthil Kumar, Sc.E1
21. Dr. M.S. Rao, Sc.C
22. Shri S K Verma, Sc. C
23. Dr. Rama Mehta, Sc.C
24. Dr. Anupama Sharma, Sc.C
25. Dr. Surjeet Singh, Sc. C
26. Shri D. G. Durbude, Sc. C
27. Smt. Archana Sarkar, Sc.C
28. Shri A K Dwivedi, Sc. C
29. Dr. Manohar Arora, Sc.C
30. Dr. M.K. Sharma, Sc.C
31. Shri Pankaj K. Garg, Sc.B
32. Shri Rajan Vatsa, Sc.B
33. Shri Digambar Singh, Sc.B
34. Dr Ravindra Kale, Sc. B
35. Shri J P Patra, Sc. B
36. Shri Sumant Kumar, Sc. B
37. Dr Rajesh Singh, Sc. B
38. Shri L N Thakral, Sc. B