

**MINUTES OF THE
52ND MEETING OF WORKING GROUP OF NIH
HELD AT NIH, ROORKEE, DURING 12-13 APRIL 2022**

The meeting was held in hybrid mode under the Chairmanship of Dr. J V Tyagi, Director, NIH. The list of participants of the meeting is given in Annexure-I.

ITEM NO. 52.1: OPENING REMARKS BY THE CHAIRMAN

The Chairman, WG, welcomed the WG members and the Scientists of NIH. He informed that the objective of this meeting is to review the progress of 2021-22 and formulate the work program of 2022-23. The Chairman then requested the WG 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.	Dr. Manoj P.Samuel	<ul style="list-style-type: none"> ▪ Avoid duplication and redundant studies ▪ Collaboration with CWRDM ▪ Climate change impact in coastal areas ▪ Work on water footprint, Early Warning Systems ▪ Explore copyright for software
2.	Prof. A K Saraf	<ul style="list-style-type: none"> ▪ Improve presentation skills ▪ Exhaustive literature survey needed before proposing a new study
3.	Dr. Bhishm Kumar	<ul style="list-style-type: none"> ▪ Upload work program on NIH website ▪ Link scientists at NIH RCs through VC
4.	Dr. S. S. Grewal	<ul style="list-style-type: none"> ▪ Focus on groundwater in Kandi areas in Punjab and Haryana
5.	Dr.Ramakar Jha	<ul style="list-style-type: none"> ▪ Studies should be outcome based ▪ Any new study should address 'Why' and 'How', and must include literature survey ▪ Explore patents, innovations; involve water industry
6.	Dr. Sadhana Malhotra	<ul style="list-style-type: none"> ▪ Improve presentation skills- rehearsal by presenters ▪ Bring out impact of completed studies
7.	Sh. Sudhindra Mohan Sharma	<ul style="list-style-type: none"> ▪ Research should be society oriented/useful for society ▪ Focus of drinking water studies ▪ Strengthen outreach activities
8.	Dr. M S Rathore	<ul style="list-style-type: none"> ▪ Time period of studies should not be too long
9.	Dr. Pawan Labhasetwar	<ul style="list-style-type: none"> ▪ Reduce long study periods ▪ Field studies addressing water quality should have suggestions for mitigation and/or adaptation

Next, the Chairman asked the Member-Secretary to take up the agenda.

ITEM No. 52.2: CONFIRMATION OF MINUTES OF 51ST MEETING OF WORKING GROUP

The 51st meeting of the Working group was held during 14-15June, 2021 in VC mode. The minutes of the meeting were circulated to all the members and invitees vide letter No. **RMOD/WG/NIH-10 dated 26 July, 2021**. The members confirmed the minutes of the 51st Working Group meeting.

ITEM No. 52.3: 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 51st working group meeting.

ITEM Nos. 52.4 & 52.5: PRESENTATION AND DISCUSSION ON THE STATUS AND PROGRESS OF THE WORK PROGRAMME FOR YEAR 2021-22 AND FINALIZATION OF THE WORK PROGRAMME FOR YEAR 2022-23

The Member-Secretary requested the respective Divisional Heads to present the progress of studies carried out during 2021-22 and also to present the proposed studies for F.Y. 2022-23. Accordingly, the progress of various studies and sponsored projects, and proposal for new studies and projects during 2022-23, were presented by all Scientific Divisions during the two-day deliberations of the Working Group. The Division wise minutes of each study/project presented during the meeting are given next.

ENVIRONMENTAL HYDROLOGY DIVISION

The overview of the technical activities of Environmental Hydrology Division (EHD) was presented by Dr R.P. Pandey, Scientist ‘G’ & Head. The Working Group was appraised about the scientific manpower, status of completed and ongoing studies, consultancy projects, publications, technology transfer activities etc. Subsequently, the scientists of the Division were invited to present the completed studies and proposed new studies. The progress of ongoing sponsored and internal studies was reported in brief. The Comments/suggestions of Working Group members are summarized below.

Progress of Work Program for 2021-22 and Recommended Work Program for the year 2022-23

S. No.	Study	Suggestions/Comments
Sponsored Projects		
1.	Title: Water Quality Assessment of Southwest Punjab Emphasizing Carcinogenic Contaminants and their Possible Remedial Measures Study Group: Rajesh Singh (PI), Pradeep Kumar, M. K. Sharma, Sumant Kumar Partner: Irrigation Deptt., Punjab Duration: 3½ Years (09/17 –3/21) Extension requested till 09/21 Sponsored by: NHP-PDS Project Cost: 65.6 Lakh Status: Completed	Progress of the study was reported and there were no specific suggestions/comments.
2.	Title: Leachate Transport Modeling for Gazipur landfill site for suggesting ameliorative measures Study Group: Anjali (PI), Sudhir Kumar, J.V. Tyagi, M.K. Sharma Partner: CGWB (Delhi unit) Duration: 3 Years (11/19 –10/22) Sponsored by: NHP-PDS Project Cost: 76.1 Lakh	Progress of the study was reported and there were no suggestions/comments. The PI of this project has been transferred from EH Division to HI Division. Therefore, this study is transferred to HI Division.

	Status: In-progress	
3.	<p>Title: Water Efficient Irrigation by Using SCADA System for Medium Irrigation Project (Mip) Shahnehar Study Group: R.P. Pandey, (PI), Jagdeesh Patra, Rajesh Singh, N. K. Bhatnagar Duration: 3 Years (12/17 –12/20) Extension requested till 03/22 Project Cost: 75.0 Lakh Status: In-progress</p>	Progress of the study was reported and there were no specific suggestions/comments.
4.	<p>Title: Isotopic and geochemical approach to study vulnerable confined and unconfided drinking water aquifers in Varanasi and surrounding area Study Group: Rajesh Singh (PI), R. P. Pandey BHU, Varanasi (Lead) Other Collaborators: BARC, Mumbai, ICER, Hungary Duration: 3 years (07/21-07/24) Project Cost: Rs. 10.0 Lakh Sponsored by: BHU Status:In-progress</p>	Progress of the study was reported and there were no specific suggestions/comments.
Internal Studies		
5.	<p>Title: Water quality assessment for Haridwar District Study Group: R.K. Nema (PI), Rajesh Singh, J. V. Tyagi, R. P. Pandey, Pradeep Kumar Duration: 2 years (05/19-06/21) Status: Completed</p>	<ul style="list-style-type: none"> • The working group member, Dr. Bhism Kumar (Ex. Scientist, NIH & IAEA) appreciated the study and its outcomes. He suggested for further investigation to find out the causes of deterioration in next study. • Sh. Prashant Rai, CGWB suggested to replace the contour maps with point maps. • Prof. A. K. Saraf, IIT Roorkee suggested to check and validate the interpolation method.
6.	<p>Title: Simulation of Non-Point Source Pollution Processes in Song River Study Group: Pradeep Kumar (PI), J.V. Tyagi, M.K. Sharma, Rajesh Singh Duration: 4 years (11/19-10/23) Status: In-progress</p>	Progress of the study was reported and there were no specific suggestions/comments.
7.	<p>Title: Development of rejuvenation plan for Hindon river system Study Group: M. K. Sharma (PI), Dr. Sudhir Kumar (Project Coordinator), R. P. Pandey, Anupma Sharma, Anjali, Vishal Singh, Pradeep Kumar, Nitesh Patidar, Surjeet Singh, Rajesh Singh. Duration: 3 years (07/20 to 06/23) Status: Closed from EH Division</p>	<p>Progress of the study was reported and there were no specific suggestions/comments. T</p> <p>This study has been Transferred to HI Division and merged with DST-NWO Project on River Hindon</p>
8.	<p>Title: Influence of Anthropogenic Factors on River Ganga in the stretch from Rishikesh to Haridwar</p>	Prof. Ramakar Jha, NIT Patna suggested to consider the pollutants load in addition to their

	Study Team: Rajesh Singh (PI), J.V. Tyagi, R.P. Pandey, R.K. Nema, Pradeep Kumar, M.K. Sharma Duration: 2 Years (06/20 – 05/22) Status: In-progress	concentration for interpreting the impact.
9.	Title: Understanding Arsenic mobilization in groundwater of Haridwar and formulating remediation measures Study Team: Rajesh Singh (PI), R.K. Nema, Sumant Kumar, Pradeep Kumar, M.K. Sharma Duration: 3 Years (07/21 – 06/24) Status: In-progress	Progress of the study was reported and there were no specific suggestions/comments.
Internal Studies (New Study)		
10.	Title: Characterisation of Groundwater Dynamics in Krishna-Godavari Delta using groundwater levels, Hydrochemistry, Isotopes and Emerging Contaminants Study Group: M. K. Sharma (PI), Suhas Khobragade, Rajesh Singh, Y. R. S. Rao, Collaborating Agency: CGWB, Hyderabad Duration: 2 years (04/22 to 03/24) Budget: Rs. 17.60 lakh Status: New Study	Dr. Sharma presented the study proposal. Dr. Prashant Rai, CGWB appreciated the proposed study and suggested that this is the right time to take up this study for the benefit of society.

GROUND WATER HYDROLOGY DIVISION

Dr. M. K. Goel, Scientist 'G' & Head, GWHD, presented a brief overview, status of studies and activities carried out by the division since the 51st Working Group meeting. He gave an account of scientific personnel available in the division; ongoing and completed internal, sponsored and consultancy projects; and also the future activities planned by the division for the year 2022-23. MKG informed that one in-house R&D study and nine sponsored studies were approved for the year 2021-22.

In addition to the above studies, scientists of the division have a major role in activities of the National Hydrology Project (NHP); development of DSS (Planning and Management); development of groundwater module for “*National Hydrologic Model (NHM)*” with IIT Kharagpur; Computer Centre; External Project Management Cell; and procurement related activities. The number of research papers published in various journals, lectures delivered in various training courses and number of M.Tech./Ph.D. students guided/under guidance during the period were also reported. Three new in-house R&D studies that are planned in the year 2022-23 and two completed sponsored studies were presented. The progress of five on-going studies was also presented by the respective Principal Investigators.

A special one-hour session was dedicated to present the major outcomes of the National Mission for Sustaining Himalayan Ecosystem (NMSHE) project entitled “**Integrated Hydrological Studies for Upper Ganga Basin up to Rishikesh**” which was sponsored by DST. This project focuses on the issues of comprehensive integrated hydrological studies for upper Ganga basin up to Rishikesh and involves 11 sub-projects with different study teams. The study was completed on Sep 2021 and the final report has been completed by March 31, 2022 and the same was shared with WG members during its meeting. MKG, who worked as the Coordinator of NMSHE Project, briefly presented the work components, objectives and major achievements of all the 11 sub-projects. WG members appreciated the work done by NIH.

The details of the GWHD studies presented in the WG meet are provided in the table below.

S. No.	Project	Project Team	Duration & Status	Funding Source
Internal Studies				
1. NIH/GWH/NIH/20-22	Integrated GEE-MODFLOW based Groundwater Recharge Assessment System for Hindon River System	Nitesh Patidar (PI) , Gopal Krishan, Suman Gurjar	2 years (08/20 – 07/22) <i>Status: In progress</i>	Internal Study
2. NIH/GWH/NIH/22-25	Studying arsenic genesis and developing alternate water supply management strategies in Ganga basin	Sumant Kumar (PI) , Surjeet Singh, Rajesh Singh, Gopal Krishan, M.K. Sharma, Vinay Kumar Tyagi, S.S. Rawat, Nitesh Patidar, P.K. Mishra, M.K. Goel	3 years (04/22 – 03/25) Status: New Study	Internal Study
3. NIH/GWH/NIH/22-24	Conjunctive Management of Water Resources in IGNP Command	Nitesh Patidar (PI) , M. K. Goel, Anupma Sharma, Gopal Krishan, Surjeet Singh, Sumant Kumar, Nidhi Kalyani	2 years (04/22 – 03/24) Status: New Study	Internal Study
4. NIH/GWH/NIH/22-24	Studying Groundwater Dynamics using Machine Learning and Numerical Modelling	Nidhi Kalyani (PI) , Anupma Sharma, Nitesh Patidar, Sumant Kumar	2 years (04/22 – 03/24) Status: New Study	Internal Study
Sponsored Projects				
5. NIH/GWH/BG S/17-20	Groundwater Fluctuations and Conductivity Monitoring in Punjab - Groundwater resilience in Punjab and adaptation to future changes in climate and water resource demands (title modified by funding agency)	Gopal Krishan (PI) , S. Singh, C. P. Kumar (retd.), M. S. Rao BGS, UK: Dr. Dan Lapworth Dr. Alan MacDonald Dr. Daren Goody	5 years (12/17-11/22) Status: In progress	BGS, UK
6. NIH/GWH/DS T/ 18-20	Future Secular Changes and Remediation of Groundwater Arsenic in the Ganga River Basin - FAR GANGA	B. Chakravorty (PI) , Surjeet Singh (Dy. Lead), Sumant Kumar, Gopal Krishan, Suman Gurjar Other India Partners: IITR, IITK, MCS, Patna UK Partners: Univ. of Manchester, BGS, Salford University, Univ. of Birmingham	4 years (01/18 - 12/21) Status: Completed	DST-Newton Bhabha-NERC-India-UK Water Quality Research Programme

7. NIH/GWH/DS T/ 18-20	Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Micro-pollutants	Anupma Sharma (PI) , Sumant Kumar, Gopal Krishan, Suman Gurjar, M. K. Sharma Indian Partners: IIT Ropar, IIT Jodhpur UK Partner: Cranfield University, Water Harvest, Excellent Develop. (UK based NGO)	4 years (01/18 - 02/22) Status: Completed	DST-Newton Bhabha-NERC-India-UK Water Quality Research Programme
8. NIH/GWH/DS T/ 19-23	Enhancing Food and Water Security in Arid Region through Improved Understanding of Quantity, Quality and Management of Blue, Green and Grey Water	Anupma Sharma (PI) , Gopal Krishan, Nitesh Patidar (Lead: CAZRI Jodhpur, Partners: NIH Roorkee, IISWC Dehradun, CSWRI & CIAH, Bikaner, NIAM Jaipur)	5 years (03/19 - 02/24) Status: In progress	DST
9. NIH/GWH/ CCRBF/20- 23	Expansion of the Indo-German Competence Centre for Riverbank Filtration – CCRBF	Gopal Krishan (PI & Co-coordinator)	3 years (07/20 – 06/23) Status: In progress	Federal Min. of Education and Research, Germany
10. NIH/GWH/ DST- SERB/21-24	Partitioning Evapotranspiration into Evaporation and Transpiration fluxes using Stable Isotopes of Oxygen and Hydrogen	Gopal Krishan (PI) , M.S. Rao	3 years (04/21 – 03/24) Status: In progress	DST-SERB

The suggestions emerged during the presentation of these studies are given below:

S. No.	Title of Project	Status and Recommendations/Suggestions
Internal Studies		
1	Integrated GEE-MODFLOW based Groundwater Recharge Assessment System for Hindon River System	Dr. Nitesh Patidar (PI) presented the objective-wise progress, results, and interface of the model developed under the study. Mr. Sudhindra Mohan Sharma asked about the model inputs, such as GW extractions and lithology and PI clarified the same. Prof. Saraf asked about the estimation of irrigation requirement in the model and PI clarified the same by explaining the LAI-based method used in the model. Prof. Ramakar Jha asked about the groundwater observation inputs in the model and PI clarified that observations are required for calibration and validation. WG members appreciated the work.
2	Studying arsenic genesis and developing alternate water supply management strategies in Ganga basin	Dr. Sumant Kumar (PI) presented the background, objectives, methodology and expected outcome of the new proposed internally funded study. The WG members appreciated and recommended to take up the study as the project outcomes would be helpful for providing safe drinking water to the community of

		arsenic affected areas. The WG members are of view that study area is large and hence they suggested PI to look after the resources and accordingly study area may be curtailed down, if possible. PI responded that the study area may be finalized after internal discussions. One of the WG members suggested to contact researchers working in the field of arsenic genesis and treatment. PI replied with thanks that NIH team is already in contact with few IITs.
3	Conjunctive Management of Water Resources in IGNP Command	Dr.Nitesh Patidar (PI) presented the problem statement, objectives and methodology of the new internal R&D study. WG member, Dr. Sudhir Kumar, suggested to look at an earlier study done by NIH in IGNP. WG members also suggested to review the studies done in IGNP and PI agreed on the suggestion. Dr. Gopal Singh Bhati appreciated the work stating that a lot of changes have happened during past 20 years in groundwater levels and cropping patterns in the area and the assessment of the current status of groundwater and water logging is needed in IGNP.
4	Studying Groundwater Dynamics using Machine Learning and Numerical Modelling	Ms. Nidhi Kalyani (PI) presented the background, objectives and methodology of the study. Prof. Ramakar Jha suggested to explore the various input layers required in the machine learning model and the PI agreed on the suggestion.
Sponsored Projects		
5	Groundwater Fluctuations and Conductivity Monitoring in Punjab - Groundwater resilience in Punjab and adaptation to future changes in climate and water resource demands (title modified by funding agency)	Dr. Gopal Krishan (PI) presented the variation in water level in last 150 years, trend of groundwater depletion mainly due to the onset of pumping; correspondence between shallow and deep is notable; deep and shallow groundwater have similar isotopic compositions and seasonal groundwater response, highlighting the vertical connectivity of the aquifer system Dr. S.S. Grewal (Retd. Director), PAU, Ludhiana, appreciated the work and told that work should be disseminated to the policy makers. Dr. M.K. Goel replied that the work has already been presented in Punjab Vidhan Sabha. Dr. M.S. Rathore, Director CEDS, Jaipur, asked about the contribution of return flow in groundwater and effect of cropping pattern on groundwater levels to do similar study in Haryana. PI informed that component of irrigation return flow was found in groundwater but it is not quantified, for effect of cropping pattern PI replied that there was a model shown depicting the groundwater level variations due to the change in cropping pattern. Regarding the similar study in Haryana, PI replied that the NIH is already doing a PDS under NHP in Mewat region. Dr. Sudhinder Mohan Sharma, Consultant ex-nodal officer MoDWS, Indore, asked about the groundwater quality status in different aquifers. PI, informed that a plot was already shown to mark changes in salinity variations.
6	Future Secular Changes and Remediation of Groundwater Arsenic in the Ganga River Basin - FAR GANGA	Dr. Surjeet Singh (PI) presented the study in detail and reported that the study is completed and a final presentation was already made to DST. No comments were made by the WG Members.

7	Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Micro-pollutants	Dr. Anupma Sharma (India Lead PI) presented the study approved under the India-UK DST-NERC-EPSRC Water Quality Research Programme (Newton Bhabha fund). The research objectives of the study, and the work packages were presented. Field investigations and data collection that were carried out at the fluoride affected field sites in Rajasthan, recharge attributable to rainwater harvesting structures, and the related laboratory experiments and results of chemical analysis were presented. Mobilization of fluoride under saturated conditions and fluoride release kinetics were presented using results of lysimeter and column experiments and geochemical modeling.
8	Enhancing Food and Water Security in Arid Region through Improved Understanding of Quantity, Quality and Management of Blue, Green and Grey Water	Dr. Anupma Sharma (PI from NIH) presented the DST sponsored WATER-IC project in which the lead agency is CAZRI, Jodhpur. The overall objectives of the study, and research objectives taken up by NIH were presented. Work being carried out in IGNP area in Rajasthan pertaining to estimation of groundwater recharge using water balance model and stable isotope analysis, as well as climate variability in the area were presented. Progress regarding field experiments to study the impacts of different irrigation schedules on a selected crop was shown. It was explained that the data generated will be used for model calibration. One of the Working Group Experts, Shri Sudhindra Mohan Sharma suggested that help from local community would further facilitate the data generation.
9	Expansion of the Indo-German Competence Centre for Riverbank Filtration – CCRBF	Dr. Gopal Krishan (PI) presented motivation for the study, development of a demonstration site, searching for new site for RBF well and progress under the project. No comments were made by WG members
10	Partitioning Evapotranspiration into Evaporation and Transpiration fluxes using Stable Isotopes of Oxygen and Hydrogen	Dr. Gopal Krishan (PI) presented the background, statement of the problem, objectives, methodology, progress and future plans of the study with main emphasis on methodology. The presentation was well appreciated. Dr. M. Samuel, Director CWRDM, asked about the methods for measuring ET and asked about use of Lysimeter. PI told that the experiments will be conducted at IIT-Kanpur and all the results will be validated and uncertainty analysis will be carried out.

RECOMMENDED WORK PROGRAM FOR THE YEAR 2022-23

S. No.	Project	Project Team	Duration & Status	Funding Source
Internal Studies				
1. NIH/GWH/NIH/ 20-22	Integrated GEE-MODFLOW based Groundwater Recharge Assessment System for Hindon River System	Nitesh Patidar (PI), Gopal Krishan Anupma Sharma	2 years (08/20 – 07/22) <i>Status: In progress</i>	Internal Study
2. NIH/GWH/NIH/ 22-25	Studying arsenic genesis and developing alternate water supply management strategies in Ganga basin	Sumant Kumar (PI), S. Singh, R. Singh, G. Krishan, S. S. Rawat, M.K. Sharma, N. Patidar, P. K. Mishra,	3 years (04/22 – 03/25) Status: New Study	Internal Study

		M. K. Goel		
3. NIH/GWH/NIH/ 22-24	Conjunctive Management of Water Resources in IGNP Command	Nitesh Patidar (PI), M. K. Goel, Anupma Sharma, Gopal Krishan, Surjeet Singh, Sumant Kumar, Nidhi Kalyani	2 years (04/22 – 03/24) Status: New Study	Internal Study
4. NIH/GWH/NIH/ 22-24	Studying Groundwater Dynamics using Machine Learning and Numerical Modelling	Nidhi Kalyani (PI), Anupma Sharma, Nitesh Patidar, Sumant Kumar	2 years (04/22 – 03/24) Status: New Study	Internal Study
Sponsored Projects				
5. NIH/GWH/BGS/ 17-20	Groundwater Fluctuations and Conductivity Monitoring in Punjab - Groundwater resilience in Punjab and adaptation to future changes in climate and water resource demands (title modified by funding agency)	Gopal Krishan (PI), S. Singh, C. P. Kumar (retd.), M. S. Rao <i>BGS, UK:</i> Dr. Dan Lapworth Dr. Alan MacDonald Dr. Daren Goody	5 years (12/17-11/22) <i>Status: In progress</i>	BGS, UK
6. NIH/GWH/PDS/ 17-21	Assessment of Impacts of Groundwater Salinity on Regional Groundwater Resources, Current and Future Situation in Mewat, Haryana – Possible Remedy and Resilience Building Measures	Gopal Krishan (PI), Surjeet Singh, C. P. Kumar (Retd.), <i>IIT-Roorkee:</i> M. L. Kansal, Brijesh Yadav <i>Sehgal Foundation:</i> Lalit Mohan Sharma	4 years (12/17-07/22) <i>Status: In progress</i>	NHP under PDS
7. NIH/GWH/PDS/ 17-21	Ganges Aquifer Management in the Context of Monsoon Runoff Conservation for Sustainable River Ecosystem Services - A Pilot Study	Surjeet Singh (PI), C. P. Kumar, Sudhir Kumar, Suman Gurjar, Gopal Krishan	4 years (12/17-07/22) <i>Status: In progress</i>	NHP under PDS
8. NIH/GWH/CEH M/18-22	Integrated Management of Water Resources for Quantity and Quality in Upper Yamuna Basin up to Delhi	Anupma Sharma (PI) S. K. Jain, A. Sarkar, M. K. Sharma, L. N. Thakural, Sumant Kumar, P.K. Mishra, V. Singh, N. Patidar, N. Kalyani <i>Partners Haryana Irr. & WR Dept., UPGW Dept., UYRB, CWC</i>	4 years (04/18-01/24) <i>Status: In progress</i>	Special Project under “Centre of Excellence” (NHP)
9. NIH/GWH/DST/ 19-23	Enhancing Food and Water Security in Arid Region through Improved Understanding of Quantity, Quality and Management of Blue, Green and Grey Water	Anupma Sharma (PI), Gopal Krishan, Nitesh Patidar <i>(Lead: CAZRI Jodhpur, Partners: NIH Roorkee, IISWC Dehradun, CSWRI &</i>	5 years (03/19 - 02/24) <i>Status: In progress</i>	DST

		CIAH, Bikaner, NIAM Jaipur)		
10. NIH/GWH/CCR BF/20-23	Expansion of the Indo-German Competence Centre for Riverbank Filtration – CCRBF	Gopal Krishan (PI & Co-coordinator)	3 years (07/20 – 06/23) <i>Status: In progress</i>	Federal Min. of Education and Research, Germany
11. NIH/GWH/DST-SERB/21-24	Partitioning Evapotranspiration into Evaporation and Transpiration fluxes using Stable Isotopes of Oxygen and Hydrogen	Gopal Krishan (PI), MS Rao	3 years (04/21 – 03/24) <i>Status: In progress</i>	DST-SERB
12. NIH/GWH/APN/22	Capacity Development Program on Site Suitability Mapping for Managed Aquifer Recharge (MAR) under Varying Climatic Conditions using Remote Sensing and Machine Learning based Hydrological Modelling Tools	Nitesh Patidar (PI), S. Singh, G. Krishan <i>IIT Roorkee(lead):</i> Basant Yadav, Ashish Pandey, R D Singh, B. J. Deka <i>In-kind support:</i> KU, Japan: Yutaka Matsuno, PNU, South Korea: Sanghyun Jeong	10 months (01/22-10/22) <i>Status: New Study</i>	Asia-Pacific Network (APN)
Consultancy Projects				
1.	Groundwater Investigations of Rana Sugars Ltd. Buttar Seviyan Area of Amritsar District, Punjab	Surjeet Singh (PI)	6 months (01/22 – 06/22) <i>Status: In progress</i>	NIT, Jalandhar (Punjab)

HYDROLOGICAL INVESTIGATIONS DIVISION

Dr Sudhir Kumar, Scientist-G and Head of the H. I. Division presented the brief details of the Division including the scientific staff strength and infrastructure. He briefly introduced about the scientific work of the Division and the various studies being carried by the Division, along with details about the publications by the Division and analytical work carried out at the Nuclear Hydrology Laboratory. He also informed about the technology transfer activities organized/proposed by the Division during 2021-22.

Table 1: Details of training Courses/Workshops organised by HI Division during April 2021-March, 2022

S. N.	Topic	Duration	Coordinator	Venue	No. of Participants
1.	Scientific data collection and processing techniques for springshed management and rejuvenation	05 Days (13-17 Dec 2021)	Dr S S Rawat	Guwahati	25
2.	Tools and techniques for springshed management	Two Days (06-07.01.2022)	Dr SS Rawat	Jammu	39
3	Stakeholder Consultation Workshop on “GRACERS	March 22, 2022	Dr. SM Pingale	Haldia, West Bengal	50

Project"	(01 day)			
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Table 2: Details of Research Publications by HI Division during April 2021-March, 2022

Publication	Published	Accepted	Communicated	Total
Books / Book Chapter	01	-	-	01
International Journals	24	-	15	39
National Journals	02	02	01	05
International Conferences	11	02	-	13
National Conferences	02	-	-	02
Total	40	04	16	60

The progress of each individual study for the year 2021-22 and the proposal for a new study was presented by the respective P.I. of the study. A new study for springs of Tehri Garhwal district of Uttarakhand was proposed by Dr. M.S. Rao, Scientist-F. However, Chairman, working group observed that another study on springs of Tehri Garhwal district is already being undertaken by the division. So, the Chairman, working group suggested that instead of Tehri Garhwal, Dr. M.S. Rao may come up with a proposal on springs of North-East region.

The comments/actions suggested by the working group for various studies are as follows:

S. N.	Project Title	Study Team	Duration	Comments
<u>INTERNAL STUDIES:</u>				
1.	Assessment of impact of land use and land cover change on groundwater conditions in parts of Sabarmati river Basin, Gujarat	M. Someshwar Rao (PI) Sudhir Kumar Vipin Aggarwal	2 years (04/21- 03/23)	Dropped
2.	Integrated Hydrological Investigations of Renuka lake, Himachal Pradesh, for its Conservation and Management	SD Khobragade (PI) Sudhir Kumar Hukam Singh Rajiv Gupta Vipin Agarwal Scientist from GoH.P.	3 years (07/20-06/23)	Dropped
3.	Assessment of dissolved radon concentration in groundwater of Uttarakhand	Hukam Singh (PI), M Someshwar Rao, Soban Singh Rawat, Vipin Agarwal	1 ¾ years (04/21-12/22)	No Comments
4.	Assessment of the Possible Impact of Climate Change on Evapotranspiration for Different Climatic Regions of India	SD Khobragade (PI), Dr. Vishal Singh, Sudhir Kumar	3 years (04/22-03/25)	No Comments
<u>SPONSORED PROJECTS:</u>				
1.	Dating very old ground waters of deeper aquifers in Ganga Plains,	M. Someshwar Rao (PI) Sudhir Kumar	3 Years (06/16 -12/22)	Not presented

S. N.	Project Title	Study Team	Duration	Comments
	India			
2.	Chemical & Isotopic Characterization of Deep Aquifer Groundwater of Middle Ganga Basin	Sudhir Kumar (PI) M. Someshwar Rao Vipin Aggarwal	3 ½ year (01/18 – 06/22)	Not presented
3.	Integrated Study on groundwater dynamics in the coastal aquifers of West Bengal for sustainable groundwater management	M. Someshwar Rao (PI), Sudhir Kumar A. R. Senthil Kumar V. S. Jeyakanthan	3 ½ years (01/18-06/22)	Not presented
4.	Development of a comprehensive plan for conservation and sustainable management of Bhimtal and Naukuchiatal lakes, Uttarakhand	Suhas Khobragade (PI) Sudhir Kumar	3 years (01/18-06/22)	Not presented
5.	Groundwater Rejuvenation As Climate change Resilience for marginalized and gender sensitive Ganges (GRACERS)	Sudhir Kumar (PI) SM Pingale	2 years (06/19 – 09/22)	Not presented
6.	Web-GIS Based Spring Inventory for Vulnerability Assessment and Hydro-Geological Investigation of Selected Springs for Sustaining Local Water Demand in Ravi Catchment of Himachal Pradesh	S S Rawat (PI) Sudhir Kumar P G Jose, Suman Gurjar, D S Bisht	4 years (08/17-09/22)	Not presented
7.	Web-enabled Inventory of Natural Water Springs of Tawi River Catchment of Jammu and Kashmir State of India for Vulnerability Analysis and Developing Adaptive Measures for Sustaining Tawi River	S S Rawat (PI) P G Jose, Suman Gurjar, D S Bisht	3 years (01/19-09-22)	No comments
8.	Changing the fate of the Hindon river by evaluating the impact of agriculture on the water balance: Developing a template for a cleaner Ganga river	Sudhir Kumar, (<i>Proj. Coordinator</i>), M. K. Sharma, (PI), Suhas Khobragade, Anjali, Vishal Singh, SM Pingale, Nitesh Patidar, Surjeet Singh.	5 years (04/22-03/27)	Not presented

RECOMMENDED WORK PROGRAMME FOR THE YEAR 2022-23

S. N.	Project Title	Study Team	Duration	Status
<u>INTERNAL STUDIES:</u>				
1.	Assessment of dissolved radon concentration in groundwater of Uttarakhand	Hukam Singh (PI), M Someshwar Rao, Soban Singh Rawat, Vipin Agarwal	1 ¾ years (04/21- 12/22)	Continuing Study
2..	Assessment of the Possible Impact of Climate Change on Evapotranspiration for Different Climatic Regions Of India	SD Khobragade (PI), Dr. Vishal Singh, Sudhir Kumar	3 years (04/22- 03/25)	New Study
3.	Ascertaining the efficacy of use of State of the art technologies for spring mapping and sustainability of springs through suitable interventions	Soban Singh Rawat, (PI) Sudhir Kumar, Santosh M. Pingale, P K Mishra, D. S. Bisht, Rajesh Singh	3 years (04/22- 03/25)	New Study
4.	Studies for selected springs of Tehri Garhwal region, Uttarakhand	MS Rao (PI) and Team		Chairman suggested that instead of Tehri Garhwal, a proposal on study of springs of North-East region may be formulated.
<u>SPONSORED PROJECTS:</u>				
1.	Dating very old ground waters of deeper aquifers in Ganga Plains, India	M. Someshwar Rao (PI) Sudhir Kumar	3 Years (06/16 - 12/22)	Continuing Study IAEA under CRP
2.	Chemical & Isotopic Characterization of Deep Aquifer Groundwater of Middle Ganga Basin	Sudhir Kumar (PI) M. Someshwar Rao Vipin Aggarwal	3 ½ year (01/18 – 06/22)	Continuing Study NHP (PDS)
3.	Integrated Study on groundwater dynamics in the coastal aquifers of West Bengal for sustainable groundwater management	M. S. Rao (PI), Sudhir Kumar A. R. Senthil Kumar V. S. Jeyakanthan	3 ½ years (01/18- 06/22)	Continuing Study NHP (PDS)
4.	Development of a comprehensive plan for conservation and sustainable management of Bhimtal and Naukuchiatal lakes, Uttarakhand	Suhas Khobragade (PI) Sudhir Kumar	3 years (01/18- 06/22)	Continuing Study NHP (PDS)
5.	Groundwater Rejuvenation As Climate change Resilience for marginalized and gender sensitive GangeS (GRACERS)	Sudhir Kumar (PI) SM Pingale	2 years (06/19 – 09/22)	Continuing Study (IIT Bombay, Mumbai)

S. N.	Project Title	Study Team	Duration	Status
6.	Web-GIS Based Spring Inventory for Vulnerability Assessment and Hydro-Geological Investigation of Selected Springs for Sustaining Local Water Demand in Ravi Catchment of Himachal Pradesh	S S Rawat (PI) Sudhir Kumar P G Jose, Suman Gurjar, D S Bisht	4 Years 17/08)– 0922/)	Continuing Study NHP (PDS)
7.	Web-enabled Inventory of Natural Water Springs of Tawi River Catchment of Jammu and Kashmir State of India for Vulnerability Analysis and Developing Adaptive Measures for Sustaining Tawi River	S S Rawat (PI) P G Jose, Suman Gurjar, D S Bisht	3 years (01/19- 09/22)	Continuing Study (NMHS)
8.	Leachate transport modelling for Gazipur landfill site for suggesting ameliorative measures	Anjali (PI) Sudhir Kumar, J. V. Tyagi M. K. Sharma Partner: CGWB (Delhi unit)	3½ years (11/19 – 06/23)	Continuing Study NHP (PDS) Transferred from EHD
9.	Changing the fate of the Hindon river by evaluating the impact of agriculture on the water balance: Developing a template for a cleaner Ganga river	Sudhir Kumar, (Proj. Coordinator), M. K. Sharma, (PI), Suhas Khobragade, Anjali, Vishal Singh, SM Pingale, Nitesh Patidar, Surjeet Singh.	5 years (04/22- 03/27)	DST

SURFACE WATER HYDROLOGY DIVISION

Dr. A.K.Lohani, Sc G & Head, Surface Water Hydrology Division presented the various activities of the division. The number of research papers published in various journals, lectures delivered in various training courses and number of M.Tech./Ph.D. students guided/under guidance during the period were also reported. The concerned PI of the study presented the progress of his/ her completed and new internal studies during the working group meeting. Sponsored studies and ongoing internal studies are not presented. The record of discussions for the respective study is given below:

Work Program for the Year 2021-22

S. N.	Title	Status and Recommendations/ Suggestions
Completed Internal Studies		
1	Application of unified-extreme-value (UEV) distribution for flood frequency: (1) Mahi & Sabermati subzone – 3a (2) Upper Narmada -3e. Study Group: S.K. Singh DOS: April 2021 DOC: March 2022	Status: Completed Study presented.
2	Assessment of Climate Change Impact on Water Availability and Agriculture in part of Banas basin Study Group: Archana Sarkar, Surjeet Singh, Suman Gurjar, Sunil Gurrapu	Status: Completed Chairman suggested to fine tune the report including rewriting the section on key messages of the study and submit the final

	DOS: Nov. 2018 DOC: March 2022	report for review.
3	Evaluation of seasonal extreme rain events across river basins of India in 3D global temperature change scenario. Study Group: Ashwini Ranade, Archana Sarkar DOS: April 2018 DOC: Sept. 2021	Status: Completed Study presented.
4	Evaluation of the influence of low-frequency atmosphere-ocean oscillations on annual floods in the Godavari and Narmada River Basins. Study Group: Sunil Gurrapu, Ashwini Ranade, J.P. Patra DOS: Nov 2018 DOC: Oct. 2021	Status: Completed Dr. S S Grewal, inquired on how this study could be useful to an implementing agency to plan watershed management plan. The PI of the study responded saying that the relationships established in this study could be useful to estimate water availability in the watershed, which can be useful in planning a better management plan for a watershed. Dr. Ramakar Jha, NIT Patna inquired about the opposite correlations in the case of gauges from Narmada basins. The PI of the study said that the monsoon rainfall across central India was shown to be least affected by PDO or ENSO, as studied by Krishnamurthy & Krishnamurthy, 2013. So, the opposite correlations were as expected. Dr. Jha also suggested that instead of developing linear relationships, non-linear regressions could be developed using all the indices used in this study. The PI of the study agreed with Dr. Jha and said that multi-linear or non-linear regressions may be developed based on the relationships established in this study. Dr. C T Dhanya, IIT Delhi said that statistically significant correlations between annual floods and PDO, could be misleading because many of the flow gauges were regulated along the basins. The PI of the project said that the significant correlations were also seen in the natural gauges, and the reservoir operations could also be influenced indirectly by these oscillations, i.e. on the water available in the basin. Dr. Dhanya agreed that if the correlation is significant in the natural gauges also, this can be accepted. Dr. Ashok Das, agreed with the PI of the project that the opposite correlations in the case of gauges from Narmada basin are because of the opposite relationships between monsoon rainfall and PDO in this region, as established by Krishnamurthy & Krishnamurthy, 2013. Mr. N N Rai, CWC was asking (online) about

		<p>the impact of climate change on PMP in Indian watersheds, but the question was not clearly heard because of connectivity issues. The PI of the project said that the literature review on the same has been done and a status report was prepared. Dr. J V Tyagi suggested that the same report shall be shared with Mr. Rai and ask for a review of the report.</p> <p>Dr. J V Tyagi, suggested that the title of the project should be changed to show the names of the study basins, i.e. Godavari and Narmada.</p>
Completed Sponsored Studies		
1	<p>Hydrological modelling in Alaknanda basin and assessment of climate change impact (NMSHE)</p> <p>Study Group: A.K. Lohani, Sanjay K. Jain, Archana Sarkar, V.S. Jeyakanthan, L.N. Thakural</p> <p>DOS: April 2016 DOC: March 2021</p>	<p>Status: Completed</p> <p>Study not presented.</p>
2	<p>Rainfall-Runoff Modelling of Selected Basin based on LULC pattern and development of Correlation (NHP)</p> <p>Study Group: A.K. Lohani, R.K. Jaiswal, Sushant Jain; Sanjay Agarwal, Shailendra Kumar</p> <p>DOS: Oct. 2019 DOC: April 2022</p>	<p>Status: Completed</p> <p>Study not presented.</p>
Ongoing Sponsored Studies		
1	<p>Dam break studies of Kandaleru and Pulichintala dams in Andhra Pradesh (NHP)</p> <p>Study Group: P C Nayak, Y.R.Satyaji Rao, A.K. Lohani, B. Venkatesh, A. R. S. Senthil Kumar, T. Thomas</p> <p>DOS: Sept 2019 DOC: April 2023</p>	<p>Status: Ongoing</p> <p>Study not presented.</p>
Ongoing Internal Studies		
1	<p>Probabilistic dam break flood wave simulation and flood risk assessment for preparation of EAP for Mahi Bajaj Sagar dam in Rajasthan</p> <p>Study Group: J.P. Patra, Rakesh Kumar, Pankaj Mani, Sunil Gurrapu</p> <p>DOS: August 2020; DOC: July 2022</p>	<p>Status: Ongoing</p> <p>Study not presented.</p>
2	<p>Uncertainty in rating curves and discharge estimation</p> <p>Study Group: Sanjay Kumar, L. N. Thakural, Sunil Gurrapu, N.K. Bhatnagar, J P Patra</p> <p>DOS: April 2021; DOC: March 2023</p>	<p>Status: Ongoing</p> <p>Study not presented.</p>

RECOMMENDED WORK PROGRAMME FOR THE YEAR 2022-23

ONGOING SPONSORED STUDIES				
S. N.	Title	Study Team	Duration	Status & Comments
1	Dam break studies of Kandaleru and Pulichintala dams in Andhra Pradesh (NHP)	P C Nayak Y.R.Satyaji Rao A.K. Lohani B. Venkatesh A. R. S. Senthil Kumar T. Thomas	3 year (Sept 2019 to April 2023)	On-going
ONGOING INTERNAL STUDIES				
1	Probabilistic dam break flood wave simulation and flood risk assessment for preparation of EAP for Mahi Bajaj Sagar dam in Rajasthan.	J.P. Patra Rakesh Kumar Pankaj Mani Sunil Gurrapu	2 years (July 2020 to August 2022)	On-going
2	Uncertainty in rating curves and discharge estimation	Sanjay Kumar L. N. Thakural Sunil Gurrapu N.K. Bhatnagar J P Patra	2 Years (April 2021 to March 2023)	On-going
NEW INTERNAL STUDIES				
1	Development of Cloud Data Based Integrated Framework to Forecast Flood for Efficient Operation of Reservoirs	Dr. A. K. Lohani, Sc-G Dr. R. K. Jaiswal, Sc-E Mr. J. P. Patra, Sc-D Dr. P. C. Nayak, Sc-F Dr. Vishal Singh, Sc-D	Two Years April 2022 – March 2024	No specific action Suggested
2	Application of unified-extreme-value (UEV) distribution for flood frequency: selected rivers of U.S.A.	S.K. Singh	Six month (April 2022 to Sept. 2022)	No specific action Suggested
3	Application of unified-extreme-value (UEV) distribution for flood frequency: Comparison of results using GEV distribution	S.K. Singh	Six month (Oct. 2022 to March 2023)	No specific action Suggested
4	Flood Forecasting under Changing Climate Conditions - Role of Machine Learning and Conceptual/Physical based Model	P. C. Nayak A. K. Lohani J. P. Patra Sunil Gurrapu T. Thomas Om Prakash Jatin Malhotra	3 Year (July2022 to June2025)	No specific action Suggested

5	Hydrological Study to conserve the water resources of Bikaner, Rajasthan	L. N. Thakural M. K. Shama R. K. Jaiswal J. P. Patra P. K. Mishra Nitesh Patidaar N. K. Bhatnagar Jatin Malhotra Anil Kumar Chhangani	2 Year (July2022 to June2024)	Dr. A. K Saraf, working group member, suggested to modify the name of study by substituting revival and restoration instead of conservation.
6	Review of design flood and dam break analysis of Khadakhai Dam in Odisha	J.P.Patra A. K. Lohani Pankaj Mani P. C. Nayak Sanjay Kumar	3 Year (April2022 to March2025)	No specific action Suggested
7	Climate change scenarios for Andhra Pradesh and its impact on streamflow and groundwater levels in Pennar River basin	Sunil Gurrapu Y R S Rao Nitesh Patidar R Venkat Raman	2 Year (April2022 to March2024)	Dr. C T Dhanya suggested that a separate objective should be added in this project to evaluate and reduce (optimize) the uncertainty in the projected hydrological scenarios. She said such analysis will be important because this project being an implementable research, the implementing agency would want to know how to handle the uncertainty. The PI of the project agreed to the same and an appropriate objective will be framed after discussing it with the other member of the team. Dr. Ramakar Jha suggested that a basic literature review should have been presented either in the proposal or during the presentation. The PI of the project informed that the objectives have been framed after discussing with the Chief Engineer

				of the implementing agency.
8	Investigation on occurrences of extreme rain events across Northwest Himalaya in relation to global atmospheric thermal and circulation changes	Ashwini Ranade P.K. Mishra Sunil Gurrapu	3 years (April2022 to March2025)	The committee members appreciated the importance of the study as well suggested minor modification in the title of the project.
9	Investigating gap areas, current trends and future directions of research in Climate Change Impact on Hydrology and water Resources in India through Scientometrics	Archana Sarkar Jyoti Patil Rohit Sambare Charu Pandey	1.5 Year (May2022 to Oct2023)	No specific action Suggested

Training Courses/Workshops and Research Publications Completed During 2021-22

Trainings/ Workshops Organized	Research publications				
	International Journals	National Journals	International Conferences	National Conferences	Chapters in books
13	3	1	7	4	2

Training Courses/Workshops and Research Publications Planned During 2022-23

Trainings/ Workshops to be Organized	Research publications				
	International Journals	National Journals	International Conferences	National Conferences	Chapters in books
10	2	4	5	5	2

WATER RESOURCES SYSTEMS DIVISION

Dr. Sanjay K Jain (SKJ), Sc. G and Head, presented an overview of the Division – scientific strength, the ongoing studies, sponsored & consultancy studies, technical publications and training courses organized. Thereafter, internal studies were presented by the respective PIs as given below:

SN	Study	Status and Recommendations/ Suggestions
Completed Sponsored/ Internal Studies		
1.	Title: Upgradation of NIH_ReSyP to .NET Platform – a Reservoir Operation Package Team: D. Chalisgaonkar (DC); M. K. Goel Duration: 1 year (08/20-03/22) Funding: NIH Status: Completed	DC presented the progress of the completed study. She informed that significant efforts have been made for the finalization of the revised version of NIH_ReSyP – 2022. All the 20 modules and their forms in .NET framework have been developed. Based on the inputs from the users, substantial improvements in the previous modeling system have been made. She informed that the following new modules have been added: <ul style="list-style-type: none"> • Storage-Yield-Reliability relationship

		<ul style="list-style-type: none"> Instant estimation of reservoir inflow using rate of rise Modules added to help operator in finding actual release to be made depending on the prevalent policy. Instant estimation of release for flood control Spillway discharge rating table Instant spillway discharge estimation <p>She also informed that the help files for different modules are provided along with the software, so no separate report will be prepared and the output will be only in the form of software.</p>
2.	<p>Title: Real-time snow cover information system for Upper Ganga basin (Sub-project – 2).</p> <p>Team: D. S. Rathore; (Now Deepa Chalisgaonkar is PI) V. S. Jeyakanthan; L. N. Thakural;</p> <p>Duration: 5 years (01/16-03/21) (Extended till Sept., 2021)</p> <p>Funding: DST</p> <p>Status: Completed</p>	<p>A special session of one-hour duration was allotted to briefly present the important outcomes of the eleven studies jointly conducted under National Mission for Sustaining the Himalayan Ecosystem (NMSHE). Dr. M. K. Goel, Project Coordinator, NMSHE presented the studies on behalf of all the Investigators. Dr Sanjay K Jain, Smt Deepa Chalisgaonkar, Dr M. K. Nema, and Dr. P. K. Mishra contributed during the presentation. Dr Goel informed that the study was completed by September, 2021 and the final report has been prepared. He also shared the hard copy of the report with the members.</p>
3.	<p>Title: Glacial Lakes & Glacial Lake Outburst Flood (GLOF) in Western Himalayan Region (Sub-project – 3).</p> <p>Team: Sanjay K. Jain; A. K. Lohani; Sudhir Kumar; Praveen Thakur (IIRS)</p> <p>Duration: 5 years (01/16-03/21) (Extended till Sept., 2021)</p> <p>Funding: DST</p> <p>Status: Completed</p>	
4.	<p>Title: Assessment of downstream impact of Gangotri glacier system at Dabrani and future runoff variations under climate change scenarios (Sub-project – 4)</p> <p>Team: Sanjay K. Jain; Sharad K. Jain (Retd.); P. K. Mishra; M. Arora; AP Dimri (JNU)</p> <p>Duration: 5 years (01/16-03/21) (Extended till Sept., 2021)</p> <p>Funding: DST</p> <p>Status: Completed</p>	
5.	<p>Title: Observation and modelling of various hydrological processes in a small watershed in Upper Ganga basin (Sub-project – 5)</p> <p>Team: M K Nema; Sharad K. Jain (Retd.); Sanjay K. Jain; P K Singh, P. K. Mishra; P. K. Agarwal; AP Dimri (JNU)</p>	

	<p>Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Completed</p>	
6.	<p>Title: Water Census and Hotspot analysis in selected villages in Upper Ganga basin (Sub-project – 11). Team: P. K. Mishra; M. K. Nema; Pradeep Kumar Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Completed</p>	
Ongoing Sponsored/ Internal Studies		
1.	<p>Title: Snow and glacier contribution and impact of climate change in Teesta river basin in Eastern Himalaya Team: Sanjay K. Jain; P. K. Singh; M. Arora; A. K. Lohani; Vishal Singh; Duration: 3 years (11/19-11/22) Funding: NMHS-MoEF Status: Ongoing</p>	Not presented.
2.	<p>Title: Assessment of seasonal variations in Hydrology and Cryosphere of upper Ganga Basin Team: Vishal Singh (VS); A. P. Dimri (JNU); Sanjay K. Jain Duration: 3 years (06/19-11/22) Funding: NRDMS-DST Status: Ongoing</p>	Not presented.
3.	<p>Title: Development of Water Accounts for the different sub-basins of Brahmaputra and Barak River Basins in the state of Meghalaya Using Water Accounting Plus (WA+) Framework. Team: P K Singh (PKS); P K Mishra; P K Agarwal Duration: 2 years (08/20-07/22) Funding: NHP Status: Ongoing</p>	Not presented.
4.	<p>Title: Development of Water Accounts for the different sub-basins in the state of Nagaland Using Water Accounting Plus (WA+) Framework. Team: P K Mishra (PKM); P K Singh; P K Agarwal Duration: 2 years (06/21-05/23) Funding: NHP Status: New</p>	Not presented.

5.	<p>Title: Long term hydrological assessment for the development of water security plan into three sub-basins namely Barak, Minor rivers draining into Bangladesh and Minor rivers draining into Myanmar sub-basins in the state of Mizoram</p> <p>Team: Vishal Singh (VS); M K Nema; P K Singh; Vanlalpekhluo Sailo (SDO from Mizoram); Lalruatkima (JE from Mizoram)</p> <p>Duration: 2.5 years (06/21-05/24)</p> <p>Funding: NHP</p> <p>Status: New</p>	Not presented.
6.	<p>Title:Impacts of glacier and climate change on runoff for selected basins of Himalayan region</p> <p>Team: Vishal Singh (VS); Sanjay K. Jain (SKJ); Manohar Arora</p> <p>Duration: 2 years (08/20-07/22)</p> <p>Funding: NIH</p> <p>Status: Ongoing</p>	<p>VS presented the study on ‘Impacts of glacier and climate change on runoff for selected basins (3 Nos) of Himalayan region’. He presented the outcome of the studies of the two catchment modelled so far. He said that the study of third catchment is under progress. The work related to impact of climate change is under progress and will be completed in next three months. He informed the work carried out for Baspa basin has already been published in Journal of Hydrology. The members asked about the validation of contribution of snow and glaciers. Dr. VS and Dr. SKJ informed that the results related to melt from snow/glacier combined have been compared with the previous works. For validation of snow and glacier melt separately. Dr. Bhism Kumar suggested to compare the results with isotope analysis based results. Chairman/Director said that the detailed analysis of isotopes for the separation of snow + glacier Q can be taken as a new study in the next phase after the submission of the present work. Dr. M K Goel informed that isotopic analysis has been carried for upper Ganga basin under NMSHE and the outcome of the study can be considered for comparison. VS noted the suggestions.</p>
7.	<p>Title:Monitoring and Hydrological Modelling of Henvel watershed in Lesser Himalaya</p> <p>Team: M K Nema; Sanjay K Jain; P K Mishra; P K Agarwal;</p> <p>Duration: 3 years (08/20-07/23)</p> <p>Funding: NIH</p> <p>Status: Ongoing</p>	<p>MKN presented the progress pertaining to third objective of the study, i.e., soil moisture modelling. He informed that an empirical model based on meteorological observations was already developed and presented in the previous working group meeting. In this meeting, Dr Nema explained the application of artificial intelligence (AI) in soil moisture modeling using different AI models such as MLP-ANN, DNN, SVM, MLR etc. The predicted soil moisture based on the AI model was satisfactory. The performance of the DNN model outplayed rest of the models as stated above. He further informed that a few Hybrid-AI models are also being developed and tested on the experimental catchments. The results shall be shared in the coming WG meetings. Director NIH suggested to run the SWAT model with the longest observed data</p>

		likely to be generated with due course of time. The working group members made no specific suggestions or comments during the presentation.
8.	<p>Title: Seasonal Characterization of Gangotri Glacier melt runoff and simulation of streamflow variation under different climate scenarios</p> <p>Team: M. Arora (MA); P K Mishra; Vishal Singh</p> <p>Duration: 3 years (04/18-03/22)</p> <p>Funding: NIH</p> <p>Status: Ongoing</p>	<p>MA presented the progress of the study. He informed the house that the data could not be collected for the ablation period of 2020 and 2021 because of Covid 19 outbreak. The progress achieved in the characterization of suspended sediment in the Gangotri Glacier melt stream was presented before the working group. It was informed that wind also plays a crucial role in the melting of glaciers and in this particular glacier the percentage of Cold katabatic and Warm anabatic wind in the years 2016-2019 is 56% and 44% respectively. HBV model was used for the simulation of streamflow. The model was calibrated for the years 2016-17 and validated for the year 2018-19. The coefficient of determination R² for the calibration period and validation period were 0.77 and 0.71 respectively. Director NIH asked as to why SNOWMOD is not used for this analysis. In its response it was informed that SNOWMOD has been used in earlier studies but now in this study the role of aspect has also been included. However, a comparison will be made between the output of two models in future. Dr A K Saraf wanted to know the role of debris cover on the glacier melting. The results obtained from small experiments carried out earlier on the debris cover were discussed.</p>
New Internal/ Sponsored Studies		
1.	<p>Title: Spatio-temporal Water Availability under Changing Climate and Land use Scenarios in Wainganga River Basin</p> <p>Team: M K Nema (MKN); P K Mishra;</p> <p>Duration: 2 years (04/22-03/24)</p> <p>Funding: NIH</p> <p>Status: New</p>	<p>MKN presented proposed new study on River Wainganga with the aim to examine the basin's water resources availability and, more importantly, to estimate the influence of current and future changes in climate and land use on the basin's water balance. He informed that he has already made a visit of the study area and discussed the study with stakeholders. A few specific comments made by the WG members during the presentation are as follows:</p> <ol style="list-style-type: none"> 1. The study should include the groundwater component. The proposal has been modified with an added objective and a team member from the groundwater division has been included. 2. Few changes were recommended in the listed objectives of the study, which has been incorporated. Dr M K Goel suggested to modify the second objective suitably. <p>Dr. Nema said that the comments/suggestions will be incorporated in the study.</p>

2.	<p>Title:Monitoring and Assessment of Mountain Ecosystem and Services in North-West Himalaya (Phase-II): Monitoring and Modeling of Hydrological Processes in Glaciated and Non-Glaciated Watersheds of North-West Himalaya</p> <p>Team: M K Nema; Sanjay K Jain (SKJ); Praveen Thakur (IIRS)</p> <p>Duration:3 years (04/22-03/25)</p> <p>Funding: IIRS</p> <p>Status: New</p>	SKJ presented the proposed new study which is a collaborative study with IIRS, Dehradun. He said that this project is multi institutional. He informed that the signing of MOU of the study has been already done with IIRS, Dehradun. He informed about the study areas to be considered for the study. No specific comments were received from Working Group Members.
3.	<p>Title:Hydrological Assessment of Ungauged Basins (Aghanashini, Dasanakatte, Sita Nadi, Madisala Hole, Swarna Nadi and Gurupur River Basins) of the West Flowing Rivers in the Western Ghat Region of Karnataka</p> <p>Team: P K Singh (PKS); Vishal Singh, Sanjay K Jain</p> <p>Duration:3 years (04/22-03/25)</p> <p>Funding: WRD, Karnataka</p> <p>Status: New</p>	PKS presented the New study which is referred by WRD, Karnataka under NHP. He elaborated the objectives and informed about the involvement of the Engineers of WRD. Director asked to involve one scientist from RC, Belgavi.

RECOMMENDED WORK PROGRAMME FOR THE YEAR 2022-2023

SN	Title	Study Team	Duration	Funding (Rs. Lakhs)
Ongoing Sponsored/ Internal Studies				
1.	Snow and glacier contribution and impact of climate change in Teesta river basin in Eastern Himalaya	Sanjay K. Jain P K Singh; M. Arora A K Lohani; Vishal Singh	3 years (11/19-11/22)	NMHS- MoEF (143)
2.	Assessment of seasonal variations in Hydrology and Cryosphere of upper Ganga Basin	Vishal Singh; Sanjay K. Jain; A P Dimri (JNU)	3 years (06/19-11/22)	NRDMS- DST (23.19)
3.	Development of Water Accounts for the different sub-basins of Brahmaputra and Barak River Basins in the state of Meghalaya Using Water Accounting Plus (WA+) Framework.	P K Singh; P K Mishra; P K Agarwal	2 years (08/20-07/22)	NHP (14.50)
4.	Development of Water Accounts for the different sub-basins in the state of Nagaland Using Water Accounting Plus (WA+) Framework.	P K Mishra; P K Singh; Vishal Singh P K Agarwal	2 years (04/21-03/23)	NHP (9.00)
5.	Long term hydrological assessment for the development of water security plan into three sub-basins namely Barak, Minor rivers draining into Bangladesh and Minor rivers draining into Myanmar sub-basins in the state of Mizoram	Vishal Singh; M K Nema; P K Singh; Vanlalpekhlua Sailo (SDO from Mizoram); Lalruatkima (JE from Mizoram)	3 years (04/21-03/24)	NHP (25.00)

6.	Impacts of glacier and climate change on runoff for selected basins of Himalayan region	Vishal Singh; Sanjay K. Jain; Manohar Arora	2 years (08/20-07/22)	NIH (9.30)
7.	Monitoring and hydrological modeling of Herval watershed in Lesser Himalaya	M K Nema; Sanjay K Jain; P K Mishra; P K Agarwal	3 years (08/20-07/23)	NIH (10.22)
8.	Seasonal Characterization of Gangotri Glacier melt runoff and simulation of streamflow variation under different climate scenarios	M. Arora; P K Mishra; Vishal Singh	3 years (04/21-03/23)	NIH
New Internal/ Sponsored Studies				
1.	Spatio-temporal Water Availability under Changing Climate and Landuse Scenarios in Wainganga River Basin	M K Nema; P K Mishra	2 years (04/22-03/24)	NIH
2.	Monitoring and Assessment of Mountain Ecosystem and Services in North-West Himalaya (Phase-II): Monitoring and Modeling of Hydrological Processes in Glaciated and Non-Glaciated Watersheds of North-West Himalaya	M K Nema; Sanjay K Jain; P. K. Mishra; Praveen Thakur (IIRS)	3 years (04/22-03/25)	IIRS, Dehradun (30.91)
3.	Hydrological Assessment of Ungauged Basins (Aghanashini, Dasanakatte, Sita Nadi, Madisala Hole, Swarna Nadi and Gurupur River Basins) of the West Flowing Rivers in the Western Ghat Region of Karnataka	P K Singh; Vishal Singh; Sanjay K Jain;	3 years (04/22-03/25)	WRD, Karnataka (54.0)

DETAILS OF RESEARCH PUBLICATIONS DURING APRIL, 2021 - MARCH, 2022

Months	Division/RC/CFMS	Research studies	Research papers	Training courses	Training of personnel
1	Apr, 2021				
2	May, 2021				
3	June, 2021		2		2
4	July, 2021		2		
5	August, 2021			1	
6	September, 2021				
7	October, 2021		1		
8	November, 2021		1	1	
9	December, 2021		4		
10	January, 2022				1
11	February, 2022				
12	March, 2022	01	10	1	2
Total		01	20	3	5

DETAILS OF TRAINING/ WORKSHOP COMPLETED

SN	Title of Training Course/Workshop	Coordinators	Duration	Venue
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1.	Online training on “Hydrological Modeling using Soil and Water Assessment Tool (SWAT): Theory and Hands-on” from August 16-20, 2021, at NIH, Roorkee sponsored by National Hydrology Project (NHP) for 23 participants from 10 state governments water resources departments and 03 central implementing agencies.	Dr. M. K. Nema, Scientist ‘D’ Dr Vishal Singh, Scientist ‘C’	5 days	Online
2.	Training on “Water Accounting Plus (WA+) for all Northeast IAs” from November 15-19, 2021, at Meghalaya, Shillong, sponsored by National Hydrology Project (NHP).	Dr P K Singh, Scientist ‘D’ Dr P K Mishra, Scientist ‘C’	5 days	Offline
3.	Online training on “Soil and Water Assessment Tool (SWAT)” from Feb 28 to March 04, 2022, at NIH, Roorkee sponsored by Indian Council of Forestry Research and Education (ICFRE), Dehradun.	Dr. M. K. Nema, Scientist ‘D’ Dr Vishal Singh, Scientist ‘C’	5 days	Online
4.	Stakeholders’ Workshop “Snow and glacier contribution and impact of climate change in Teesta river basin, eastern Himalaya” under NMHS Project at Gangtok, Sikkim on 23/02/2022	Dr. Sanjay K Jain, Scientist ‘G’ Dr P K Singh, Scientist ‘D’	One day	Offline

RESEARCH MANAGEMENT AND OUTREACH DIVISION (RMOD)

Dr. V C Goyal, Sc. G & Head, presented an overview of the Division’s activities and progress of studies during 2021-22. He also presented tables showing the studies and outreach activities proposed for the F.Y. 2022-23. Next, he invited Er. Omkar Singh, Dr. Senthil Kumar, Dr. Jyoti Patil and Er. Rohit Sambare to present the progress of studies/project as given below:

SN	Title of Project/Study, Study Team	Status and Recommendations/Suggestions
1.	Integrated assessment of water resources for sustainable use in Upper Dhasan basin in Bundelkhand Region, Central India Team: Dr. Jyoti P Patil (PI) Dr. T. Thomas (RC-Bhopal) Dr. Prabhash K Mishra Er. Rohit Sambhare DOS: September 2020, DOC: February 2023	The results of trend analysis, climatic indices, and WEAP model were briefly presented as those were discussed during the last WG meeting. The preliminary findings of Water Accounting + framework for Betwa basin were presented. These findings can be confirmed only after discussions with the stakeholders in the basin. The queries of the members were answered by the PI and Co-PI.
2	Establishing hydrological regime and ecohydrological functions of Jhilmil Jheel	The HGM classification of wetland and its functional assessment using open source

	wetland (Haridwar District) Team: Er. Rohit Sambare (PI), Dr. V.C. Goyal, Dr. Suhas Khobragade, Dr. Gajendra Singh, Scientist (USAC, Dehradun), Shri N. R. Allaka DOS: Jul2020, DOC: Jun 2022 Extn. Sought upto August 2023	geospatial data has been presented. Sri S M Sharma suggested to include biodiversity component. The PI requested for extension of this study upto Aug 2023 due to his illness. The working group members agreed for extension of the study.
3	Hydrology-based scenario planning for water productivity and optimization of income from farming practices in Mewat Region, Haryana Team: A. R. Senthil Kumar, Omkar Singh, Rajesh Agarwal, Nageswara Rao Allaka. DOS: Jul 2020, DOC: Jun 2022 Extn. Sought upto Sep 2022	Dr S. S. Grewal suggested to consider the pattern of the crop types with respect to quality of ground water while going for the crop diversity scenario. Dr. Ramakar Jha, Professor, NIT Patna queried about the quantum of data involved in WEAP model setup. The PI informed about the sources of data for both WEAP and LINGO model.
4.	Development of Water Security Plan for Healthcare Facilities: A Pilot Study for Swami Rama Himalayan University (SRHU-HIHT), Jolly Grant, Dehradun Team: Omkar Singh (PI), V.C. Goyal, Rajesh Singh (Co-PI), Jyoti Patil, Rohit Sambare, N.R. Allaka; Team from SRHU-HIHT, Dehradun DOS: Apr 2022, DOC: Mar 2024	This is a new study in collaboration with SRHU-HIHT, Dehradun. Sh. Omkar Singh (PI) presented the proposed objectives, methodology and expected outcome. Dr. Pawan Labhasetwar, Dr. Manoj Samuel and Dr. Ramakar Jha appreciated this type of study with hospitals, and suggested to take due care with Hospital Administration about any hazardous wastes in the wastewater.
5.	Innovation Centre for Eco-Prudent Wastewater Solutions (IC-EcoWS) DST (GoI), Cost: Rs. 5.1 Crore V.C. Goyal (PI), Omkar Singh, Rajesh Singh, Jyoti P. Patil, Rohit Sambare Partners: NIH, MNIT-Jaipur, IIT-Bombay, IRMA-Ahmedabad DOS: Apr 2019, DOC: Mar 2024	This is a sponsored project of DST (GoI) and reported in the WG meeting. Hence, the progress was not presented in this meeting.

RECOMMENDED WORK PROGRAM FOR THE YEAR 2022-23

SN	Title of Project/Study	Funding	Study Team	Duration	Status
Internal Study					
1	Integrated assessment of water resources for sustainable use in Upper Dhasan basin in Bundelkhand region	NIH	Jyoti Patil (PI) T Thomas (Co-PI), P K Mishra Rohit Sambare	Sep 2020- Feb 2023	On-going
2	Establishing hydrologic regime and ecohydrological functions of Jhilmil Jheel wetland (Haridwar District, Uttarakhand)	NIH	Rohit Sambare (PI) V C Goyal (Co-PI), Suhas Khobragade, N R Allaka; Gajendra Singh-USAC, Dehradun; WI-SA, New Delhi; HESCO, Dehradun	Sep 2020- Aug 2023	On-going

3	Hydrology-based scenario planning for water productivity and optimization of income from farming practices in Mewat region, Haryana	NIH	A R Senthil Kumar (PI) Omkar Singh (Co-PI) Rajesh Agarwal, N R Allaka Scientist from KVK/Agri Univ.	Sep 2020- Aug 2022	On-going
4	Development of Water Security Plan for Healthcare Facilities: A Pilot Study for Swami Rama Himalayan University (SRHU-HIHT), Jolly Grant, Dehradun	NIH	Omkar Singh (PI) V.C. Goyal, Rajesh Singh (Co-PI), Jyoti Patil, Rohit Sambare, N.R. Allaka; Team from SRHU-HIHT, Dehradun	April 2022- Mar 2024	New Study
Sponsored Projects					
1	Innovation Centre for Eco-Prudent Wastewater Solutions (IC-EcoWS)	DST (GoI)	V.C. Goyal (PI), Omkar Singh, Rajesh Singh, Jyoti P. Patil, Rohit Sambare, Project Team, HQ (IC-EcoWS) Partners: NIH, MNIT-Jaipur, IIT-Bombay, IRMA-Anand	Apr 2019-Mar 2024	On-going

Proposed Training/Webinar/Outreach Activities of RMOD (2022-23)

S.N.	Outreach Activity	Tentative Date & Month	Place	Target Participants	Team
1	Brainstorming session on 'Water Security in a Changing Environment-Focus on Indian Himalayan Region (IHR)', during 16th Uttarakhand Science and Technology Congress	June 2022	UCOST, Dehradun	Conference participants	V. C. Goyal, J P Patil, Amrendra Bhushan
2	5-days training on 'Life Cycle Approach for Rejuvenation of Ponds and Lakes using Nature-Based Solutions' sponsored by National Water Mission (4Nos)	April 2022 May 2022 June 2022 July 2022	Bhopal Belgaum Kakinada Roorkee	R&D Institutes/ University/ Govt. Organizations	Bhopal: T Thomas Belgavi: B Venkatesh Kakinada: YRS Rao Roorkee: J P Patil, Omkar Singh, Rohit Sambhare
3	Training on GEM	June 2022	NIH Roorkee	Admn and finance staff of NIH	A. R. Senthil kumar Omkar Singh
4	Webinar on ecohydrological functioning of wetlands	Jul 2022	NIH Roorkee	Students and researchers	Rohit Sambare V C Goyal
5	Stakeholders workshop for Upper Dhasan Basin water resources assessment	May 2022	Bhopal	CWC, CGWB, State departments (Irrigation, WRD, Agril etc)	J P Patil, T Thomas, P K Mishra, Rohit Sambhare

6	Workshop/Webinar on rejuvenation of ponds and treatment of domestic wastewater through constructed wetlands	Jul 2022	NIH Roorkee	R&D Institutes/University/Govt. Organizations	NIH: Omkar Singh, V.C. Goyal, Rajesh Singh, Digambar Singh UKCEH: Laurence Carvalho & Elliot Hurst
7	Five-day training program on “Hydrology of water bodies and their development under climatic uncertainty”	Jun/Jul 2022	NIH Roorkee	Engineers in Irrigation/PHE/SWC departments	A. R. Senthil kumar, Rohit Sambare, Santosh M Pingale, N R Allaka
8	E-course on Urban hydrology	June 2022	NIH, Roorkee NIUA, Delhi	Researchers, academicians, scholars	NIH: V C. Goyal, J. P. Patil NIUA: Victor Shinde
9	Awareness Programme for School Children	July-Sep 2022	3 Schools in Roorkee/ Nearby Roorkee	School Children	Digambar Singh, Omkar Singh, A. R. Senthil kumar, Rajesh Agarwal, N R Allaka

Other Outreach Activities:

S.N.	Activity
1	<ul style="list-style-type: none"> • Preparation of Short Video on Pond Rejuvenation & CW-NTS of Ibrahimur Masahi • River Walk of Solani River • Short video on Hydrology for People @district level • Short video on vulnerability assessment under Hydrology for People series
2	<ul style="list-style-type: none"> • Coordination of 75 planned Activities at HQ & RCs under Azadi Ka Amrut Mahotsav @ India 75 • Organizing activities as per mandate of Division under Azadi Ka Amrut Mahotsav @ India 75 • Compendium of NIH activities on the activities under Azadi Ka Amrut Mahotsav @ India 75
3	<ul style="list-style-type: none"> • Any other Outreach activity on demand/assigned

Dr. V C Goyal thanked the members for their valuable contributions during deliberations in the Working Group meeting. The meeting ended with vote of thanks to the Chair.

ANNEXURE-I**List of Working Group Members who attended the 52nd WG meeting**

1.	Dr. J V Tyagi, Director, NIH	Chairman
2.	Dr. A. K Das, IMD, New Delhi	Member
3.	Sh. Sudhindra Mohan Sharma, Ex-Nodel Officer, MoDWS, Indore	Member
4.	Sh. Prashant Rai, CGWB, Dehradun	Member
5.	Dr. Manoj P.Samuel, CWRDM, Kozhikode	Member
6.	Dr. Sadhana Malhotra, Mindspace, Dehradun	Member
7.	Prof. A K Saraf, IIT Roorkee	Member
8.	Dr. Bhishm Kumar, IAEA (Retd.), Roorkee	Member
9.	Prof. Ramakar Jha, NIT, Patna	Member
10.	Dr. S S Grewal, Chandigarh	Member
11.	Prof. Varun Joshi, GGSIPU, New Delhi	Member
12.	Prof. Danya, C.T. Assistant Professor, IIT, Delhi	Member
13.	Dr. Sushil Kumar Rohella, WIHG, Dehradun	Member
14.	Dr. R K Goyal, CAZRI, Jodhpur	Member
15.	Dr. Praveen Thakur, IIRS, Dehradun	Member
16.	Dr. P R Ojasvi, ICAR-IISWC, Dehradun	Member
17.	Dr. Manohar S. Rathore, CE &DS, Jaipur	Invitee
18.	Sh. Gopal Singh Bhatti (Retd.), Pokhran, Rajasthan	Invitee
19.	Dr. Sudhir Kumar, Sc. G & Head HI Division, NIH	Member
20.	Dr. Sanjay K. Jain, Sc. G & Head WRS Division, NIH	Member
21.	Dr. M. K. Goel, Sc. G & Head GWH Division, NIH	Member
22.	Dr. A.K. Lohani, Sc. G & Head SWH Division, NIH	Member
23.	Dr. R P Pandey, Sc.G & Head EH Division, NIH	Member
24.	Dr. V C Goyal, Sc. G & Head, RMO Division, NIH	Member-Secretary

Scientists from NIH

	EH Division		RMO Division
1	Dr. M.K. Sharma, Sc.E	18	Er. Omkar Singh, Sc.F
2	Dr. Rajesh Singh, Sc.D	19	Dr. A R Senthil Kumar, Sc.F
3	Dr. Pradeep Kumar, Sc.D	20	Dr. (Mrs.) Jyoti P. Patil, Sc.D
4	Dr. Vinay K. Tyagi, Sc.D	21	Sh. Digamber Singh, Sc.D
5	Sh. Rajesh K. Nema, Sc.B	22	Sh. Rohit Sambare, Sc.B
	GWH Division		SWH Division
6	Dr. Anupama Sharma, Sc.F	23	Dr. P C Nayak, Sc.F
7	Dr. Surjeet Singh, Sc.F	24	Dr. Sanjay Kumar, Sc.E
8	Dr. Sumant Kumar, Sc.D	25	Dr. Archana Sarkar, Sc.E
9	Dr. Gopal Krishan, Sc.D	26	Dr. L.N. Thakural, Sc.D
10	Sh. Nitesh Patidar, Sc.B	27	Dr. J.P. Patra, Sc.D
11	Ms. Nidhi Kalyani, Sc.B	28	Dr. Ashwini A. Ranade, Sc.D
	HI Division	29	Sh. Sunil Gurrapu, Sc.C
12	Dr. Suhas Khobragade, Sc.F		WRS Division
13	Dr. M.S. Rao, Sc.F	29	Smt. Deepa Chalisgaonkar, Sc. G
14	Dr. Soban S. Rawat, Sc.D	30	Dr. Manohar Arora, Sc.E
15	Dr. Santosh M Pingale, Sc.C	31	Dr. P K Singh, Sc.D
16	Sh. Hukam Singh, Sc.B	32	Dr. Manish Nema, Sc.D
17	Mrs. Anjali, Sc.B	33	Dr. P K Mishra, Sc.D
		34	Dr. Vishal Singh, Sc.C
		35	Sh. P K Agarwal, Sc.B
		36	Sh. Yatveer Singh, Sc.B