

**APPROVED MINUTES OF THE
51ST MEETING OF WORKING GROUP OF NIH
HELD AT NIH, ROORKEE, DURING 14-15JUNE 2021**

The meeting was held in VC 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. 51.1: OPENING REMARKS BY THE CHAIRMAN

The Chairman, WG, welcomed the WG members and the Scientists of NIH. 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"> ▪ Suggested use of modern tools like AI, IOT ▪ Address water related issues with changes in landuse and water use ▪ Also address equity and economics aspects of water security
2.	Dr. Pawan Labhasetwar	<ul style="list-style-type: none"> ▪ Use of IOT sensors and systems
3.	Dr. Man Singh	<ul style="list-style-type: none"> ▪ Bring out a vision paper on hydrology in future ▪ Impact of rural toilets on groundwater system and health of human beings
4.	Dr. Varun Joshi	<ul style="list-style-type: none"> ▪ Align spring studies demonstrating impacts to beneficiaries ▪ Urban flood modelling for some cities in India
5.	Prof. A K Saraf	<ul style="list-style-type: none"> ▪ Emphasized on effective presentation during meetings
6.	Dr. Bhishm Kumar	<ul style="list-style-type: none"> ▪ Address real-life water related problems faced by India ▪ Start with problems in Roorkee
7.	Dr.Kaushal K Garg	<ul style="list-style-type: none"> ▪ Attempt holistic solution through integrated approach
8.	Dr. Sadhana Malhotra	<ul style="list-style-type: none"> ▪ Document success stories ▪ Plan follow up studies for impact assessment ▪ Due attention should be given to the preparation and delivery of the presentation ▪ Carefully worded shorter titles with important keywords are easier to locate in a keyword search ▪ Objectives for the project can be stated as SMART objectives ▪ Wider dissemination of short and informative films, such as made by RMOD, to reach as many people as possible can go a long way in generating interest and desirable action in hydrology
9.	Sh. Sudhindra Mohan Sharma	<ul style="list-style-type: none"> ▪ More studies/projects dealing with drinking water security
10.	Director, NIH & Chair	<ul style="list-style-type: none"> ▪ PIs to complete pending studies ▪ Before proposing a new study, explore data availability, consent of local user departments and collaborators ▪ Find out how studies are utilized by user organizations/stakeholders

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

ITEM No. 51.2: CONFIRMATION OF MINUTES OF 50th MEETING OF WORKING GROUP

The 50th meeting of the Working group was held during 20-21 August, 2020 in VC mode. The minutes of the meeting were circulated to all the members and invitees vide letter No. **RMOD/WG/NIH-10 dated 7 Sept., 2020**. The members confirmed the minutes of the 50th Working Group meeting.

ITEM No. 51.3: 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 50th working group meeting.

ITEM Nos. 51.4& 51.5: PRESENTATION AND DISCUSSION ON THE STATUS AND PROGRESS OF THE WORK PROGRAMME FOR YEAR 2020-21 AND FINALIZATION OF THE WORK PROGRAMME FOR YEAR 2021-22

The Member-Secretary requested the respective Divisional Heads to present the progress of studies carried out during 2020-21 and also to present the proposed studies for F.Y. 2021-22. Accordingly, the progress of various studies and sponsored projects, and proposal for new studies and projects during 2021-22, 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, progress of ongoing internal studies and proposed new studies. The Comments/suggestions of Working Group members are summarized below.

Work Program for 2020-21

S. No.	Study	Suggestions/Comments
Sponsored Projects		
1.	Title: Environmental Assessment of Aquatic Ecosystem of Upper Ganga Basin Study Group: M. K. Sharma (PI), Manohar Arora, Pradeep Kumar, Rajesh Singh & D. S. Malik (GKU) Duration: 5 Years (04/16 –3/21) Sponsored by: DST (NMSHE) Status: Draft Report submitted	Dr. M. K. Sharma Sc E presented the findings of the study. Dr. Pawan Labhasetwar, NEERI appreciated the study and suggested to compare the results of other studies carried out by other workers in the region. Dr. Saraf, IITR suggested to include geological map in the report to correlate with hydro-chemistry. The suggestion was noted for compliance.
2.	Title: Ground Water Quality Assessment with Special Reference to Sulphate Contamination in Bemetara District of Chhattisgarh State and Ameliorative Measures Study Group: M. K. Sharma (PI), Surjeet Singh,	There was no specific comments from the members.

	Pradeep Kumar; Partner: WRD, Raipur & CGWB, Raipur Duration: 3½ Years (09/17 –3/21) Sponsored by: NHP-PDS Status: Project Report submitted	
3.	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 –8/21) Sponsored by: NHP-PDS Status: In-progress	Not presented.
4.	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 (11/2019 –05/23) Sponsored by: NHP-PDS Status: In-progress	Not presented.
5.	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 –06/22) Status: In-progress	Not presented
Internal Studies		
6.	Title: Water quality assessment for Haridwar District Study Group: R.K. Nema (PI), Rajesh Singh, J. V. Tyagi, R. P. Pandey & Pradeep Kumar Duration: 2.0 years (05/19-06/21) Status: Ongoing	Dr. Rajesh Singh presented the progress of the study. Dr. Bhism Kumar appreciated the study and its outcomes. He suggested that the study has very significant contributions in determining the deterioration in water quality at different areas in the Haridwar district and he suggested for further investigation to find out the causes of deterioration in next study. He also suggested that the outcomes of the study should be presented before the district administration for suitable dissemination of results of this study for the benefit of the mass. Dr. Sudhindhra Mohan Sharma suggested to incorporate layer of drainage map with the maps of water quality parameters. He also suggested publicizing the outcomes of the study.
7.	Title: Simulation of Non-Point Source Pollution	Not presented.

	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: Ongoing	
8.	Title: Identification of Causes for deterioration of River Hindon and suggestive rejuvenation plan Study Group: M. K. Sharma (PI), Dr. Sudhir Kumar (Project Coordinator), R. P. Panday, Anupma Sharma, Anjali, Vishal Singh, Pradeep Kumar, Nitesh Patidar, Surjeet Singh, Rajesh Singh. Duration: 3 years (07/20 to 06/23)	Dr. M. K. Sharma presented the progress of the study in brief. There was no specific comments from experts.
9.	Title: Influence of Anthropogenic Factors on River Ganga in the stretch from Rishikesh to Haridwar 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)	Not presented.

Recommended Work Program for the Year 2021-22

SN	Study	Study Team	Duration/Status
Sponsored Projects (Ongoing)			
1.	Water Quality Assessment of Southwest Punjab Emphasizing Carcinogenic Contaminants and their Possible Remedial Measures	Rajesh Singh (PI) Pradeep Kumar, M. K. Sharma, Sumant Kumar Partner: Irrigation Department, Punjab	3 Years (09/17-08/21) Sponsored by: NHP-PDS Status: In-progress
2.	Leachate Transport Modeling for Gazipur landfill site for suggesting ameliorative measures	Anjali (PI) Sudhir Kumar, J. V. Tyagi M. K. Sharma Partner: CGWB (Delhi unit)	3 Years (11/2019 – 5/2023) Sponsored by: NHP-PDS Status: In-progress
3.	Water Efficient Irrigation by Using SCADA System For Medium Irrigation Project (Mip) Shahnehar	R.P. Pandey, (PI). Jagdeesh Patra, Rajesh Singh, N. K. Bhatnagar, Shekhar Saini	3-years (12/17-06/22) Status: In-progress
Sponsored Projects (New)			
4.	Isotopic and geochemical approach to study vulnerable confined and unconfined drinking water aquifers in Varanashi and surrounding area	Rajesh Singh (PI) R. P. Pandey BHU, Varanashi (Lead) Other Collaborators: BARC, Mumbai, ICER, Hungary	3 years 07/ 2021-07/24 (proposed collaborative study)
Internal Study (Ongoing)			
5.	Water quality assessment of Haridwar District	R.K. Nema (PI) Rajesh Singh, J. V. Tyagi, Pradeep Kumar	2 years (05/19-06/21) Status: completed
6.	Simulation of Non-Point Source Pollution Processes in Song River	Pradeep Kumar (PI) J. V. Tyagi, M. K. Sharma, Rajesh Singh, R. K. Nema	4 years (11/19-10/23) Status: In-progress

7.	Development of rejuvenation plan for Hindon river system	M. K. Sharma (PI) Sudhir Kumar, R. P. Pandey, Anupma Sharma, Anjali, Vishal Singh, Pradeep Kumar, Nitesh Patidar, Surjeet Singh, Rajesh Singh	3 Years (07/20-06/23) Status: In-progress
8.	Influence of Anthropogenic Factors on River Ganga in the stretch from Rishikesh to Haridwar	Rajesh Singh (PI) J. V. Tyagi, R. P. Pandey, R.K. Nema, Pradeep Kumar, M. K. Sharma	2 Years (06/20-05/22) Status: In-progress
Internal Studies (New Study)			
9.	Understanding Arsenic mobilization in groundwater of Haridwar and formulating remediation measures	Rajesh Singh (PI) R. K. Nema, Sumant Kumar, Pradeep Kumar, M. K. Sharma	3 Years (July 2021 – June 2024) Status: Proposed Dr. Bhism Kumar appreciated the proposed study and suggested that this is the right time to take up this study, for the benefit of society, before the problem exaggerates.

GROUND WATER HYDROLOGY DIVISION

Dr. M. K. Goel, Scientist 'G' presented a brief overview, status of studies and activities carried out by the division since the 50th Working Group meeting held in August, 2020. He gave an account of scientific personnel available in the division; internal, sponsored and consultancy projects - ongoing and completed; and also future activities planned by the division for the year 2021-22. Dr. Goel informed that four in-house R&D studies and ten sponsored studies were approved for the year 2020-21.

In addition to the above studies, scientists of the division have a major role in activities of the National Hydrology Project (NHP), DSS (Planning and Management) in selected states, development of groundwater module for “*Spatial Hydrologic Model (SHM)*” 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. The progress of following studies was presented by the respective Principal Investigator:

Work Program for the year 2020-21

SN	Title of Project/Study	Study Team	Duration	Status & Comments/ Suggestions	Funding
Internal Studies					
1. NIH/GWH/ NIH/19-21	Application of Satellite Data Products for Water Resources Assessment	Suman Gurjar (PI), Vishal Singh, Surjeet Singh, C. P. Kumar, P. K. Singh	May 2019- Apr 2021	Completed Presented It was informed that Mrs. Suman Gurjar is leaving NIH and joining IMD by middle of July, 2021 and will submit the report before her relieving.	Internal
2. NIH/GWH/ NIH/19-20	The Regional Hydrological Impact of Agricultural Water Saving Measures in the Gangetic Plains	Sumant Kumar (PI), C. P. Kumar, Archana Sarkar, Surjeet Singh, P. K. Mishra	Aug 2019- Mar 2021	Completed Presented Dr. Arun K. Saraf asked about the existence of relationship between geological formation and groundwater level and PI clarified the same. WG members appreciated the work completed in the scoping study and suggested to provide the outcomes of the study to user agency.	Internal
3. NIH/GWH/ DoWR/20- 20	Impact on Salinity of River Mahadayi due to Proposed Dams on River Mahadayi	Gopal Krishan (PI), B. Venkatesh, Nitesh Patidar	July 2020- May 2021	Completed Presented	Internal
4. NIH/GWH/ NIH/20-22	Integrated GEE-MODFLOW based Groundwater Recharge Assessment System for Hindon River System	Nitesh Patidar (PI), Gopal Krishan, Suman Gurjar	Aug 2020- Jul 2022	On-going Presented	Internal
Sponsored Projects					
5. NIH/GWH/B GS/17-20	Groundwater Fluctuations and Conductivity Monitoring in Punjab - New Evidence of Groundwater Dynamics in Punjab from High Frequency Groundwater Level and Salinity Measurements	Gopal Krishan (PI), Surjeet Singh, C. P. Kumar, M. S. Rao <i>From: BGS, UK</i> Dr. Dan Lapworth (PI) Prof. Alan MacDonald	Dec 2017- Nov 2021	On-going Not presented	Sponsored by BGS, UK

6. NIH/GWH/ NMSHE/16 -20	Study of River - Aquifer Interactions and Groundwater Potential in the Upper Ganga Basin up to Dabrani	Surjeet Singh (PI), C.P. Kumar, R.J. Thayyen, Sudhir Kumar, Manohar Arora, Gopal Krishan, Nitesh Patidar, Anjali	Jan 2016- Mar 2021	Completed Presented	Sponsored by DST under NMSHE
7. NIH/GWH/ PDS/17-20	Hydro-geochemical Evolution and Arsenic Occurrence in Aquifer of Central Ganges Basin	Sumant Kumar (PI), Sudhir Kumar, Rajesh Singh, Gopal Krishan, Anju Chaudhary, Ram Chander Partner Organization: MWRD, Bihar Collaborator: Brijesh Yadav, IIT Roorkee; N.S. Maurya, NIT Patna	Dec 2017- Jul 2021	Completed Presented Dr. Bhisim Kumar suggested PI to carry out dating to know the age of GW and a relation may be established with arsenic concentration.	Sponsored by NHP under PDS
8. 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, <i>IIT-Roorkee:</i> M. L. Kansal, Brijesh Yadav (PI) <i>Sehgal Foundation, Gurgaon:</i> Lalit Mohan Sharma	Dec 2017- Jul 2022	On-going Not presented	Sponsored by NHP under PDS
9. 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), M. K. Goel, Sudhir Kumar, Suman Gurjar, Gopal Krishan	Dec 2017- Jul 2022	On-going Not presented	Sponsored by NHP under PDS
10. NIH/GWH/ DST/18-20	Future Secular Changes and Remediation of Groundwater Arsenic in the Ganga River Basin - FAR GANGA	B. Chakravorty (India Lead), Surjeet Singh (Dy. Lead), Sumant Kumar, Gopal Krishan, Suman Gurjar <i>Other India Partners:</i> IITR, IITKg, MCS, Patna <i>UK Partners:</i> Univ. of Manchester, BGS, Salford University, Univ. of Birmingham	Jan 2018- Dec 2021	On-going Not presented	DST-Newton Bhabha – NERC - India -UK Water Quality Research Programme

11. NIH/GWH/ DST/18-20	Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Micro-pollutants	Anupma Sharma (India Lead), Sumant Kumar, Gopal Krishan, Suman Gurjar, M. K. Sharma <i>Other Indian Partners:</i> IIT Ropar, IIT Jodhpur <i>UK Partner:</i> Cranfield University <i>Project Partners:</i> Water Harvest, Excellent Development (UK based NGOs)	Jan 2018- Dec 2021	On-going Presented On a query regarding collection of baseline data to study the impact of rainwater harvesting structures, it was informed that historical records are available for the study area and in addition, lysimeter experiments mimicking the field conditions are also being carried out to generate data.	DST-Newton Bhabha-NERC-India-UK Water Quality Research Programme
12. NIH/GWH/ CEHM/18-22	Integrated Management of Water Resources for Quantity and Quality in Upper Yamuna Basin upto Delhi	Anupma Sharma (PI), Sanjay K. Jain, Archana Sarkar, M. K. Sharma, L. N. Thakural, Sumant Kumar, Suman Gurjar, Vishal Singh, Nitesh Patidar <i>Partner Organizations:</i> Irrigation & WRD Haryana, Groundwater Dept. UP, Yamuna Basin Organization, CWC, New Delhi	Apr 2018- Mar 2022	On-going Not presented	Special Project under “Centre of Excellence ” (NHP)
13. 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 (Lead NIH), C. P. Kumar, Suman Gurjar, Nitesh Patidar <i>(Lead: CAZRI Jodhpur, Partners: NIH Roorkee, IISWC Dehradun, CSWRI Bikaner, CIAH Bikaner, NIAM Jaipur)</i>	Mar 2019- Feb 2024	On-going Not presented	Sponsored by DST

14. NIH/WRS/N MSHE/16-20	Development of a project website and hydrological database in Upper Ganga basin (SP-1)	M. K. Goel (PI), M. Arora, A. K. Lohani, D. S. Rathore, D. Chalisgaonkar, A. R. S. Kumar, Surjeet Singh, P. Mani, A. Sarkar, M. K. Nema, Suman Gurjar, P. K. Mishra	Jan 2016- Sep 2021	On-going Not presented	Sponsored by DST under NMSHE SP-1,
15. NIH/GWH/C CRBF/20-23	Expansion of the Indo-German Competence Centre for Riverbank Filtration – CCRBF	Gopal Krishan (PI & Coordinator)	Jul 2020- Jun 2023 <i>Status: Approval is under consideration of MEA</i>	On-going Not presented	Sponsored by Federal Ministry of Education & Research, Germany

Training Courses Organized	
1	Online training course on “ Groundwater Modelling using Visual MODFLOW ” under National Hydrology Project (NHP) during 06-10 Jul, 2020.
2	Online training course on “ Groundwater Modelling using Visual MODFLOW ” under National Hydrology Project (NHP) during 18-22 Jan, 2021.
3	Online training course on “ Groundwater Salinity, Issues and Management Solutions ” under National Hydrology Project (NHP) during 17-19 Feb, 2021.
4	Online training course on “ Principles of Groundwater Hydrology ” under National Hydrology Project (NHP) during 24-26 Feb, 2021.
5	Online training course on “ Groundwater Management & Modelling ” under National Hydrology Project (NHP) during 08-12 Mar, 2021.
Research Publications	
1	International Journal - 7
2	National Journal - 1
3	International Conferences - 17

Recommended Work Program for the year 2021-22

SN	Title of Project/Study	Study Team	Duration	Status & Comments/ Suggestions	Funding
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	Aug 2020- Jul 2022	On-going	Internal

Sponsored Projects					
2. NIH/GWH/B GS/17-20	Groundwater Fluctuations and Conductivity Monitoring in Punjab - New Evidence of Groundwater Dynamics in Punjab from High Frequency Groundwater Level and Salinity Measurements	Gopal Krishan (PI), Surjeet Singh, C. P. Kumar, M. S. Rao <i>From: BGS, UK</i> Dr. Dan Lapworth (PI) Prof. Alan MacDonald	Dec 2017- Nov 2021	On-going	Sponsored by BGS, UK
3. 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, <i>IIT-Roorkee</i> :M. L. Kansal, Brijesh Yadav (PI) <i>Sehgal Foundation, Gurgaon</i> : Lalit Mohan Sharma	Dec 2017- Jul 2022	On-going	Sponsored by NHP under PDS
4. 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), M. K. Goel, Sudhir Kumar, Suman Gurjar, Gopal Krishan	Dec 2017- Jul 2022	On-going	Sponsored by NHP under PDS
5. NIH/GWH/ DST/18-20	Future Secular Changes and Remediation of Groundwater Arsenic in the Ganga River Basin - FAR GANGA	B. Chakravorty (India Lead), Surjeet Singh (Dy. Lead), Sumant Kumar, Gopal Krishan, Suman Gurjar <i>Other India Partners:</i> IITR, IITKg, MCS, Patna <i>UK Partners:</i> Univ. of Manchester, BGS, Salford University, Univ. of Birmingham	Jan 2018- Dec 2021	On-going	DST- Newton Bhabha – NERC - India -UK Water Quality Research Programme
6. NIH/GWH/ DST/18-20	Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Micro-pollutants	Anupma Sharma (India Lead), Sumant Kumar, Gopal Krishan, Suman Gurjar, M. K. Sharma <i>Other Indian Partners:</i> IIT Ropar, IIT Jodhpur <i>UK Partner:</i> Cranfield University <i>Project Partners:</i> Water Harvest, Excellent Development (UK based NGOs)	Jan 2018- Dec 2021	On-going	DST- Newton Bhabha- NERC- India-UK Water Quality Research Programme

7. NIH/GWH/ CEHM/18- 22	Integrated Management of Water Resources for Quantity and Quality in Upper Yamuna Basin upto Delhi	Anupma Sharma (PI), Sanjay K. Jain, Archana Sarkar, M. K. Sharma, L. N. Thakural, Sumant Kumar, Suman Gurjar, Vishal Singh, Nitesh Patidar <i>Partner Organizations:</i> Irrigation & Water Resources Dept. Haryana, Groundwater Dept. UP, Yamuna Basin Organization, CWC, New Delhi	Apr 2018- Mar 2022	On-going	Special Project under “Centre of Excellence ” (NHP)
8. 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 (Lead NIH), C. P. Kumar, Suman Gurjar, Nitesh Patidar <i>(Lead: CAZRI Jodhpur, Partners: NIH Roorkee, IISWC Dehradun, CSWRI Bikaner, CIAH Bikaner, NIAM Jaipur)</i>	Mar 2019- Feb 2024	On-going	Sponsored by DST
9. NIH/WRS/N MSHE/16-20	Development of a project website and hydrological database in Upper Ganga basin (SP-1)	M. K. Goel (PI), M. Arora, A. K. Lohani, D. S. Rathore, D. Chalisgaonkar, A. R. S. Kumar, Surjeet Singh, P. Mani, A. Sarkar, M. K. Nema, Suman Gurjar, P. K. Mishra	Jan 2016- Sep 2021	On-going	Sponsored by DST under NMSHE SP-1,
10. NIH/GWH/C CRBF/20-23	Expansion of the Indo-German Competence Centre for Riverbank Filtration – CCRBF	Gopal Krishan (PI & Coordinator)	Jul 2020- Jun 2023 <i>Status: Approval is under consideration of MEA</i>	On-going	Sponsored by Federal Ministry of Education & Research, Germany

Training Courses Proposed

1	Four Training courses shall be organized by the Division during 2021-22 under the National Hydrology Project (NHP).
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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 2020-21.

Table 1: Details of training Courses/Workshops organised and Proposed by HI Division during April 2020-March, 2021

S. N.	Title of Training Course/Workshop	Duration	Venue	No. of Participants
1.	Stakeholder Workshop on “Web-GIS based Spring Information System”	02 Dec., 2020	NIH, Roorkee (Virtual mode)	91
2.	Advanced Tools & Techniques for Hydrological Investigations	22-26 Feb., 2021	NIH, Roorkee (Virtual mode)	49

Table 2: Details of Research Publications by HI Division during April 2020-March, 2021

	Published	Accepted	Communicated
Books/Book Chapter	01	-	-
International Journals	09	-	08
National Journals	1	01	01
International Conferences	02	-	-
National Conferences	-	-	-

The progress of each individual study for the year 2020-21 and the proposal for a new study was presented by the respective P.I. of the study. The comments/actions suggested by the working group for various studies are as follows:

Work Programme for the year 2020-21

SN	Project	Study Team	Duration	Status & Comments/suggestions	Funding
INTERNAL STUDIES					
1.	Hydrological Investigations of Selected Springs in Tehri-Garhwal District of Uttarakhand	S M Pingale (PI), Sudhir Kumar Suhas Khobragade S. S. Rawat Rajeev Gupta	Apr 2019 – Mar 2022	<i>Continuing Study</i> Dr. Bhisim Kumar suggested to contact Uttarakhand Government and get funding for this study. Director, NIH suggested to take this	

SN	Project	Study Team	Duration	Status & Comments/ suggestions	Funding
				study outcome to the logical end and show utility of this study to the end users.	
2.	Assessment of Impact of Land Use and Land Cover Change on Groundwater Recharge in Parts of Sabarmati River Basin, Gujarat	M S Rao (PI), Sudhir Kumar, Hukum Singh, V. K. Agarwal, Vishal Gupta and S.L. Srivastava + Central University , Gujrat	Apr 2021 –Mar 2023	Revised New Study Dr. Bhisim Kumar advised to use tritium tagging technique only at places where estimation of vertical recharge to groundwater is of utmost necessity.	
3.	Integrated Hydrological Investigations of Renuka Lake, Himachal Pradesh, for Its Conservation and Management	SD Khobragade (PI), Sudhir Kumar; Hukam Singh, Rajeev Gupta, Vipin Agarwal and Forest & Wildlife Dept., Govt. of HP	Jul 2020 – Jun 2023	Continuing Study Dr. Khobragade informed that it was told during the field visit that the lake catchment is a protected reserved forest hence permission of the Dept. of Forests & Wildlife, Govt. of HP is necessary for carrying out the study. He further informed that communication in this regard has been made with the Forest Department but response is still awaited. Dr. Bhisim Kumar suggested that efforts be continued to get the response from the department.	
<u>SPONSORED PROJECTS</u>					
1.	Understanding of hydrological processes in Upper Ganga basin using isotopic techniques	Suhas Khobragade (PI) Sudhir Kumar Rajesh Singh M. Arora	Apr 2016 – Mar 2021 Extended to Sep2021 by sponsoring authorities	Continuing Study Dr. Bhisim Kumar commented that different studies have given different contribution show/ice, GW etc to	NMSHE Project

SN	Project	Study Team	Duration	Status & Comments/ suggestions	Funding
				river Ganga. The final report should include a review of these studies and possible reasons for variation in reported contribution	
2.	Dating very old ground waters of deeper aquifers in Ganga Plains, India	MS Rao (PI) Sudhir Kumar S.K. Verma	Jun 2016 –May 2019 Extended till Dec 2022 by sponsoring authorities	Continuing Study No specific action suggested	IAEA
3.	Chemical & Isotopic Characterization of Deep Aquifer Groundwater of Middle Ganga Basin	Sudhir Kumar (PI) M. Someshwar Rao, S.K. Verma	Jan 2018 – Jan 2022	Continuing Study No specific action suggested	PDS under NHP
4.	Integrated Study on groundwater dynamics in the coastal aquifers of West Bengal for sustainable groundwater management	M.S. Rao (PI), Sudhir Kumar, V.S. Jeyakanthan. SWID, Govt. of West Bengal	Mar 2018 - Jan 2022	Continuing Study No specific action suggested	PDS under NHP
5.	Development of a comprehensive plan for conservation and sustainable management of Bhimtal and Naukuchiatal lakes, Uttarakhand	Suhas Khobragade (PI) Sudhir Kumar Rajiv Gupta	Jan 2018 – Jun 2022	Continuing Study No specific action suggested	PDS under NHP
6.	Unravelling Submarine Discharge (SGD) zones along the Indian subcontinent and its islands (Mission SGD) – Pilot Study	Sudhir Kumar (PI) MS Rao SM Pingale BK Purandra YRS Rao	Apr 2019 – Mar 2020 Extended upto Sep 2021 by sponsoring authorities	Continuing Study No specific action suggested	MoES through NCESS
7.	Groundwater Rejuvenation As Climate change Resilience for marginalized and gender sensitive Ganges (GRACERS)	Sudhir Kumar (PI) MS Rao SM Pingale	Jun 2019 – May 2021 Extended upto May 2022 by sponsoring authorities	New study No specific action suggested	IIT Bombay, Mumbai
8.	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	Aug 2017- Mar 2022	Continuing Study No specific action suggested	PDS under NHP

SN	Project	Study Team	Duration	Status & Comments/ suggestions	Funding
9.	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	Jan 2019 – Dec 2021	<i>Continuing Study</i> No specific action suggested	NMHS

Recommended Work Programme for the year 2021-22

S. N.	Project Title	Study Team	Duration	Status
<u>INTERNAL STUDIES:</u>				
1.	Hydrological investigations of selected springs in Tehri Garhwal District , Uttarakhand	S M Pingale (PI), Sudhir Kumar S. D. Khobragade Soban Singh Rawat Er. Padam Singh, (UUHF, Ranichauri) Rajeev Gupta	Apr 2019-Mar 2022	Continuing Study
2.	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	Apr 2021 – Mar 2023	<i>Revised New Study</i>
3.	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.	Jul 2020-Jun 2023	Continuing Study
4.	Assessment of dissolved radon concentration in groundwater of Uttarakhand	Hukam Singh (PI), M Someshwar Rao, Soban Singh Rawat, Vipin Agarwal	Apr 2021-Dec 2022	New Study
<u>SPONSORED PROJECTS</u>				
1.	Understanding of hydrological processes in Upper Ganga basin by using isotopic techniques	Suhas Khobragade (PI) Sudhir Kumar, Rajesh Singh, M. Arora	Apr 2016 – Mar 2021 Extended upto Sep 2021	NMSHE Project
2.	Dating very old ground waters of deeper aquifers in Ganga Plains, India	M. Someshwar Rao (PI) Sudhir Kumar	Jun 2016 – Dec 2022	IAEA under CRP
3.	Chemical & Isotopic Characterization of Deep Aquifer Groundwater of Middle Ganga Basin	Sudhir Kumar (PI) M. Someshwar Rao Vipin Aggarwal	Jan 2018 – Jan 2022	NHP (PDS)

S. N.	Project Title	Study Team	Duration	Status
4.	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	Jan 2018 – Jan 2022	NHP (PDS)
5.	Development of a comprehensive plan for conservation and sustainable management of Bhimtal and Naukuchiatal lakes, Uttarakhand	Suhas Khobragade (PI) Sudhir Kumar	Jan 2018 – June 2022	NHP (PDS)
6.	Unravelling Submarine Discharge (SGD) zones along the Indian subcontinent and its islands (Mission SGD) – Pilot Study	Sudhir Kumar (PI) SM Pingale, M. Someshwar Rao, BK Purandara, YRS Rao	Apr 2019 – Sep 2021	Study under NCESS, MoES
7.	Groundwater Rejuvenation As Climate change Resilience for marginalized and gender sensitive GangeS (GRACERS)	Sudhir Kumar (PI) M. Someshwar Rao SM Pingale	Jun 2019 – May 2022	(IIT Bombay, Mumbai)
8.	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	Aug 2017 – Mar 2022	NHP (PDS)
9.	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	Jan 2019– Dec 2021	NMHS

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 study during the working group meeting. The record of discussions for the respective study is given below:

Work Program for the year 2020-21

S. N.	Title of Project/ Study, Study Group, Start/ Completion Dates	Status and Recommendations/ Suggestions
Completed Internal Studies		
1	Application of unified-extreme-value (UEV) distribution for flood frequency: (1) Lower Narmada & Tapi subzone-3b, (2) Lower Godavari subzone-3f Study Group: Sushil K. Singh DOS: April, 2020; DOC: March, 2021	Status: Completed Not presented.
2	Development of regional relationships for water availability analysis and flood estimation for lower Godavari basin (3f) Study Group: Sanjay Kumar, Rakesh Kumar, J.P. Patra,	Status: Completed Study presented. Queries from Dr. Pawan

	Pankaj Mani DOS: April 2017; DOC: March, 2021	Labhasetwar, NEERI were answered.
3	Study of Hydrological Changes in selected Watersheds in view of Climate Change in India (completed) Study Group: L.N. Thakural, D.S. Rathore, Surjeet Singh, Sanjay K. Jain, Sharad K. Jain DOS: April 2015; DOC: Dec., 2020	Status: Completed Study presented.
4	Evaluation of water quality of Government schools in Roorkee block, District Haridwar (completed) Study Group: N.K. Bhatnagar, M.K. Sharma, L.N. thakural, Reena Rathore DOS: Oct 2018; DOC: sept. 2020	Status: Completed Report is under Review
Ongoing Sponsored Studies		
1	Hydrological modelling in Alaknanda basin and assessment of climate change impact (NMSHE) (Ongoing) Study Group: A.K. Lohani, Sanjay K. Jain, Archana Sarkar, V.S. Jeyakanthan, L.N. Thakural DOS: April, 2020; DOC: September, 2021 Funding: DST	Status: Ongoing Not presented.
2	Rainfall-Runoff Modelling of Selected Basin based on LULC pattern and development of Correlation (NHP) Study Group: A.K. Lohani, R.K. Jaiswal, Sushant Jain, Sanjay Agarwal, Shailendra Kumar DOS: April, 2020; DOC: April, 2022 Funding: NHP	Status: Ongoing Not presented.
Ongoing Internal Studies		
1	Assessment of Climate Change Impact on Water Availability and Agriculture in part of Banas basin (Ongoing) Study Group: Archana Sarkar, Surjeet Singh, Suman Gurjar, Sunil Gurrapu DOS: Nov. 2018; DOC: Mar 2021. Funding: NIH	Status: Ongoing Study presented. Dr S.K. Manik from IMD enquired why IMD data of precipitation and temperature was not used for rainfall runoff modeling to which Dr Sarkar replied that daily data of precipitation for 19 stations was readily available from WRD, Rajasthan at no cost so it was used, and about temperature data, as gridded data was available in the institute and 90% of the study area does not have very high altitude so it was used. Another member from NEERI, Nagpur appreciated the study and enquired whether it was possible to assess water allocation under climate change scenarios from the reservoir to which Dr Sarkar replied that it is possible provided accurate discharge data is made available.

		Chairman agreed the extension of the study to upto August 2021
2	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: Mar 2021.	Status: Ongoing Study presented. Dr Ranade requested for the 6 months extension in order to complete the remaining project work, which has been accepted by the committee members.
3	Evaluation of the influence of low-frequency atmosphere-ocean oscillations on annual floods in the watersheds of the Indian subcontinent Study Group: Sunil Gurrapu, Ashwini Ranade, J.P. Patra DOS: Nov 2018; DOC: October 2021.	Status: Ongoing Not presented.
4	Probabilistic dam break flood wave simulation and flood risk assessment for preparation of EAP for Mahi Bajaj Sagar dam in Rajasthan Study Group: J.P. Patra, Rakesh Kumar, Pankaj Mani, Sunil Gurrapu DOS: August 2020; DOC: July 2022.	Status: Ongoing Not presented.

Recommended Work Program for the year 2021-22

SN	Title of Project/Study	Study Team	Duration	Status & Comments	Funding
Ongoing Sponsored Studies					
1	Hydrological modelling in Alaknanda basin and assessment of climate change impact(NMSHE)	A.K.Lohani Sanjay K. Jain Archana Sarkar V.S. Jeyakanthan L.N. Thakural	5 years (April 2016 to September 2021)	On-going	DST
2	Rainfall-Runoff Modelling of Selected Basin based on LULC pattern and development of Correlation (NHP)	A.K. Lohani R.K. Jaiswal Sushant Jain WRD Rajasthan Sanjay Agarwal Shailendra Kumar	24 months (Oct. 2019 to April 2022)	On-going	NHP
Ongoing Internal Studies					
1	Assessment of Climate Change Impact on Water Availability and Agriculture in part of Banas basin	Archana Sarkar Surjeet Singh Suman Gurjar Sunil Gurrapu	2.5 years (Nov. 2018 August 2021).	On-going Extended upto August 2021	NIH
2	Evaluation of seasonal extreme rain events across river basins of India in 3D global temperature change scenario.	Ashwini Ranade Archana Sarkar	3 years (April 2018 to October 2021)	On-going Extended upto October 2021	NIH

3	Evaluation of the influence of low-frequency atmosphere-ocean oscillations on annual floods in the watersheds of the Indian subcontinent	Sunil Gurrapu Ashwini Ranade J.P. Patra	3 years (Nov 2018 to October 2021)	On-going	NIH
4	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	NIH
New Internal Studies					
1	Application of unified-extreme-value (UEV) distribution for flood frequency: (1) Mahi & Sabermati subzone – 3a (2) Godavari subzone-3e.	S.K. Singh	One year (April 2021 to March 2022)	New Study Not Presented	NIH
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)	New Study Presented	NIH

Training Courses/Workshops and Research Publications Completed During 2020-21

Trainings/ Workshops Organized	Research publications				
	International Journals	National Journals	International Conferences	National Conferences	Chapters in books
21	20	1	35	16	7

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

Trainings/ Workshops to be Organized	Research publications				
	International Journals	National Journals	International Conferences	National Conferences	Chapters in books
10	10	1	18	8	4

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. Dr. Jain remembered Late Dr. Renoj J. Thayyen, Sc-E, who left us on 22 April, 2021 due to Covid-19, for his valuable contributions to the division and NIH. Thereafter, individual studies were presented by the respective PIs as given below:

Work Programme for the year 2020-2021

SN	Study	Status and Recommendations/ Suggestions
Completed Sponsored/ Internal Studies		
1.	<p>Title: Developments of Water Accounts for Subarnarekha Basin Using Water Accounting Plus (WA+) Framework</p> <p>Team: P. K. Singh (PKS); P. K. Mishra; M. K. Goel; Suman Gurjar</p> <p>Duration: 2 years (12/18-12/20)</p> <p>Funding: NIH</p> <p>Status: Completed</p>	<p>PKS presented the completed study on “Developments of Water Accounts for Subarnarekha Basin Using Water Accounting Plus (WA+) Framework”. He described methodology in brief. He explained all the results obtained and conclusions drawn from the study. SKJ informed that the draft report of the study has been prepared and submitted for review. The work was appreciated by the experts/members of the working group. Dr. Sudhindra Sharma inquired whether we can have the estimates of the land and water productivity at the block/district level. PKS replied that the maps available are of coarse resolution, in case fine resolution maps are available then the study can be done at district/block level. Dr. Manoj Samuel asked whether we can include climate scenarios in the WA+ Framework. The inclusion of the climate scenarios in WA+ is not possible as it requires a lot of data, which is only available in real or near-real time and scenarios are not available for these datasets.</p>
2.	<p>Title: Real time flood modelling using HEC-RTS modelling framework</p> <p>Team: Vishal Singh (VS); A. K. Lohani</p> <p>Duration: 2 years (12/18-12/20)</p> <p>Funding: NIH</p> <p>Status: Completed</p>	<p>VS presented study on Real time flood modelling using HEC-RTS framework in Periyar river basin. He briefly presented the different components under HEC-RTS and methodology through a flow chart. He explained the results with different scenarios. SKJ informed that the draft report of the study has been prepared and submitted for review. Director, NIH suggested to add the basin name (Periyar) in the study title. Dr. Dimri suggested if NIH can develop its own new integrated flood model for flood forecasting in a new project in which he also shown his willingness of participation. Dr. Manoj Samuel shown interest in the study and asked if some study jointly can be taken up. SKJ asked VS to send the report to Dr. Manoj and then formulation of joint study can be explored.</p>
Ongoing Sponsored/ Internal Studies		
1.	<p>Title: Development of a project website and hydrological database in Upper Ganga Basin (Sub-project – 1).</p> <p>Team: M. K. Goel; M. Arora; A. K. Lohani; D. S. Rathore; D. Chalisgaonkar; A. R. S. Kumar; S.</p>	Not presented.

	<p>Singh; P. Mani; A. Sarkar; M. K. Nema; P. K. Mishra Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Ongoing</p>	
2.	<p>Title: Real-time snow cover information system for Upper Ganga basin (Sub-project – 2). Team: D. S. Rathore; (Now Deepa Chalisgaonkar is PI) V. S. Jeyakanthan; L. N. Thakural; Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Ongoing</p>	Not presented.
3.	<p>Title: Glacial Lakes & Glacial Lake Outburst Flood (GLOF) in Western Himalayan Region (Sub-project – 3). Team: Sanjay K. Jain; A. K. Lohani; Sudhir Kumar; Praveen Thakur (IIRS) Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Ongoing</p>	Not presented.
4.	<p>Title: Assessment of downstream impact of Gangotri glacier system at Dabrani and future runoff variations under climate change scenarios (Sub-project – 4) Team: Renoj J. Thayyen; Sanjay K. Jain; Sharad K. Jain (Retd.); P. K. Mishra; M. Arora; AP Dimri (JNU) Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Ongoing</p>	Not presented.
5.	<p>Title: Observation and modelling of various hydrological processes in a small watershed in Upper Ganga basin (Sub-project – 5) Team: M K Nema; Sharad K. Jain (Retd.); Renoj J. Thayyen; Sanjay K. Jain; P K Singh, P. K. Mishra; P. K. Agarwal; AP Dimri (JNU) Duration: 5 years (01/16-03/21) (Extended till Sept., 2021) Funding: DST Status: Ongoing</p>	Not presented.

6.	<p>Title: Water Census and Hotspot analysis in selected villages in Upper Ganga basin (Sub-project – 11).</p> <p>Team: P. K. Mishra; M. K. Nema; Renoj J. Thayyen; Pradeep Kumar</p> <p>Duration: 5 years (01/16-03/21) (Extended till Sept., 2021)</p> <p>Funding: DST</p> <p>Status: Ongoing</p>	Not presented.
7.	<p>Title: Investigating Water Stress using Hydro-meteorological and Remote Sensing data</p> <p>Team: D. S. Rathore; (Now L. N. Thakural is PI); Sanjay Kumar; B. Venkatesh; M. K. Jose; T. Chandramohan</p> <p>Duration: 3 years (08/2017-09/2020) (Extended up to June, 2021)</p> <p>Funding: PDS under NHP</p> <p>Status: Ongoing</p>	Not presented.
8.	<p>Title: Snow and glacier contribution and impact of climate change in Teesta river basin in Eastern Himalaya</p> <p>Team: Sanjay K. Jain; P. K. Singh; M. Arora; Renoj J. Thayyen; A. K. Lohani; Vishal Singh;</p> <p>Duration: 3 years (11/19-11/22)</p> <p>Funding: NMHS-MoEF</p> <p>Status: Ongoing</p>	Not presented.
9.	<p>Title: Assessment of seasonal variations in Hydrology and Cryosphere of upper Ganga Basin</p> <p>Team: Renoj J. Thayyen; Vishal Singh; A. P. Dimri (JNU); Sanjay K. Jain</p> <p>Duration: 3 years (06/19-11/22)</p> <p>Funding: NRDMS-DST</p> <p>Status: Ongoing</p>	Not presented.
10.	<p>Title: Permafrost mapping and characterization of Ladakh Region</p> <p>Team: Renoj J. Thayyen; A. P. Dimri (JNU) will lead now; G. Jeelani (KU); V. Agnihotri (GBPNI)</p> <p>Duration: 3 years (11/19-11/22)</p> <p>Funding: NMHS-MoEF</p> <p>Status: Ongoing</p>	Not presented.
11.	<p>Title: Development of Water Accounts for the different sub-basins of Brahmaputra and Barak River Basins in the state of Meghalaya Using Water</p>	PKS presented the progress of the study on “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” which is

	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	undertaken under NHP. Dr V. C. Goyal asked to include the latest time period, i.e., up to 2020 in this WA+ study. The PI responded affirmatively on the inclusion of the latest datasets (open source satellite datasets) depending on the availability of the data.
12.	Title: Seasonal Characterization of Gangotri Glacier melt runoff and simulation of streamflow variation under different climate scenarios Team: M. Arora; P K Mishra; Vishal Singh Duration: 3 years (04/18-03/22) Funding: NIH Status: Ongoing	This study was not presented in the WG. This study is under progress. SKJ informed that the visit to the Bhojwasa site and observations could not be taken in 2020 due to Covid. In 2021, the site visit was planned in April, 2021 but due to Covid, it was not taken up. If situation improves then the site visit will be taken up from July 2021. During this period the collected data is being processed and analyzed.
13.	Title: Impacts of glacier and climate change on runoff for selected basins of Himalayan region Team: Vishal Singh (VS); Sanjay K. Jain (SKJ); Manohar Arora Duration: 2 years (08/20-07/22) Funding: NIH Status: Ongoing	VS presented the study on 'Impacts of glacier and climate change on runoff for selected basins of Himalayan region'. He presented the outcome of one of the basin i.e. Baspa basin modelled so far. He informed that snow and glacier maps of 2000, 2006, 2011 and 2018 have been prepared to see the impact of glacier change on runoff. He further said that the whole basin is divided in 17 watersheds. SKJ informed that the calibration of the model has been carried out for the basin up to Sangla site then the same model was applied on different watersheds to see the impact of glacier change on each watershed. He informed that a paper in Journal of Hydrology (Int. Journal) has already been published from the work carried out so far. Dr. Dimri asked about the melt runoff range from different watersheds given in the conclusion. He said that the conclusion presented is contradictory. VS informed that the range is given on the basis of each watershed response however response varies as per the total area of glaciers in the different watersheds. SKJ informed that the details of outcome for each watershed will be given in results/conclusions of the report so that there will not be any confusion in the outcome.
14.	Title: Monitoring and Hydrological Modelling of Henvel watershed in Lesser Himalaya (Phase II) Team: M K Nema; Sanjay K Jain; Renoj J. Thayyen ; P K Mishra; P K Agarwal; Manohar Arora Duration: 3 years (08/20-07/23) Funding: NIH Status: Ongoing	MKN presented the progress of the study focused on soil moisture modelling. In the beginning, he informed that in Phase I instrumentation and data collection was done in the experimental Henvel catchment. He said that in this phase, data collection is continued and under progress. He explained the development of an empirical model based on the meteorological observations made. Parameters of the model were optimized using GRG non-linear optimization methods, and equations were developed for different soil depths. He presented the model calibration and validation results, which indicated that the model performed very well at shallow soil depths, but the efficacy of the model was not as good at the deeper soil depths. Director, NIH suggested to correct the name of the study in the agenda notes of the working group meeting and also asked to compare soil moisture output of

		the SWAT model with the observed values and simulated output of this empirical model. MKN noted the suggestion. The working group members made no specific suggestions or comments during the presentation.
15.	Title: Upgradation of NIH_ReSyP to .NET Platform– a Reservoir Operation Package Team: D. Chalisgaonkar; M. K. Goel Duration: 1 year (08/20-07/21) Funding: NIH Status: Ongoing	This study was not presented in the WG. This study is under progress and will be completed in July 2021.

Recommended Work Programme for the year 2021-2022

SN	Title of Project/Study	Study Team	Duration	Status & Comments	Funding
Ongoing Sponsored/ Internal Studies					
1.	Development of a project website and hydrological database in Upper Ganga Basin (Sub-project – 1)	M. K. Goel; M. Arora; A. K. Lohani; D. S. Rathore; D. Chalisgaonkar; A. R. S. Kumar; S. Singh; P. Mani; A. Sarkar; M. K. Nema; P. K. Mishra	5 years (01/16-03/21) (Extended till Sept., 2021)	On-going Not presented	DST
2.	Real-time snow cover information system for Upper Ganga basin (Sub-project – 2)	D. S. Rathore; (Now Deepa Chalisgaonkar is PI) V. S. Jeyakanthan; L. N. Thakural;	5 years (01/16-03/21) (Extended till Sept., 2021)	On-going Not presented	DST
3.	Glacial Lakes & Glacial Lake Outburst Flood (GLOF) in Western Himalayan Region (Sub-project – 3)	Sanjay K. Jain; A. K. Lohani; Sudhir Kumar; Praveen Thakur (IIRS)	5 years (01/16-03/21) (Extended till Sept., 2021)	On-going Not presented	DST
4.	Assessment of downstream impact of Gangotri glacier system at Dabrani and future runoff variations under climate change scenarios (Sub-project – 4)	Renoj J. Thayyen ; Sanjay K. Jain; Sharad K. Jain (Retd.) P. K. Mishra; M. Arora; AP Dimri (JNU)	5 years (01/16-03/21) (Extended till Sept., 2021)	On-going Not presented	DST
5.	Observation and modelling of various hydrological processes in a small watershed in Upper Ganga basin (Sub-project – 5)	M K Nema; Sharad K. Jain (Retd.); Renoj J. Thayyen ; Sanjay K. Jain; P K Singh, P. K. Mishra; P. K. Agarwal AP Dimri (JNU)	5 years (01/16-03/21) (Extended till Sept., 2021)	On-going Not presented	DST
6.	Water Census and Hotspot analysis in selected villages in Upper Ganga basin (Sub-project – 11)	P. K. Mishra; M. K. Nema; Renoj J. Thayyen ; Pradeep Kumar	5 years (01/16-03/21) (Extended till Sept., 2021)	On-going Not presented	DST
7.	Investigating Water Stress using Hydro-meteorological and Remote Sensing data	D. S. Rathore; (Now L. N. Thakural is PI); Sanjay Kumar; B. Venkatesh	3 years 2017-2020 (Extended)	On-going Not presented	PDS under NHP

		M. K. Jose; T. Chandramohan	upto June, 2021)		
8.	Snow and glacier contribution and impact of climate change in Teesta river basin in Eastern Himalaya	Sanjay K. Jain P. K. Singh; M. Arora Renoj J. Thayyen ; A. K. Lohani; Vishal Singh;	3 years (11/19-11/22)	On-going Not presented	NMHS-MoEF
9.	Assessment of seasonal variations in Hydrology and Cryosphere of upper Ganga Basin	Renoj J. Thayyen Vishal Singh A. P. Dimri (JNU) Sanjay K. Jain	3 years (06/19-11/22)	On-going Not presented	NRDMS -DST
10.	Permafrost mapping and characterization of Ladakh Region	Renoj J. Thayyen ; A. P. Dimri (JNU) will lead now; G. Jeelani (KU); V. Agnihotri (GBPNI)	3 years (11/19-11/22)	On-going Not presented	NMHS-MoEF
11.	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)	On-going Presented	NHP
12.	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 (04/18-03/22)	On-going Not presented	NIH
13.	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)	On-going Presented	NIH
14.	Monitoring and Hydrological Modelling of Henvel watershed in Lesser Himalaya (Phase II)	M K Nema; Sanjay K Jain; Renoj J. Thayyen ; P K Mishra; P K Agarwal	3 years (08/20-07/23)	On-going Not presented	NIH
15.	Upgradation of NIH_ReSyP to .NET Platform– a Reservoir Operation Package	D. Chalisgaonkar M. K. Goel	1 year (08/20-07/21)	On-going Not presented	NIH
New Internal/ Sponsored Studies					
1.	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; P K Agarwal	2 years (06/21-05/23)	New Presented Due care will be taken to use the latest available open access dataset preferably up to 2020, as advised by Dr. V. C. Goyal.	NHP

2.	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; Vanlalpekhluo Sailo (SDO from Mizoram); Lalruatkima (JE from Mizoram)	2.5 years (06/21-05/24)	New Presented No specific comments were received from the members.	NHP
3.	Monitoring of Hydrological Processes in Glaciated and Non Glaciated Watersheds of North-West Himalaya	M K Nema; Sanjay K Jain; Manohar Arora; Vishal Singh; Praveen Thakur (IIRS)	3 years (07/21-06/24)	Presented This study was not presented in the WG. SKJ informed that this study will be taken up after MOU is signed with IIRS.	IIRS

DETAILS OF RESEARCH PUBLICATIONS DURING APRIL, 2020 - MARCH, 2021

Research studies	Research papers	Training courses	Training of personnel
3	43	9	16

DETAILS OF TRAINING/ WORKSHOP COMPLETED DURING APRIL, 2020 - MARCH, 2021

SN	Title of Training Course/Workshop	Coordinators	Duration	Venue
1.	Training on Hydrologic modelling using HEC RAS and HEC HMS	Dr. Vishal Singh, Scientist 'C' and Dr. A. K. Lohani, Scientist 'G'	5 days	Online
2.	One-day online workshop on "Machine Learning for Remote Sensing Data Classification" conducted by Indian Institute of Remote Sensing (IIRS), Dehradun	Dr. M. K. Nema, Scientist 'D'	1 day	Online
3.	Training Programme on "Remote Sensing Application in Agricultural Water Management" from August 03-07, 2020 conducted by Indian Institute of Remote Sensing (IIRS), Dehradun.	Dr. M. K. Nema, Scientist 'D' and Dr. P. K. Mishra, Scientist 'C'	5 days	Online
4.	Training Programme on "Hydrological Modeling using SWAT" for more than 65 participants.	Dr. M. K. Nema, Scientist 'D' and Dr Vishal Singh, Scientist 'C'	5 days September 21-25, 2020	Online
5.	Training Programme on "Understanding of Coastal ocean processes using RS and Numerical Modeling" under IIRS Outreach Programme conducted by Indian Institute of Remote Sensing (IIRS), Dehradun.	Dr. P. K. Mishra, Scientist 'C'	5 days September 21-25, 2020	Online
6.	Training Programme on "Application of Water Accounting Plus (WA+) Tool for Water Resources Management" under NHP.	Dr. P. K. Singh, Scientist 'D' and Dr P. K. Mishra, Scientist 'C'	5 days November 16-21, 2020	Online

7.	Training Programme on 'Advanced Hydrology' under National Hydrology Project (NHP).	Dr. Manohar Arora, Scientist 'E'	5 days November 23-27, 2020	Online
8.	Training Programme on "Hydrological Modeling using SWAT" from November 30-04, 2020	Dr. M. K. Nema, Scientist 'D' and Dr Vishal Singh, Scientist 'C'	5 days	Online
9.	Stakeholders' Workshop on "Snow and Glacier Contribution and Impact of Climate Change in Teesta River Basin, Eastern Himalaya a project sponsored under NMHS" at Gangtok	Dr. Sanjay K. Jain, Scientist 'G' and Dr. P. K. Singh, Scientist 'D'	February 23, 2021.	Gangtok

DETAILS OF TRAINING/ WORKSHOP PROPOSED DURING APRIL, 2021 - MARCH, 2022

SN	Title of Training Course/Workshop	Tentative Date & Month	Place	Target Participants	Team
1.	One-day Stakeholders Workshop on the Water Accounting Plus (WA+) study for the Subernarekha basin	Aug., 2021	Online	WRD officials from three states (Jharkhand, Odisha, West Bengal)	Dr. P. K. Singh and Dr. P. K. Mishra
2.	Advanced Hydrology	August 2021	On line	Under NHP	Dr. Manohar Arora and Dr. J P Patra
3.	Training Programme on "Application of Water Accounting Plus (WA+) Tool for Water Resources Management" under National Hydrology Project (NHP).	Nov. - Dec., 2021	Shillong/ Kohima	WRD officials from Meghalaya and Nagaland states	Dr. P. K. Singh and Dr. P. K. Mishra
4.	Training Programme on "Hydrological Modeling using Soil SWAT – Theory and Hand-on" under NHP.	Aug., 2021	Online	Field Engineers from IAs under NHP; State Depts.	Dr. M. K. Nema and Dr. Vishal Singh
5.	Training Programme on "Hydrological Modeling using Soil SWAT – Theory and Hand-on"	Jan., 2022	Online	Research Scholars, Academician	Dr. M. K. Nema and Dr. Vishal Singh

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 2020-21. He also presented tables showing the studies and outreach activities proposed for the F.Y. 2021-22. Individual studies were presented by the respective PIs as given below:

Work Program for the year 2020-21

SN	Title of Project/Study	Study Team	Duration	Funding	Status & Comments/ suggestions
INTERNAL STUDY					
1	Conservation of ponds in Ibrahimpur-Masahi Village and performance evaluation of natural treatment system	NIH: Omkar Singh (PI) V C Goyal, Rajesh Singh, Digambar Singh, Subhash Kichlu, Rajesh Agrawal, Rakesh Goel, NR Allaka; CEH-UK: Prof. Laurence Carvalho & Team	Apr 2018-Mar 2021 (Extended upto Jul 2021)	NIH, CEH-UK	Sh. Omkar Singh (PI) informed that the performance evaluation of the CW-NTS has been carried out based on about 25 field investigations. As suggested by UK-CEH, a request was made for extension upto Sept. 2021 to carry out additional field investigations and perform planned outreach activities. Director, NIH advised to complete the study and submit the final technical report by July 2021. He assured that NIH will continue to facilitate the logistic support required by UK-CEH to complete their part of the study.
2	Integrated assessment of water resources for sustainable use in Upper Dhasan basin in Bundelkhand region	Jyoti Patil (PI) T Thomas (Co-PI), P K Mishra Rohit Sambare	Sept.2020-Feb. 2023	NIH	Dr. Jyoti P Patil (PI) presented the data inventory, trend analysis, climatic indices, and WEAP model formulation. Dr. Man Singh (PD-WTC) asked about water-saving technologies in the Bundelkhand region and Dr. Manoj Samuel (CWRDM) asked the basis of selection of different scenarios and the effect of all scenarios on water resources, which were answered by the PI.

3	Establishing hydrologic regime and ecohydrological functions of Jhilmil Jheel wetland (Haridwar District, Uttarakhand)	Rohit Sambare (PI) V C Goyal (Co-PI), Sahas Khobragade; Gajendra Singh- USAC, Dehradun; WI-SA, New Delhi; HESCO, Dehradun	Jul 2020- Jun 2022	NIH	On-going Not presented
4	Hydrology-based scenario planning for water productivity and optimization of income from farming practices in Mewat region, Haryana	A R Senthil Kumar (PI) Omkar Singh (Co-PI) Rajesh Agarwal, N R Allaka Scientist from KVK/Agri Univ.	Jul 2020- Jun 2022	NIH	Dr. A. R. Senthil kumar (PI) presented the progress made for setting up of WEAP and LINGO models. The chairman suggested to carry out cost-benefit analysis and scenario analysis with deficit irrigation and crop cutting experiments/crop related data. He also suggested to include one Agronomist/Economist who can contribute in this study. Dr. Man Singh, PD-WTC) was requested to suggest a Scientist from WTC for this purpose.

SPONSORED PROJECTS

1	Hydrological modelling in Bhagirathi basin up to Tehri dam and assessment of climate change impact	A R Senthil Kumar (PI) J. V. Tyagi, M. K. Goel, S. D. Khobragade, P. C. Nayak, Manohar Arora	Mar 2016- Mar 2021	DST- NMSHE	On-going Not presented
2	Rejuvenation of village ponds in identified villages of Baghpat, Ghaziabad and Meerut districts of Uttar Pradesh	Omkar Singh (PI), Rajesh Singh, V C Goyal, Digambar Singh, Subhash Kichlu, Rajesh Agrawal, Rakesh Goel, NR Allaka	Jan. 2018- Dec. 2020	MoJS (through Scheme funds)	Completed Not presented
3	Innovation Centre for Eco-Prudent Wastewater Solutions (IC-EcoWS)	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	DST (GoI)	The progress was jointly presented by Er. Omkar Singh and Dr. Rajesh Singh. Dr. Manoj Samuel (CWRDM) wanted to know about plants/root & shoot analysis, Dr. Sudhindra M Sharma (Indore) enquired about treatment systems, and Dr. Sushil Rohilla

					(WIHG) & Dr. Pawan Labhasetwar (NERI) about its overall applicability in rural and urban areas. PI responded to all queries.
4	Preparation of Guidebook on S&T Interventions on Pond Rejuvenation	V C Goyal (PI), Jyoti Patil	Sep 2020-Jun 2021 (Ext. upto Dec 2021 from DST)	DST (GoI)	On-going Not Presented.

Training Courses/ Workshops Organised

S.N.	Name of activity	Period	Coordinator	Venue
1	Webinar on “Hydrology of Upper Ganga basin in climate change perspective organized on the occasion of Himalaya Day (under aegis of INC-IHP of UNESCO)	Sept. 9, 2020	Dr. V C Goyal	Online mode
2	Training course on “Water security for resilience to deal with disasters and outbreaks”	Nov. 2-6, 2020	Dr. V C Goyal Dr. Jyoti Patil	Online mode
3	One day Webinar on “Ecohydrology-Engineering harmony for a sustainable World” under INC-IHP	Jan.27, 2021	Dr. Jyoti Patil Er. Rohit Sambare	Online mode

Awareness Activity Organized

S.N.	Name of activity	Period	Venue
1	Lecture on Water Conservation by Dr. V C Goyal & Er. Omkar Singh	29 Sept., 2020	KV-1, Roorkee
2	Activities under Swachhta Pakhwada	16-31 Mar, 2021	Roorkee
3	Lecture on Water Conservation by Dr. V C Goyal	22 April, 2021	KV-1, Roorkee
4	Expert lecture on “Nature based solutions for water and wastewater in a circular economy by Dr. V C Goyal	22 April, 2021	Amity University, Gwalior
5	Programe on Water Conservation Awareness	12 Nov., 2020	GIC, Roorkee
6	Programe on Water Conservation Awareness	18 Nov., 2020	Govt. Hr. Sec. School, Sohalpur (Tehsil Bhagwanpur) Dist. Haridwar
7	Exhibition under Atma Nirbhar Bharat	11-12 Jan., 2021	Udaipur, Rajasthan
8	Special session on Technical Communication Skills by Prof. A K Saraf, IIT, Roorkee	16 Feb., 2021	NIH, Roorkee

Research Publications

1	International Journal - 7
2	International Conferences - 2
3	Chapters in Books - 2

NIH video series “Hydrology for People”

S.N.	Topic	Link
1	Improving our understanding of the aquifer systems in Sundarbans – Dr Gopal Krishan	https://www.youtube.com/watch?v=qUrQBgnsSuQ
2	Groundwater Salinity Study Model -Dr Gopal Krishan	https://www.youtube.com/watch?v=9jEz15kvX1o
3	Water Census and Hotspot analysis in selected villages in Upper Ganga Basin-Dr. P K Mishra	https://www.youtube.com/watch?v=r_vuMD_hqRQ
4	Ladakh: Water resources research in Ladakh (Glaciers , snow and permafrost)- Dr. Renoj Thayyen	https://www.youtube.com/watch?v=6KDZnh2XIIw
5	GLOF Study- Dr Sanjay Jain, Dr A.K. Lohani	https://www.youtube.com/watch?v=S9w9FKoK0_Y
6	Observations and Hydrological Modelling in the Henval watershed-Dr Manish Nema	https://www.youtube.com/watch?v=uPSi7LY4QRQ
7	Water footprints of Internet- Dr V.C. Goyal	https://www.youtube.com/watch?v=e4eWE8_YfkE
Other films		
1	Himalaya Diwas Webinar	https://www.youtube.com/watch?v=jd7ncLlJygM
2	वर्षाजलप्रबंधनएवंसंरक्षण	https://www.youtube.com/watch?v=HVzcQ0Sh6mI
3	NIH Library : An overview	https://www.youtube.com/watch?v=UcNdibjVDM4
4	Virtual Water and Smart Economy	https://www.youtube.com/watch?v=yKTiB4zpdhU
5	Follow Water Footprints to Find Virtual Water.	https://www.youtube.com/watch?v=5fAGemhzO2I
6	राष्ट्रीयजलविज्ञानसंस्थानकेस्वच्छताप्रहरी	https://www.youtube.com/watch?v=-xAB3WrtOrM

Recommended Work Program for the year 2021-22

SN	Title of Project/Study	Study Team	Duration	Funding	Status
INTERNAL STUDY					
1	Conservation of ponds in Ibrahimpur- Masahi Village and performance evaluation of natural treatment system	NIH: Omkar Singh (PI) V C Goyal, Rajesh Singh, Digambar Singh, Subhash Kichlu, Rajesh Agrawal, Rakesh Goel, NR Allaka; CEH-UK: Prof. Laurence Carvalho & Team	Apr 2018-Jul 2021	NIH, CEH-UK	On-going
2	Integrated assessment of water resources for sustainable use in Upper Dhasan basin in Bundelkhand region	Jyoti Patil (PI) T Thomas (Co-PI), P K Mishra Rohit Sambare	Jul 2020- Dec 2022	NIH	On-going

3	Establishing hydrologic regime and ecohydrological functions of Jhilmil Jheel wetland (Haridwar District, Uttarakhand)	Rohit Sambare (PI) V C Goyal (Co-PI), Suhas Khobragade; Gajendra Singh-USAC, Dehradun; WI-SA, New Delhi; HESCO, Dehradun	Jul 2020- Jun 2022	NIH	On-going
4	Hydrology-based scenario planning for water productivity and optimization of income from farming practices in Mewat region, Haryana	A R Senthil Kumar (PI) Omkar Singh (Co-PI) Rajesh Agarwal, N R Allaka Scientist from KVK/Agri Univ.	Jul 2020- Jun 2022	NIH	On-going
SPONSORED PROJECTS					
1	Hydrological modelling in Bhagirathi basin up to Tehri dam and assessment of climate change impact	A R Senthil Kumar (PI) J. V. Tyagi, M. K. Goel, S. D. Khobragade, P. C. Nayak, Manohar Arora	Mar 2016-Mar 2021 (Extended upto Sep 2021)	DST-NMSHE	On-going
2	Innovation Centre for Eco-Prudent Wastewater Solutions (IC-EcoWS)	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	DST (GoI)	On-going
3	Preparation of Guidebook on S&T Interventions on Pond Rejuvenation	V C Goyal (PI), Jyoti Patil	Sep 2020- Jun 2021 (Ext. requested upto Dec 2021 from DST)	DST (GoI)	On-going

Proposed Training/Webinar/Outreach Activities of RMOD (2021-22)

S. N.	Outreach Activity	Tentative Date & Month	Place	Target Participants	Team
1	Webinar on “Water for Public Health (W4PH): Preparing for Disasters & Pandemics”	Jul 2021	Online mode	Medical and WASH professionals, water utility professionals, researchers	V C Goyal, Jyoti Patil, Varun Goyal, Amrendra Bhushan
2	Workshop/Webinar on rejuvenation of ponds and treatment of domestic wastewater through constructed wetlands	Sep 2021	NIH Roorkee	R&D Institutes/Univer sity/Govt. Organizations	NIH: Omkar Singh, V.C. Goyal, Rajesh Singh, Digambar Singh UKCEH: Laurence Carvalho & Elliot Hurst
3	Awareness Programme for School Children	July-Sep 2021	2 Schools in Roorkee/ Nearby	School Children	Digambar Singh, Omkar Singh, Subhash Kichlu, Rajesh Agarwal, N R Allaka

4	Awareness Programmes on “Water Conservation/Pond Rejuvenation” for Stakeholders in Ibrahimpur Masahi village/schools	Sep-Dec, 2021	Ibrahimpur Masahi/schools	Villagers/ School children	Omkar Singh, V.C. Goyal, Rajesh Singh, Digambar Singh, Subhash Kichlu, Rajesh Agarwal, NR Allaka
5	Life cycle approach for rejuvenation of ponds and lakes using Nature Based Solutions (4 training courses of 5-days duration) Funded by NWM (MoJS, GoI)	Sep’21 – Jul ’22	Roorkee/ Online	Field engineers and practitioners	Jyoti Patil, V C Goyal, Omkar Singh, Digambar Singh, Rohit Sambare, N R Alakka

Other Outreach Activities:

S.N.	Activity
1	• Preparation of Short Video on Pond Rejuvenation & CW-NTS of Ibrahimur Masahi
2	• Coordination of 75 planned Activities at HQ & RCs under Bharat Ka Amrut Mahotsav @ India 75 • Organizing activities as per mandate of Division under Bharat Ka Amrut Mahotsav @ India 75
3	• River Walk of Solani River (stretch to be identified)
4	• 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 51st WG meeting**

1.	Dr. J V Tyagi, Director, NIH	Chairman
2.	Dr. A. K Das and Sh. S M Manik, 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. Sushil Kumar, WIHG, Dehradun	Member
7.	Dr. R K Goyal, CAZRI, Jodhpur	Member
8.	Dr. Pawan Labhasetwar, NEERI, Nagpur	Member
9.	Dr. Man Singh, WTC, ICAR-IARI, New Delhi	Member
10.	Prof. Varun Joshi, GGSIPU, New Delhi	Member
11.	Prof. A K Saraf, IIT Roorkee	Member
12.	Dr. Bhishm Kumar, IAEA (Retd.), Roorkee	Member
13.	Prof. A P Dimri, JNU, New Delhi	Member
14.	Dr.Kaushal K Garg,ICRISAT, Hyderabad	Member
15.	Dr. Debashish Sen, PSI, Dehradun	Member
16.	Dr. Sadhana Malhotra, Mindspace, Dehradun	Member
17.	Dr. Sudhir Kumar, Sc. G & Head HI Division, NIH	Member
18.	Dr. Sanjay K. Jain, Sc. G & Head WRS Division, NIH	Member
19.	Dr. M. K. Goel, Sc. G & Head GWH Division, NIH	Member
20.	Dr. A.K. Lohani, Sc. G & Head SWH Division, NIH	Member
21.	Dr. R P Pandey, Sc.G & Head EH Division, NIH	Member
22.	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	Sh. Rajesh K. Nema, Sc.B	21	Sh. Digamber Singh, Sc.C
5	Ms. Anjali, Sc.B		SWH Division
	GWH Division	22	Dr. Sanjay Kumar, Sc.E
6	Dr. Anupama Sharma, Sc.F	23	Dr. Archana Sarkar, Sc.E
7	Dr. Surjeet Singh, Sc.F	24	Dr. L.N. Thakural, Sc.D
8	Dr. Sumant Kumar, Sc.D	25	Dr. J.P. Patra, Sc.D
9	Mrs. Suman Gurjar, Sc.D	26	Dr. Ashwini A. Ranade, Sc.C
10	Dr. Gopal Krishan, Sc.D	27	Sh. Sunil Gurrapu, Sc.C
11	Sh. Nitesh Patidar, Sc.B	28	Sri N K Bhatnagar, Sc.B
	HI Division		WRS Division
12	Dr. Suhas Khobragade, Sc.F	29	Smt. Deepa Chalisgaonkar, Sc. G
13	Dr. M.S. Rao, Sc.F	30	Dr. Manohar Arora, Sc.E
14	Dr. Soban S. Rawat, Sc.D	31	Dr. P K Singh, Sc.D
15	Dr. Santosh M Pingale, Sc.C	32	Dr. Manish Nema, Sc.D
16	Ms. Nidhi Kalyani, Sc.B	33	Dr. P K Mishra, Sc.C
17	Sh. Hukam Singh, Sc.B	34	Dr. Vishal Singh, Sc.C
		35	Sh. P K Agarwal, Sc.B