



INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
CBIP - 2018 Awardee "Best R&D Institute in Water Resources Sector"

Report of the International Conference
on
**Sustainable Technologies
for Intelligent Water Management**

February 16-19, 2018

Organised by:



**IWRS and Department of Water Resources
Development & Management, IIT Roorkee**



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- Prof. S. Bala Prasad, Deptt. of Civil Engineering, Andhra University, Visakhapatnam
- Prof. T.I. Eldho, IIT Bombay
- Dr. Praveen K Gupta, Space Applications, Centre, ISRO, Ahmedabad
- Prof. D.G. Regulwar, GCOE, Aurangabad
- Dr. Ambrish Kumar, IISWC, Dehradun
- Dr. V.M. Chowdary, Head, RRSSC, Kolkata
- Er. N.N. Pande, Chief Engineer (Ret.), NHPC
- Dr. Ashok Mishra, IIT Kharagpur
- Dr. R. P. Pandey, NIH, Roorkee

International Conference
“Sustainable Technologies for Intelligent Water Management”

(16-19 Feb. 2018)

Organisers

Indian Water Resources society, Roorkee
Dept. of Water Resources Development & Management,
IIT Roorkee

1. INTRODUCTION & REGISTRATION

Indian Water Resources Society (IWRS), Roorkee in association with the Department of Water Resources Development & Management (WRDM), IIT Roorkee organised a 4-day 'International Conference on Sustainable Technologies for Intelligent Water Management' during 16th – 19th February 2018. Eminent experts from well-known foreign universities such as Texas Agricultural and Mechanical University (TAMU), Purdue University, Consiglio Nazionale delle Ricerche Via Madonna Alta PERUGIA (ITALY), University of Florida, and University of Nebraska-Lincoln of USA and reputed Indian institutions including IITs, AIIMS, NRSC, NITS, ICAR etc. and several other prestigious Indian universities participated in the conference. The delegates from Ministry of Water Resources, RD & GR; NWM; NMCG; SJVN Limited; CWC; THDCIL; NTPC; and other Central and State government as well as Non-Government organisations also participated in the conference. Total three hundred fifty nine delegates registered for the conference. Total 359 delegates registered for the conference.

2. INAUGURAL FUNCTION

All the guests were honoured by Prof. S.K. Mishra, Professor and Head Department of Water Resources Development and Management & Executive Vice President IWRS and Prof. Ashish Pandey, Associate Professor, Department of Water Resources Development and Management & Secretary, IWRS during the inaugural function.



Plate 1: Lightning of the Lamp by Chief Guest during the Inaugural function

The conference was inaugurated by Shri. Satpal Ji Maharaj, Hon'ble Cabinet Minister of Govt. of Uttarakhand and the Chief Guest of the function. He highlighted the problems of the Himalayan region in general and Uttarkhand in particular including the problems of flash floods, erosion, landslides, glacier outburst floods avalanches etc. besides those of erosion and sedimentation, affecting the life of reservoirs and operation of hydropower plants. Dr. Y. V. N. Krishna Murthy, Director, NRSC, Hyderabad mentioned that the use of satellite technology may bring a lot of changes in the water management practices and has large scope of employment through start-up programs. Er. A.B. Pandya, President, IWRS, and Secretary General, ICID, Er. H.L. Arora, Director (T), THDCIL, Rishikesh, Prof. N.S. Raghuvanshi, Director, MANIT, Bhopal, Prof. Ravi Kant, Director, AIIMS, Rishikesh and Prof. Ajit Kumar Chaturvedi, Director, IIT Roorkee also addressed the gathering during the inaugural session.

The Chief Guest also released the abstract Proceeding of the Conference, IWRS Theme Paper on “Inter-Basin Water Transfer” (Author: Er. Shri M. Gopalakrishnan, Former Secretary General, ICID) and a text Book on “Introductory Soil and Water Conservation Engineering (Authors B.C. Mal and Ashish Pandey)”.



Plate 2: Release of Book on “Introductory Soil and Water Conservation Engineering” during Inaugural Function

The Chief Guest also presented awards instituted by the IWRS for the years 2016 and 2017, as follow.

For the year 2016, Dr. Mahesh Verma, Former Professor (Dept. WRD&M, IIT Roorkee) was conferred up on the Life Time Achievement Award. Er. Ramesh N. Misra, Ex-CMD, SJVN Limited; Prof. K.N. Tiwari, Professor, IIT Kharagpur and Dr. Surendra Kumar Chandniha Post-Doctoral Fellow, NIH Roorkee were been conferred up on Eminent Water Resources Engineer Award, Eminent Water Resources Scientist Award and the Best Water Resources Student award respectively.

For the year 2017, Shri M. Gopalakrishnan, Former Secretary General, ICID was conferred up on the Life Time Achievement Award. Er. R.C. Jha, Former Chairman, CWC, New Delhi; Prof. T.I. Eldho, Professor and Head, Civil Engg. Department, IIT Bombay and Dr. Pravin R. Patil, Research Associate, NIH Roorkee were conferred up on Eminent Water Resources Engineer Award, Eminent Water Resources Scientist Award and the Best Water Resources Student award respectively.



Plate 3: Chief Guest Conferring Life Time Achievement Award of IWRS-2017 on Shri M. Gopalakrishnan during the Inaugural function.



Plate 4: Prof. S.K. Mishra, Executive Vice President, IWRS addressing the gathering during Inaugural function



Plate 5: Shri A.B. Pandya, President, IWRS addressing the gathering during Inaugural function



Plate 6: Presidential address by Prof. Ajit K. Chaturvedi, Director, IIT Roorkee during Inaugural function



Plate 7: Address by Dr. Y.V.N. Krishna Murthy, Director, NRSC during the Inaugural function



Plate 8: Address by Chief Guest of the Inaugural function

3. PRELIMINARY SESSIONS

Total 34 Keynote addresses on various conference themes were delivered by eminent scientists/professors/water professionals from India and abroad in 5 Plenary Sessions as detailed below:

PLENARY SESSION –I (Feb. 16, 2018)

CHAIRMAN- Er. M. Gopalakrishnan, Former President IWRS and Ex- Secretary General ICID, New Delhi

Co-Chairman -Prof. S.K. Shukla, Adjunct Professor, IIT Roorke

- A. Technologies to Address Water Resources Management Challenges in India.**
Dr. Sharad K. Jain, Director National Institute of Hydrology, Roorkee
- B. Space Technology Based Operational Hydrological Services in India.**
Dr. V.V. Rao, Group Director-Water Resources Group, NRSC, ISRO, Hyderabad
- C. Water pollution and health.**
Prof. S. Kishore, Dean (Academics) & Prof. & Head Dept. of Community & Family Medicine, AIIMS, Rishikesh
- D. Sustainable Coastal Management through Modeling and Monitoring –Scope of Numerical Simulation.**
Prof. T.I. Eldho, Professor, Department of Civil Engineering, IIT Bombay
- E. Rubber Check Dams for Flood and Drought Management**
Dr. Susanta Kumar Jena, Principal Scientist, ICAR-IIWM, Bhubaneswar

PLENARY SESSION –II (Feb. 16, 2018)

CHAIRMAN- Prof. S. Kishore, Dean (Academics) & Prof. & Head Dept. of Community & Family Medicine, AIIMS, Rishikesh

Co-Chairman - Dr. R.P. Pandey, Scientist G NIH, Roorkee

- A. We all live downstream – watershed activities affect water quality and ecosystem services.**
Prof. Indrajeet Chaubey, Associate Dean and Director of International Programs in Agriculture Professor – Agricultural and Biological Engineering Professor – Earth, Atmospheric, and Planetary Sciences Purdue University, West Lafayette, IN 47907, (USA)
- B. Using Climate Information for Reducing Drought and Water Quality Impacts.**
Prof. Puneet Srivastava, Director, Water Resources Center, Butler-Cunningham Eminent Scholar, Professor, Biosystem Engineering, 203 Hubbard CASIC Building, 559 Devall Drive, Auburn University, (USA)
- C. Sustainable irrigation water management.**
Shri. K Vohra, Commissioner (SPR), MoWR
- D. Ground & satellite observations for hydrological applications.**
Dr. Tommaso Moramarco, D. WRE via Madonna Alta Perugia (Italy)

E. Groundwater trends and availability under current and future groundwater withdrawals and climate scenarios in semi-arid South India.

Prof. Sanjay Shukla, Professor, Agricultural and Biological Engineering, University Term Professor and Distinguished Water Institute Fellow, SWFREC, University of Florida (USA)

F. Impact of Climate Change on Precipitation Regimes and its role on Hydrologic Extremes.

Dr. Venkataramana Rao Sridhar, Biological System Engg. Dept., Seitz Hall, RM 212, Virginia Tech., 155 Ag Quad Lane, Blacksburg, Virginia Tech Uni. (USA)

PLENARY SESSION –III (Feb. 16, 2018)

CHAIRMAN- Prof. N.S. Raghuvanshi, Director, MANIT, Bhopal-M.P.

Co-Chairman- Prof. S. Bala Prasad, Department of Civil Engineering, Andhra University, Visakhapatnam

A. Theory of Frequency Distributions in Water Engineering.

Dr. V. P. Singh, Department of Biological & Agricultural Engineering & Zachry, Department of Civil Engineering, Texas A&M University College Station, Texas-USA

B. An Approach to Sustainable Watershed Management.

Dr. Ramesh P. Rudra, Water Resource Engineering, School of Engineering, University of Guelph, Guelph, Ontario, (Canada) N1G 2W1

C. Local Controls for Effective Management of Water Supplies for Agriculture.

Prof. Chittaranjan Ray, Prof. and Director, Nebraska Water Center, Daugherty Water for Food Global Institute, University of Nebraska, Lincoln, NE, (USA)

D. Water Advanced Research and Innovation (WARI) Fellowship Program

Mr. Jesse Starita, Education Outreach Coordinator, Daugherty Water for Food Global Institute, University of Nebraska, Lincoln, NE, (USA)

E. The Water and Energy-Food Security Nexus in Northwest India: Challenges and Opportunities for New Green Deal.

Dr. N.K. Tyagi, Former -member ASRB and Former Director CSSRI, Karnal

PLENARY SESSION –IV (Feb. 17, 2018)

CHAIRMAN- Prof. V. P. Singh, Department of Biological & Agricultural Engineering & Zachry, Department of Civil Engineering, Texas A&M University College Station, Texas, USA

Co-Chairman - Prof. T.I. Eldho, Prof. & Head, Civil Engg, Dept. IIT Bombay and Dr. V. M. Chowdary, Scientist/Engg "SG".

A. Water Resources Management under Climate Change in a Semi-Arid Basin: Challenges and Opportunities.

Dr. Tushar Sinha, Texas A&M University, Kingsville, TX, United States

B. Water Resources Management Embracing the Data Deluge.

Dr. Saurav Kumar, Research Assistant Professor, UTEP, USA

C. Integrated Flood Management under Climatic variability.

Dr. Rakesh Kumar, Scientist-G & Head NIH Roorkee

- D. Misunderstood Notions of Hydropower in India.**
Shri R.N. Mishra, Former-CMD, SJVN Limited
- E. Holistic Capacity-Building for the 21st Century in Agricultural Water Management.**
Dr. V.K. Labsetwar, Director, ICID, New Delhi
- F. Scientific Water Management for Higher Fish Production.**
Prof. B.C. Mal, Vice Chancellor, JIS University, Agarpara, Kolkata
- G. Influence of Plantation Crops on Hydrological Processes.**
Prof. K. N. Tiwari, Professor, Department of Agricultural and Food Engineering, Indian Institute of Technology Kharagpur, India
- H. Efficient Irrigation Water Management is Key for Sustainable Development.**
Dr. K Yella Reddy Vice President, ICID, Director, WALAMTARI, Hyderabad
- I. Sustainable Irrigation Water Management.**
Dr. N.K. Gontia, Dean Junagadh Agricultural University, Junagadh
- J. History and Development of Water Laws and Governance in India.**
Dr. Avdhesh Pratap, Water Law, Management and Constitution Law Expert

PLENARY SESSION –V (Feb. 18, 2018)

CHAIRMAN- Er. R.N. Mishra, Former CMD, SJVN Limited

Co-Chairman - Prof. R.D. Singh, Adjunct Professor, IIT Roorkee

- A. State Water Budgeting Towards Water Security, Safety and Sustainability.**
Dr. Ariz Ahammed, Mission Director, National Water Mission, MoWR, India
- B. Precision Irrigation Techniques for Enhancing Water Productivity.**
Dr. Ramadhar Singh, PS & Former Head
- C. Sustainable Hydraulic Measurements for Intelligent Water Management.**
Prof. Pranab Kumar Mohapatra, Civil Engineering, IIT Gandhinagar
- D. Integrated Groundwater Management in Coastal Aquifers using Regional Groundwater Flow Modelling.**
Dr. V. M. Chowdary, Scientist/Engg "SG", RRSC-N, NRSC, ISRO, New Delhi
- E. Relevance of climate change on characteristics of regional droughts and irrigation requirement.**
Dr. R.P. Pandey, Scientist G, NIH, Roorkee
- F. Inter-basin Water Transfer Through Link Canals -Some Problems and Solutions.**
Prof. Somendra Kumar Mazumder, Former AICTE, Em. Professor, DCE/DTU.
- G. Coastal Disasters Threats to Marine Ecosystem.**
Shri. R. D. Singh, Adjunct faculty, Department of Water Resources Development and Management, IIT Roorkee
- H. Issues and Challenges for Development of Decision Support System for large river basin in India for management of water resource of the basin – A Case Study.**
Prof. Vijay Kumar Dwivedi, Professor, NIT Durgapur, West Bengal



Plate 9: Presentation of Keynote paper by Dr. S.K. Jain, Director, NIH Roorkee during a plenary session.



Plate 10: Presentation of Keynote paper by Dr. S. Kishore, Dean (Academics), AIIMS Rishikesh during a plenary session.



Plate 11: Presentation of Keynote paper by Prof. T.I. Eldho, IIT Bombay during a plenary session.



Plate 12: Presentation of Keynote paper by Prof. Indrajeet Chaube, Purdue University, USA during a plenary session.



Plate 13: Presentation of Keynote paper by K. Vohra, (State Projects) MoWR, RD & GR during a plenary session.



Plate 14: Presentation of Keynote paper by Prof. Puneet Srivastava, Director, Water Resources Center, Auburn University, (USA) during a plenary session.



Plate 15: Presentation of Keynote paper by Prof. Tommaso Moramarco, IRPI-Consiglio Nazionale delle Ricerche Via Madonna Alta PERUGIA (ITALY) during a plenary session.

4. TECHNICAL SESSIONS

Total 160 technical papers on various conference themes were presented by the eminent scientists/professors/water professionals/students in twenty 25 technical sessions as per the detailed below:

TECHNICAL SESSION –I (Feb. 17, 2018)

HALL-1

CHAIRMAN- Prof. Chittaranjan Ray, Director of Nebraska Water Center Nebraska University of Nebraska

Co-Chairman - Dr. Tushar Sinha, Texas A&M University, Kingsville, TX, USA

- 1 Upflow hydroponic constructed wetland microbial fuel cell (UHCW-MFC) for wastewater treatment and recovery of bioelectricity.**
Chabungbam Niranjit Khuman, Gourav Dhar Bhowmick, Bikash Ranjan Tiwari, Dibyojoy Nath, Makarand Madhao Ghangrekar and Arunabha Mitra
- 2. Evaluation of Water Quality: A Case Study of Hindon River (Tributary of Yamuna River).**
Deepak Kumar, Vinay Kumar and Sangeeta Kumari
- 3. Effect of Operating Parameters on Removal of Iron from Drinking Water by Electrocaogulation (Ec).**
Daisy Das and Barun Kumar Nandi
- 4. Water Management and Purification.**
Faizul Haque Quraishi, Jawed Rafiq and Akash Kumar Srivastava

5. **Voltammetric behavior of 3-chloro 2-methylaniline in aqueous medium.**
Richa Paliwal, Rajdeep Malik, Ravi Kant and Yogendra Nailwal
6. **Simultaneous Nutrient Removal, Algal Biomass Production and Electricity Generation in Microbial Carbon Capture Cell.**
B Neethu, Pankaj Kumar Goutam, Dipak Ashok Jadhav and Makarand Madhao Ghangrekar
7. **Waste water Parameters and its Imperishable Augmentation.**
Sakshi Gupta and Deepak Khare
8. **Examining resiliency and entropy as surrogate measures for Hydraulic Reliability Estimation of water distribution networks.**
Swati Sirsant and M Janga Reddy
9. **Evaluation of the efficacy of chlorine sensors in investigating the biological quality of drinking water distribution systems.**
Abhijith G R and S Mohan
10. **Application of carbon supported Silver-Tin oxide composite (Ag-SnO₂) cathode for enhancing desalination performance in microbial desalination cell.**
Ganta Anusha, Md. Tabish Noori, Pritha Chatterjee and Makarand Madhao Ghangrekar.

HALL-II

CHAIRMAN- Dr. Rakesh Kumar, Scientist-G & Head NIH Roorkee

Co-Chairman – Er. Sher Singh, Director, CWC, New Delhi

Co-Chairman – Dr. Susheel Kumar Himanshu, Research Scientist, NRSC, ISRO, Hyderabad

11. **An Analytical Investigation to Select a Suitable Path for Canal using ANN to Meet the Challenges of Water Scarcity in Gomati District of Tripura.**
Saumyadeep Bhowmik, Bishnu Kant Shukla and Dolonchapa Prabhakar
12. **Assimilation and Analysis of Microwave Radiance observations with Atmospheric Radiative Transfer Simulator (ARTS) using Megha Tropiques SAPHIR data.**
Catherin Sebastian, Shashi M and Jugdambe Sharma
13. **Evapotranspiration Model Using Artificial Neural Network**
Shreenivas Londhe and Madhura Kulkarni
14. **Development of Neural Network Models for Estimation of Discharge from Stage.**
Shreenivas Londhe and Kirti Sonawane
15. **Parameter Estimation of a Macroscale Hydrological Model Using an Adaptive Differential Evolution.**
Saswata Nandi and M Janga Reddy
16. **Prioritization of Sub-Watersheds Based on Morphometric Parameter Analysis Using Geospatial Technology.**
Kanak Moharir and Chaitanya Pande
17. **Investigating the effect of objective functions on ANN model calibration for flood forecasting.**
Cicily Kurian, K P Sudheer and Debabrata Sahoo

HALL-III

CHAIRMAN- Prof. S. Bala Prasad, Professor of Environmental Engineering, Department of Civil Engineering, Andhra University, Visakhapatnam-530003

Co-Chairman – Dr. Sushil K. Himanshu, Research Scientist, NRSC, ISRO, Hyderabad

- 18 Study of Groundwater Contamination due to Landfill Leachate in Mangaluru, India.**
Divya Anand and Shrihari S
- 19. Settling velocity of fine suspended sediments in Muthupet estuary, India and Bouregreg estuary, Morocco.**
Priya K L, Haddout S and Adarsh S
- 20. Bathymetric and Numerical Studies on Morphological Characteristics of Hooghly Estuary.**
Kalyan Kumar Bhar, Manoranjon Paul and Subhadip Kangsabanik
- 21 Rationalization of Krishna River Water Quality Monitoring Locations using Multivariate Statistical Techniques and Water Quality Index.**
Dr. Vikas Varekar, Aditya Nanekar and Hasan Rameez
- 22. Modelling Dissolution of Light Non-Aqueous Phase Liquid (LNAPL) Under Varying Subsurface Flow Conditions.**
Pankaj Gupta and Brijesh Kumar Yadav
- 23. Investigations on infiltration characteristics of soils in Hamirpur (Himachal Pradesh).**
Nitish Mahant and Vijay Shankar

HALL-IV

CHAIRMAN- Prof. Indrajeet Chaubey, Associate Dean & Director of International Programs in Agriculture Head, Department of Earth, Atmospheric, and Planetary Purdue University, West Lafayette IN 47907-2093

Co-Chairman – Prof. Ajay Kalra, Department of Civil and Environmental Engineering Southern Illinois Univ. Illinois

- 24. Grey Water Treatment by Two Stage Bioreactor.**
Naresh Kumar, Chiranjivi Eshwar, Manu D S and Arun Kumar Thalla
- 25 Sewage Water & Human Waste Management By Recycling & Power Production Scheme using Eco-Friendly Method.**
Prabhakaran J, Sooryaprakash M and Yuvaraj Krishnan M
- 26. Recent Advances and Challenges in NF-RO Hybrid Water Desalination Technology.**
Alka Srivastava and Manoj Garg
- 27. Removal of Fluoride from Drinking Water Supplies.**
Stephano Alphayo and Mahendra Sharma
- 28. “Aeration”- An Essential Practice for Successful Aquaculture Water Treatment.**
Subha M. Roy and Bimal Chandra Mal
- 29. Sustainable Water Management of Water Bodies in Urban Area – A case of Indore.**
Dinesh Singh and Harsimran Kaur
- 30. Reductive removal of Cr(VI) from drinking water.**
Neha Bisht, Renuka Verma and Sudipta Sarkar

HALL-V

CHAIRMAN- Prof. Puneet Srivastava, Director, Water Resources Center, Butler-Cunningham Eminent Scholar, Professor, Biosystem Engineering, Auburn University, Auburn.

Co-Chairman – Prof. Sumit Sen, Department of Hydrology, IIT Roorkee

- 31. Efficacy of Surface Drainage System of Bhubaneswar City (Odisha), the Smart City No 1 – A Case Study.**
Joygopal Jena, Bandana Jethy and Swapnaranee Mohanta
- 32. Urban Flooding Solution: A Case Study of Bhubaneswar.**
Siddharth Purohit and Anil Kumar Kar
- 33. Groundwater conditions in northwest India: Few case studies for its sustainable management.**
Gopal Krishan, Ne Ghosh, Dj Lapworth, Alan Macdonald, Helen Bonsor, Cornelius Sandhu and Brijesh Yadav
- 34. Algorithms of Minimal Number of Sensors Placement Using Pressure Sensitivity Analysis for Leak Detection in Pipe Network.**
Manish Kumar Mishra and Kailash Jha
- 35. The influence of slope profile on rain garden hydrological performance.**
Osheen and Krishna Kumar Singh
- 36. Assessing Ground Water Recharge Potential through Rain Water Harvesting in Urban Environment- A Case of Bhopal City.**
Mrunmayi Wadwekar and Dr. Rama Pandey
- 37. Improvement of Ground Water Quality Index using Citrus limetta.**
Rupas Kumar, Saravana Kumar, Amarendra Kumar, Likhita Komal and Sreedeepti Molleti

TECHNICAL SESSION –II

HALL-I

CHAIRMAN- Dr. Ambrish Kumar, Principal Scientist, IISWC Dehradun

Co-Chairman – Dr. Rajesh Singh, Scientist, NIH Roorkee

- 38. 10 Challenges of water supply management in Harbour City of Freetown in Western Sierra Leone.**
Augustine Amara and Mitthan Lal Kansal
- 39. Development of Bio-filters for the Treatment of Grey Water**
Sujata Kulkarni, Basavaraj Hungund, Raghavendraprasad Suryavanshi, Geeta Bellad and M R Patil
- 40. Production and characterization of Bio-Surfactants from various lactobacillus species: a bioremediation technique.**
Ashwin T, Surinder Deswal and Baljeet Singh Saharan
- 41. Water Quality Status of Upper Ganga Canal.**
Rajesh Singh, Daniel Kanbienaa and Ashish Pandey

HALL-II

CHAIRMAN- Prof. Tommaso Moramarco, IRPI-Consiglio Nazionale delle Ricerche Via Madonna Alta PERUGIA (ITALY)

Co-Chairman – Prof. M. Perumal, Department of Hydrology, IIT Roorkee

- 42. Development of a new approach for Scatterometer based river monitoring.**
Rohit Pradhan, P K Gupta and R P Singh
- 43. Monitoring of Soil moisture variability and establishing the correlation with topography by remotely sensed GLDAS Data.**
Kaushlendra Verma and Yashwant Bhaskar Katpatal
- 44. Analysis & GIS Mapping of the Groundwater Quality in the vicinity of Kala Sanghian Drain.**
Kirti Goyal and Bhanu Magotra
- 45. Effect of monthly variation of near surface lapse rate on snowmelt runoff simulation in Eastern Himalayas.**
Minotshing Maza, Liza Kiba, Arnab Bandyopadhyay and Aditi Bhadra
- 46. Integrated Watershed Management and GIS: A Case Study of Khajuri Watershed.**
Sabita Madhvi Singh, Pabitra Maiti and Neetu Singh
- 47. Land Use Classification of Sone River Basin-Bihar**
Zeenat Ara
- 48. Groundwater Modeling in a Semi-Confined Aquifer using Gis and Modflow**
Priyanka Thakare and Yashwant Katpatal
- 49. A Framework for High Resolution Downscaling for Large Regions.**
Maharana Pratap Singh and Varun Singh

HALL-III

CHAIRMAN- Prof. Manoj K. Jain, Department of Hydrology, IIT Roorkee

Co-Chairman- Dr. Sushil K. Himanshu, Research Scientist, NRSC, ISRO, Hyderabad

- 50. Hydrological Modelling of River Basin using SimHyd Model.**
Ankit Balvanshi and H. L. Tiwari
- 51. Dying Tributaries of River Kuakhai and Flow Restoration River Kushabhadra - A Case Study.**
Amrita Preetam Barick, Mahendra Kumar Bhuyan, Anil Kumar Kar and Harihar Mohanty
- 52. Development of saturated rain-gauge network for runoff computation.**
Biswajit Choudhury, Anil Kumar Kar and Anil Kumar Lohani
- 53. Rain Response Releases in Krishna basin.**
Venugopal Kurnool and Srinivasu Nalluri
- 54. Experimental study and calibration of hydraulic coefficient using vertical orifice.**
Tejaswini R and Surendra H J
- 55. A simple and efficient numerical model for flow simulation around groyne.**
Kaushik Bora and Hriday Mani Kalita

56. **Comparison of FAO56 and NDVI-derived Kc Curves for Major Crops in Pare Basin of Arunachal Pradesh.**
Waikhom Rahul Singh, Khyoda Meema, Tana Matthew, A. Bhadra and A. Bandyopadhyay
57. **Performance Study of Cross Flow Hybrid Hydrokinetic Turbine.**
Gaurav Saini and Rp Saini
58. **Flash flood mapping using HEC-RAS.**
Birju Pal, Sovan Sankalp and Sanat Nalini Sahoo

HALL-IV

CHAIRMAN- Prof. Devdutta Das, Former Head, Department of WRD&M, IIT Roorkee

Co-Chairman- Prof. Manoj K. Jain, Department of Hydrology, IIT Roorkee

59. **Fate and Transport of Nano-Plant Nutrients in Lateritic Soils**
Maheshwar Durgam and Damodhara Rao Mailapalli
60. **Brahma Dravya: A liquid sample to render wastewater pathogens-free.**
Monika Negi, Ayushi Maithani and Sakshi Gupta
61. **Improvement in efficiency of activated carbon by doping through Zr: Sorption affinity towards anionic reactive dye.**
Sonalika Sonal and Brijesh Kumar Mishra
62. **Response Surface Methodology approach for the optimization of Chlorhexidine Digluconate adsorption using activated carbon derived from chemically modified flyash.**
Astha Singh and Brijesh Kumar Mishra
63. **Wastewater Treatment Modelling Using floating aquatic macrophytes (FAM) System and Management Strategies.**
Dr. Satya Narain, Dr S. K. Mishra, Prof. C.S.P. Ojha and Mr. Tufa Feyissa

HALL-V

CHAIRMAN- Dr. P.K. Singh, Professor, Dept. of Irrigation & Drainage Engg., GBPUAT, Uttarakhand

Co-Chairman- Dr. Omkar Singh, Scientist, NIH Roorkee

64. **Scaling up of microbial fuel cell for treatment of human waste to develop bioelectric toilet.**
Indrasis Das, Dipak A. Jadhav and Makarand M. Ghangrekar
65. **Improved wastewater treatment by using integrated microbial fuel cell-membrane bioreactor system along with ruthenium/activated carbon cathode composite to enhance bio-energy recovery.**
G. D. Bhowmick, S. Ghosh Ray, M. M. Ghangrekar and A. Mitra
66. **Water management system ancient v/s modern: A case study.**
Madhulika Bhati and Radhika Rai
67. **Defluoridation of Industrial Waste Water using Eichornia Crassipes**
Shreyank Goel, Tushar Srivastava and Dr Tej Pratap Singh
68. **Enviro - economic analysis of active single slope solar still with cooling condensing cover.**
Poonam Joshi and Gopal Nath Tiwari

69. **Cost effective economic model for performance up-gradation of centralized potable water system of STEM, India.**

Dr. Vikas Varekar, Vivek Chowdhary and Shashikant Salunke

TECHNICAL SESSION –III

HALL-I

CHAIRMAN- Prof. B. C. Mal, Vice Chancellor, JIS University, Agarpara, Kolkata, Former Vice Chancellor, Chhattisgarh Swami Vivekananda Technical University, Bhilai

Co-Chairman- Dr. Ambrish Kumar, Principal Scientist, IISWC Dehradun

70. **A study on usage of treated waste water in agriculture.**
Lavanya M B., Surendra H J and Teenu N
71. **Performance Study on Treatment of Slaughterhouse Wastewater using Hybrid UASB Reactor.**
R. Loganath and Debabrata Mazumder
72. **Implementation of an Upgraded Anaerobic Reactor for Marigold Flower Processing Industry Effluent- Design and Performance Approach.**
Kiran Kumar Kurilla, Dr.Pankaj Kumar and Dr.Ramakrishna Kotha
73. **Performance optimization of funnel and gate type of permeable reactive barrier.**
Shashi Ranjan and Brijesh K. Yadav
74. **Textile dyebath decolourization using pressure driven membranes: an integrated sustainable approach.**
Harpreet Singh and Akepati S. Reddy

HALL-II

CHAIRMAN- Dr. V. M. Chowdary, Scientist/Engg "SG", RRSC-N, NRSC, New Delhi

Co-Chairman- Rohit Pradhan, Scientist, SAC, Ahmadabad

75. **Accuracy Assessment of Land use/Land cover Using Remote Sensing and GIS: Case Study of Kaushalya Watershed, Haryana.**
Khushbu Choudhary and Baldev Setia
76. **GIS based Rainfall runoff model A case study of Gurugram district.**
Jawale Madhuri Vasudev and Abhilash Rawat
77. **Evaluation of Sentinel 2 red edge channel for enhancing land use classification.**
Sucharita Pradhan, Kamlesh Narayan Tiwari and Anirban Dhar
78. **Meteorological Drought Assessment in Tripura of Humid Northeast India using EDI.**
Annu Taggu and Salil K. Shrivastava
79. **Glaciers and glacial lake outburst flood risk mapping using geospatial techniques.**
Nity Tirkey, Dr. Anil Kumar Lohani and Dr. P K Parhi

HALL-III

CHAIRMAN- Prof. K. N. Tiwari, Professor, Department of Agricultural and Food Engineering, IIT Kharagpur

Co-Chairman- Dr. D.R. Sena, Principal Scientist, IISWC Dehradun

80. **A multi-model ensemble based drought characterization over India for 21st century**
Vivek Gupta and Manoj Kumar Jain

81. **Optimization of Human Effort and Time by Modified Foot Pump.**
Shalini Tripathi, Shivam Mishra, Shubham Mishra, Anish Kumar and Jitendra Tivari
82. **Temporal and Spatial Variability of Daily Rainfall Extremes in Assam of humid northeast India.**
Maisnam Luwangleima and Salil K. Shrivastava
83. **Discharge Prediction Approaches in Compound Meandering Channel.**
Piyush Pritam Sahu, Kanhu Charan Patra and Abinash Mohanta
84. **Application of GIS in Flood Risk Zonation of a Catchment.**
Subimal Nandi and Sujata Biswas
85. **A case study on flood and drought management in Jammu and Kashmir as well as Rajasthan with solutions.**
Pakeeza Jhan, Mumtaz Mohammed Jahangir and Saumyadeep Bhowmik
86. **An Analytical S-Curve Approach for SUH Derivation.**
P. R. Patil, S. K. Mishra, S. K. Jain and P. K. Singh

HALL-IV

CHAIRMAN- Prof. Gopal Chauhan, Former Head WRD&M, IIT Roorkee

Co-Chairman- Dr. Surajit Singh, Scientist, NIH Roorkee

87. **Impact of Land Use and Land Cover Change on Groundwater Resources in Sardar Sarovar Command Area of Region-V Using GIS and Modelling Approach.**
Nitin Mishra, Murari Kumar, Shahid Shafai and Dolonchapa Prabhakar
88. **Solar radiation forecasting using ANN for smart grid energy management.**
Divyakshi Aeron, R.P. Saini and N.P. Padhy

HALL-V

CHAIRMAN- Prof. N. K. Gontia, Dean, Agricultural Engineering Faculty, Junagadh Agricultural University, Junagadh 362 001, India

Co-Chairman- Prof. P.K. Jha, Department of MIED, IIT Roorkee

89. **New strategy of green water resources management for enhancing productivity, use efficiency and protection of environment.**
Ram Yadav
90. **Challenges of Food Security in Tanzania: Need for Precise Irrigation.**
Deogratius Nyamsha and Mitthan Lal Kansal
91. **Sustainable water use mechanisms for integrated irrigation and agriculture plan in Odisha.**
Devipriya Paikaroy
92. **Indigenous Irrigation Management system in the Bhutan Himalayan Foothill Zone of Assam: Challenges and Sustainability.**
Sourav Saha, Dr. Nityananda Deka and Dr. Abani Kumar Bhagabati
93. **Factor analysis of various reference evapotranspiration models for sub-humid sub-tropical climate.**
Akshika Guleria and Vijay Shankar

94. **Command Area Development and Management Strategies.**
R K Panda, S K Rautaray, P Panigrahi, S K Ambast, O P Verma, S Raychoudhuri, A K Thakur, R K Mohanty and M K Sinha
95. **Command Area Development Through Micro Irrigation.**
Vishnu Arya
96. **Yield Maximization through Sustainable Water Conservation in Dryland Agriculture**
Mahendra Nagdeve and Rajesh Patode

TECHNICAL SESSION –IV

HALL-I

CHAIRMAN- Prof. Venkataramana Rao Sridhar, Biological System Engg. Dept., Seitz Hall, RM 212, Virginia Tech., 155 Ag Quad Lane, Blacksburg, VA 24061, Virginia Tech Uni. USA

Co-Chairman- Dr. Manohar Arora, Scientist, NIH Roorkee

97. **Waste Water Management In Super thermal Power Stations-NTPC perspective.**
Mr. Sudarsan Chakrabarti, Ms. S.Padmapriya, Mr.Anirudh Sood
98. **Paper mill effluents: identification of emerging pollutants in Taranga Beel of Assam, India.**
Khanindra Sharma, Neelotpal Sen Sarma and Arundhuti Devi
99. **Evaluation of Water Quality in Rivers Ganga and Yamuna using water quality index (WQI) and Streeter-Phelps Model.**
Sudha Goel and Aman Sharma
100. **Contamination in drinking water supply: A case study of Shimla city, Himachal Pradesh.**
Mukesh Sharma, Chakresh Jain, Rajesh Singh and Omkar Singh

HALL-II

CHAIRMAN- Prof. Tushar Sinha, Texas A&M University, Kingsville, TX, USA

Co-Chairman- Prof. P.K. Jha, Department of MIED, IIT Roorkee

101. **Assessing The Land Use Change Impact on Stream Flow of Baitarani Basin Using ArcSWAT.**
Aparna Das, Raunak Prusty and Kanhu Charan Patra
102. **Analysis of Agricultural Drought Frequency using the Geo spatial Technology in Marathwada, Maharashtra.**
Mohammadsanaulla K. Huddar, N.R. Patel Abhishek Danodia and Avyakt Kumar Pathak
103. **Geospatial Analysis coupled with Logarithmic method for Groundwater Quality assessment in part of Pindrawan tank in Raipur district of Chhattisgarh, India.**
Purushottam Agrawal, Alok Sinha, Srinivas Pasupuleti, Rajesh Nune and Sarbani Saha
104. **Agricultural crop mapping using MODIS time-series data in DVC command area.**
Dibyendu Roy, Sneha Murmu and Sujata Biswas.
105. **Assessment of surface urban heat island growth over Ahmedabad city using geospatial techniques.**
Aneesh Mathew, Shivam Chauhan, Sumit Khandelwal and Nivedita Kaul
106. **Morphological changes in the Deltaic River of Odisha using GIS Techniques.**
Rashmirekha Hembram, Anil Kumar Kar and Harihar Mohanty
107. **Dynamic Programming Integrated Differential Evolution Algorithm for Determining Optimal Policy of Reservoir.**
Bilal, Millie Pant and Deepti Rani

HALL-III

CHAIRMAN- Dr. N.K. Tyagi, Former Member -ASRB and Former Director, ICAR-CSSRI Karnal
Co-Chairman- Prof. M. P. Tripathi, Professor and Head, SV College of Agril. Engg and Tech. IGKV, Raipur – Chhattisgarh

- 108. Application of LISS III and MODIS-derived vegetation indices for assessment of micro-level agricultural drought.**
Moumita Palchaudhuri and Sujata Biswas
- 109. Analyzing the translation from Metrological to Hydrological Drought for Wainganga River of Central India.**
Amit Kumar, Lalit Pal and Manish Nema
- 110. Rationalization of Water Quality Parameters for Krishna River Basin.**
Dr. Vikas Varekar, Hasan Rameez and Aditya Nanekar
- 111. Vulnerability Assessment of Manipur to Floods Using Unequal Weights.**
Sanayanbi Hodam, Dr Arnab Bandyopadhyay and Dr. Aditi Bhadra
- 112. Rainfall-runoff modeling using numerical model.**
Shreenivas Londhe and Digvijay Saruk
- 113. Experimental drought monitoring.**
Anantha Krishnan S, Saksham Joshi, Annie Maria Isaac, Raju Pv and Venkateswar Rao V
- 114. Agricultural drought management in Rajasthan.**
Dr. Raj Vir Singh
- 115. Dam Break Flood Inundation Modelling for a Hydroelectric Dam.**
Pankaj Mani, Rakesh Kumar and Jagadish Prasad Patra
- 116. Spatial Assessment of Hydrogeological Characteristics of Watershed Using Well Records.**
Salahu M. Hamza, Amimul Ahsan, Abubakar A. Musa, Sarki A. Salisu and Mohammed B. Ibrahim
- 117. Design flood estimation for gauged and ungauged catchments of the western Himalayas zone 7.**
Chanchala

HALL-IV

CHAIRMAN- Prof. Vinay K. Pandey, Dean, SV College of Agricultural Engineering and Technology, IGKV, Raipur - 492012 (Chhattisgarh)

Co-Chairman- Prof. Subir Sen, Department of HSS, IIT Roorkee

- 118. Assessment of Groundwater Potential and Sustainability in an Aquifer System of Mahanadi Delta, Odisha, India.**
Aruna Kumar Nayak, Madan Kumar Jha and Sasmita Sahoo
- 119. Rainfall Variability Assessment Over Rokel-Seli River Basin In Sierra Leone.**
Saramadie Thorlu-Bangura, Surendra Kumar Chandniha and Mitthan Lal Kansal
- 120. SCADA based Rainfall simulation and precision Lysimeters with open top climate chambers for Assessing the climate change impacts on Resource losses in Semi-Arid Regions.**
K S Reddy, Vanaja Maddi, M Kumar and T Saikrishna
- 121. Analysing Trend and Change Point of Hydro-Climatic Variables in Kesinga Sub-Catchment of Mahanadi Basin, India: 1970 – 2015.**
Pooja Agarwal, Mohd. Afaq Alam and Lalit Pal
- 122. Climatic Change due to Global Warming with Respect to Various Parameters.**
Mumtaz Mohammad Jahangir and Irfan Yousuf Wani

HALL-V

CHAIRMAN- Prof. S. K. Shukla, WRDM, IIT Roorkee

Co-Chairman- Prof. Subir Sen, Department of HSS, IIT Roorkee

- 123. Relationship of Catchment Storage Command for Rainwater Harvesting In the Farm Pond.**
Rajesh Patode and Mahendra Nagdeve

124. **Problem of Groundwater, Irrigation and Cropping pattern in Uttar Pradesh.**
Jyoti Tripathi and Rekha Gupta
125. **Model to Generate Alternatives (MGA) of cropping pattern for tribal farmers.**
Aniket Deo, Prof. Amit Arora and Prof. Upendra Bhandarkar
126. **Modelling of Groundwater Development Using Arc-SWAT and MODFLOW**
Satavisha Ghosh, Sunny Gupta and Susmita Ghosh
127. **Numerical modeling of Moisture flow and Nitrate-N transport through unsaturated porous media in laboratory condition.**
Jahangeer and Brijesh Kumar Yadav
128. **Soil moisture depletion based irrigation technology for summer finger millet under midland situation of Chhattisgarh plains.**
Dr. M. P. Tripathi, Yatnesh Bisen, Priti Tiwari, Prafull Katre, Karnika Dwivedi and Gaurav Kant Nigam

TECHNICAL SESSION –V

HALL - I

CHAIRMAN- Dr. Ariz Ahammed, IAS, Mission Director, National Water Mission, MoWR, Rd&GR, Govt. of India

Co-Chairman- Er. Anuj Kanwal, Director-INCSW, CWC-New Delhi

129. **Humic acid removal from water using hydrophilic polysulfone membrane.**
Bharti Saini, Manish Sinha and Sukanta Dash
130. **Removal of Dyes and Iron using Eco-Friendly Adsorbents.**
Devika S L, Nimitha P, Shrihari Surathkal and Venkatesh Muganur
131. **Challenges and Opportunities for Optimizing Water Consumption in Painting Process.**
Veer Shivajee, Sanjay Rastogi and Rajesh Singh
132. **Binary adsorption of Cd (II) & Ni (II) ions from aqueous solution using A.barbadensis Miller leaves residue powder.**
Shweta Gupta and Arinjay Kumar
133. **Numerical modelling of pollutant dispersion at Upper Ganga Canal.**
Tefamariam Abreha Bahita, Ambrish Maurya, Pradeep Kumar Jha and Ashish Pandey

HALL - II

CHAIRMAN- Dr. C.V. Dharma Rao, Joint Secretary and Advisor (C&M), National Water Mission, MoWR, Rd&GR, Govt. of India

Co-Chairman- Dr. V. M. Chowdary, Scientist/Engg "SG", RRSC-N, NRSC, New Delhi

134. **Flood forecasting of the Himalayan River Kosi at Baltara (India) by a wavelet-GA-ANN conjunction models.**
Mani Kumar and Rajeev Sahay
135. **Bringing science in community planning under changing climate.**
Ajay Kalra, Ranjan Parajuli, Narayan Nyaupane, Lorenzo Mastino, Marco Velotta and Sajjad Ahmad
136. **Streamflow Response to Land Use-Land Cover Change over the Subarnarekha River Basin, India.**
Pratik Deb, Ashok Mishra, Igor Musikhin and Soukhin Tarafdar
137. **A Study on Variability and Trends Towards Climate Instability.**
Abhinav Anand Sinha, Nishant Kumar Singh and Avinash Kumar
138. **Multifractal Description of Droughts in Western India using Detrended Fluctuation Analysis.**
Adarsh S and Priya K.L.
139. **Impacts of Climatic Variability and Extremes on Agriculture and Water in Odisha Coasts.**
Devipriya Paikaroy, Anil Kumar Kar and Prof. Kabir Mohan Sethy

- 140. Sectoral and Livelihood Vulnerability to Climate Risk in Indian Himalaya: A Case Study of Almora District of Uttarakhand.**

Ashish Kumar Panda, Dr. Anil Kumar Gupta and Prof. Amarjeet Kaur

HALL - III

CHAIRMAN- Prof. Pranab Kumar Mohapatra, Civil Engineering Department, IIT, Gandhinagar

Co-Chairman- Prof. Brijesh Yadav, Department of Hydrology, IIT Roorkee.

- 141. Flood Risk Management with Real-Time Flood Forecasting.**
Nandana Perera, Shyam Prasad, Rob James and Karen Finney
- 142. Effect of capillary rise on irrigation requirements for wheat.**
Arunava Poddar, Navsal Kumar and Vijay Shankar
- 143. An approach towards mitigation of Cyclone disaster- A case study of Odisha during Phailin.**
Anil Kumar Kar, Krishna Kumar Gupta, Joygopal Jena and Dipti Ranjan Jena
- 144. Flood and Drought Management through Water Resources Development in Odisha.**
Pidathala Sunil, Sachin Dhiman and Kanhu Charan Patra
- 145. Hydrologic analysis and modelling of bridge across Chandrabhaga river.**
Jagadish Prasad Patra, Rakesh Kumar and Pankaj Mani
- 146. Scaling of open channel flow velocity along the centre line of emergent, highly sparse and rigid vegetation patch with rough bed interior of the patch.**
Chitrangini Sahu and Dr. Prashanth Hanmaiahgari
- 147. Regional flood frequency analysis for gauged and ungauged catchments of Upper Narmada and Tapi Subzone 3 (c).**
Raksha Kapoor, Rakesh Kumar and Mohit Kumar
- 148. Developing Strategies for Mitigating Pluvial Flooding in Gurugram.**
Abhilash Rawat, Govind M.P. and Jawale Madhuri Vasudev
- 149. Low Impact Development (LID) Modelling for Stormwater Management.**
Nandana Perera, Shyam Prasad and Rob James

HALL - IV

CHAIRMAN- Dr. Ramadhar Singh, PS & Former Head, Irrigation & Drainage, Engineering Division, CIAE, Bhopal

Co-Chairman- Dr. Avdhesh Pratap, Water Law, Management and Constitution Law Expert

- 150. Assessment of impact of climate change on hydrology of Brahmani and Baitarani river basin.**
Raunak Prusty, Aparna Das and Kanhu Charan Patra
- 151. Rainfall Variability and Its Impact on Groundwater Conditions in Semi-arid Godavari Basin.**
Pallavi Kulkarni and Sudhakar Pardeshi
- 153. Comparison of GCM derived rainfall – a case study in Kerala.**
Lini R Chandran and Jairaj P G
- 154. Climate Change Detection in Upper Ganga River Basin.**
Chetan Sharma and Chandra Shekhar Prasad Ojha
- 155. Modelling CO₂ sequestration and its subsequent migration in subsurface.**
Shachi Shachi and Brijesh Kumar Yadav

HALL - V

CHAIRMAN- Er. R.N. Mishra, Former CMD, SJVN Limited

Co-Chairman- Er. L.P. Joshi, AGM, THDCI Limited

- 156. Water Governance and Capacity Building.**
Dr. Nanditesh Nilay
- 157. Hydro-Social Leadership: Adaptive Governance for Evolving Water worlds.**
David M.N. Gosselin

158. **Impact of Environmental flow on Hydro Power Projects - A Case Study.**
Naresh Dongre and Vivek Gupta
159. **Hydro-ecological assessment of environmental flows for Satluj river.**
Pradeep Kumar, Jai Nayak and Shobha Ram
160. **Ground water governance and interplay between policies in India.**
Akshi Bajaj and Diptimayee Nayak

5. VALEDICTORY FUNCTION

During the valedictory function, Prof. S.K. Mishra, Chairman of the Conference welcomed the gathering. Prof. Ashish Pandey, Organising Secretary of the Conference presented a brief report of the conference and also the draft recommendations of the conference. Prof. A.K. Chaturvedi, Director, IIT Roorkee emphasised the use of emerging technologies for addressing the water resources problem and appreciated the outcome of the conference. He emphasised upon the sharing of these recommendations with the stake holders for their effective implementation in the field. Shri Prakash Pant Ji, Hon'ble Cabinet Minister, Govt. of Uttarakhand, Dehradun was the Chief Guest of the valedictory function. He informed about the various water conservation practices being followed in Uttarakhand and emphasized that the recommendations of the conference would be very useful for not only Integrated Water Resources Development & Management in Uttarakhand under the climate change scenario but also for water managers and practitioners. Shri R.N. Mishra, Former CMD, SJVN Limited, Prof. V. P. Singh, Department of Biological & Agricultural Engineering & Zachry Department of Civil Engineering, Texas A&M University College Station, Texas, USA, Dr. S.K. Jain, Director, NIH Roorkee and Dr. C.V. Dharma Rao, Joint Secretary and Advisor (C&M), National Water Mission, MoWR, RD & GR, Govt. of India also addressed the gathering. During his address, Dr. C.V. Dharma Rao emphasised on the active collaboration between IIT Roorkee and Ministry of Water Resources, RD and GR on various issues and challenges being faced by country in water sector.



Plate 16: Presentation of the conference report by Dr. Ashish Pandey, Associate Professor, WRDM, IIT Roorkee and Secretary IWRS during valedictory function.



Plate 17: Address by Dr. C.V. Dharma Rao, Joint Secretary and Advisor (C&M), National Water Mission, MoWR, RD & GR, Govt. of India and Guest of Honour during valedictory function.



Plate 18: Address by Prof. V.P. Singh, Texas A&M, University and Chairman of the International Advisory Committee of the conference during valedictory function.



Plate 19: Presidential Address by Prof. Ajit K. Chaturvedi, Director, IIT Roorkee during the valedictory function.



Plate 20: Address by Chief Guest during valedictory function.

6. POSTER & PICO SESSIONS

On the last day of the conference, a poster session was organised. The students displayed 34 posters, prepared based on their research papers, in the premise of Department of WRDM, IIT Roorkee as per the following details :

POSTER SESSION

CHAIRMAN: Prof. V.P. Singh, Texas, A&M, USA

Co-Chairman: Dr. C.V. Dharma Rao, Joint Secretary and Advisor (C&M), National Water Mission, MoWR, RD & GR, Govt. of India

- 161. SWAT based Runoff and Soil Erosion Modelling: a case study of Varanasi region watershed.**
Nikita Shivhare, Padam Omar, Atul Kumar Rahul, Prabhat Kumar Singh Dikshit and Shyam Bihari Dwivedi
- 162. Recharge potential mapping and recharge site suitability analysis in complex hydrological system of Kosi Basin in Mid-Himalayan region.**
Meenu Rani, Kireet Kumar and Himanshu Joshi
- 163. A revisit to SCS-CN inspired antecedent moisture content formulae.**
Mohan Lal, S. K. Mishra and Ashish Pandey
- 164. Estimation of Surface runoff with SCS curve number method using GIS. A Case Study of Vadodara city.**
Lakhwinder Singh and Deepak Khare
- 165. Assessment of satellite-based precipitation estimates over an agriculture based Indian watershed.**
Sushil Kumar Himanshu, Ashish Pandey and Deen Dayal
- 166. Reference crop evapotranspiration estimation using remote sensing technique.**
Samuel Mukpuou, Ashish Pandey and V.M Chowdary
- 167. Determination of ERA-INTERIM proficiency for rainfall-runoff modelling**
Tanmoyee Bhattacharya, Dr. Deepak Khare and Dr. Manohar Arora
- 168. Assessment of evapotranspiration using satellite data: a case study of Tamor watershed, Nepal**
Kul Raj Chalise, Ashish Pandey and Kumar Ghimire
- 169. Assessment of irrigation water requirement and its trend in Betwa river basin, India.**
Ashish Pandey, Reetesh Kumar Pyasi and Santosh S. Palmate
- 170. Laboratory performance evaluation of a rainfall simulator.**
Vikas Jadhao, Rupesh Bhattarai, Ashish Pandey and S. K. Mishra
- 171. Application of hydrologic modelling system (HEC-HMS) for flood assessment; case study of kelani river basin, sri lanka.**
Sivakumaran Rajkumar, S K Mishra and R D Singh
- 172. Hydrological Modelling of West Rapti river basin, Nepal using SWAT.**
Shekhar Nath Neupane and Ashish Pandey
- 173. Assessing hydrologic alteration due to dam construction in the upper godavari basin**
Santosh S. Palmate and Ashish Pandey
- 174. Design of High Head Regulating Radial gate using Microsoft Excel.**
Roshan Kumar Deo, Thanga Raj Chelliah, Sk Shukla and Mayank Jain
- 175. Review of flow simulation methods in alluvial river.**
Deepak Dhakal, Nayan Sharma and Ashish Pandey
- 176. Research needs for stream power moderation in Hilly torrents for Disaster mitigation.**

Manoj Prasad Patel, Nayan Sharma and Ashish Pandey

177. **Study of drought characteristics in ken river basin of bundel khand region in India.**
Sudin Moktan, R.P. Pandey, S.K. Mishra and R.B. Pokharel
178. **Meteorological drought characteristics in eastern India.**
Kumar Amrit, Rajendra Pandey and Surendra Mishra
179. **SCS-CN method revisited in perspective of strange data.**
Shailendra Kumar Kumre, Surendra Kumar Mishra and Ashish Pandey
180. **Rainwater harvesting system planning for Tanzania.**
Msafiri Mussa Mtanda, Sakshi Gupta and Deepak Khare
181. **Development of Mathematical Model for Estimation of Wetting Front under Drip Irrigation.**
Harsh Vardhan Singh and Vishwendra Singh
182. **Design of pressurized Irrigation system to Improve Irrigation water use efficiency in Canal Command.**
Alemayehu Yadesa and Dr.M.L Kansal
183. **Effect of land use on runoff curve number in steep slope.**
Chakra Bikram Singh, S.K. Mishra and Shailendra Kumre
184. **Effect of watershed characteristics on SCS-CN.**
Krishna Prasad Dumrakoti, S.K. Mishra and S.K. Kumre
185. **Review of Streambank Protection Approach using Jack Jetty Field.**
Vishnu Bhandari, Nayan Sharma and Ashish Pandey
186. **Event based hydrological modelling of babai watershed using HEC-HMS.**
Dinesh Parajuli, J.P. Patra and S.K. Mishra
187. **Assessment of blue, green and grey water footprint at river basin level: a case study of the Koshi river basin, Nepal**
Kumar Ghimire, R.D Shingh, Ashish Pandey, G.S Murthy and Kulraj Chalise
188. **Rainwater harvesting in rural communities: a case study of Ghana.**
Collins Andoh, Sakshi Gupta and Deepak Khare
189. **Advancement plans for revitalization and development of ankobra river basin in Ghana.**
Benjamin Lawortey, Thanga Raj Chelliah and S.K Shukla
190. **Water quality indices (wqis) for vadodara enviro channel limited and its member industries**
Shambhu Jha and Dr. S. K. Mishra
191. **Changes in temporal distribution of rainfall using Precipitation Concentration Index in Rampur watershed of Mahanadi river basin.**
Priyanka Gunjan, S. K. Mishra, Anil Kumar Lohani and Surendra Kumar Chandniha
192. **A comparison of methods for computation of evapotranspiration in tana basin in Ethiopia.**
Hailu Birara, Surendra Mishra and Rajendra Pandey
193. **Long term historic changes in temperature and potential evapotranspiration over Betwa river basin.**
Ashish Pandey, Deen Dayal, Santosh Subhash Palmate, S.K. Mishra and R.P. Pandey
194. **Evaluation of Hydro-Meteorological Drought Indices in Dry Land Area, a Case Study of Seonath River Basin.**
R. B. Pokharel, R. P. Pandey, S. K. Mishra and Sudin Moktany



Plate 21: Poster Presentation during the conference.

PICO presentation was organised for some of the research papers and three students were awarded for best presentation namely. Mr. Samuel Mukpuou, Mr. Manoj Prasad Patel and Mr. Mohan Lal students of the Department of WRDM, IIT Roorkee. Prof. V.P. Singh addressed the students and the faculty and encouraged them to take up the R&D studies involving the applications of advanced tools and techniques.



Plate 22: Evaluating Committee and students attending the PICO presentation during the conference.



Plate 23: Evaluating Committee and students attending the PICO presentation during the conference



Plate 24: Prof. V.P. Singh, Texas A&M, University, USA addressing the Evaluating Committee and students during the PICO presentation in the conference.



Plate 25: A group photograph of some of the delegates attended the International conference.

7. EXHIBITION

An exhibition was also organised through out the conference wherein advanced & state of art equipment were demonstrated. The participants took keen interest during the exhibition and inquired about the capabilities of different equipment.

8. RECOMMENDATIONS

Based on deliberations, plenary and technical sessions, important recommendations were brought out and these are given below:

1. Hydrological data (gauge and discharge, snow melt, physical, chemical and biological water quality, ground water, and lakes and reservoir), hydro-meteorological data (rainfall, snowfall, temperature, evaporation, wind speed, relative humidity, glacial melt), and water quality networks need to be strengthened using advanced instrumentation for measuring data at shorter temporal and spatial resolutions. Application of Space Technology particularly Remote Sensing and Geographic Information System (GIS) for spatial data collection and data processing needs to be encouraged.
2. The data must be archived after passing through the quality checks. The data collected must be shared on-line by the stakeholders. In this regard a central agency/authority need to be made responsible for disseminating the data to the users after maintaining the necessary protocols.
3. Web-service-based systems be developed to strengthen open machine-to-machine and machine to human data dissemination for retrieval and dissemination of data to the user free of cost.
4. Emerging technologies should be applied to address the field problems, which may entail training of field engineers. Emphasis should be on developing indigenous technologies for addressing water resources problems of the country.
5. Existing dams must be re-evaluated for their safety under the spectre of climate change, and strengthened accordingly.
6. Real time reservoir operation and management must be based on Decision Support System. Emerging technologies must be applied for addressing problems of flash floods, landslides, glacier lake outburst floods, drying of springs, glacier retreat, reduction in the snow-covered areas, erosion and sedimentation, and meandering and shifting of river courses in the Himalayan region.

7. Pollution hotspots, where immediate structural and non-structural measures are needed, must be identified using water quality data.
8. State level action plans need to be developed for effective utilization of water by all the stake holders and adaptation strategies should be evolved to cope with the impact of climate change on water resources.
9. Appropriate drainage facilities should be provided in urban areas as well as in the proposed smart cities.
10. Measures need to be taken up for enhancing the water use efficiency in all sectors, with particular emphasis on agriculture irrigation which consumes more than 80% fresh water.
11. Application of precision irrigation (including micro irrigation and precision land levelling for gravity irrigation) systems should be promoted for reducing water and nutrient use in agriculture. However, optimum use of fertilizers, insecticides, and pesticides should be insured to avoid soil degradation. There is a need to encourage the use of organic fertilizers.
12. Micro irrigation should be encouraged in canal commands to improve water use efficiency giving due considerations to the leaching requirement.
13. Recycle and reuse of wastewater need to be encouraged to minimize the disposal of wastewater in river systems. The treated wastewater can provide an alternative to the fresh water for irrigation, resulting in an increase of water table and enhancing river flows during the lean season.
14. Hydropower is the cheapest means of energy and has the longest life. There is an urgent need to re-assess the hydropower potential using emerging technologies under climate change and identify potential sites for development of small, medium, and large hydropower projects.
15. Vulnerable areas along the coast line, likely to be affected due to climate change, should be identified.
16. Water governance is one of the major issues which requires immediate attention. Water laws need to be implemented and an awareness campaign should be launched for their successful execution.
17. Water pricing needs to be revisited in view of ongoing over-exploitation of ground water due to free/heavy subsidies in electricity.
18. Pipe Irrigation Networks should be encouraged in arid and semiarid regions, which will facilitate the use of micro-irrigation systems.
19. Integrated Water Resources Management (IWRM) should be taken up for all river basins of India to ensure equitable distribution of water of desirable quality for each sector.
20. Hydrological extremes such as floods and droughts, whose frequencies of occurrence have increased in recent past, need to be properly managed adopting structural and non-structural measures. Interlinking of Rivers, which is one of the flagship programme of the Government of India, should be scientifically investigated for each identified river links using emergent technologies before its implementation.
21. In alluvial areas, erosion and sedimentations are major problems during monsoon season. The sediment management strategies should be decided analysing the sediment data utilizing the emerging technology and tools.

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कुल गीत

जयति जयति विद्या संस्थान,
हिम गिरि शृंगों से अभिनंदित,
गंगा जल करते कल गान। ॥ जयति॥

शिक्षा आदर्शों में उन्नत,
जीवन शिल्पी भू रचना रत,
'श्रमं विना न किमपि साध्यम्' व्रत,
यन्त्र कला कौशल अभियान। ॥ जयति॥

जन जीवन प्रासाद उठाकर,
सेतु बांध भू खण्ड जुड़ाकर,
अंतरिक्ष में यान उड़ाकर,
नव युग को देता आह्वान। ॥ जयति॥

सर्जन हित जीवन नित अर्पित,
धरा स्वर्ग शोभा कर निर्मित,
वैज्ञानिक युग पट में मूर्तित,
भू पर लाता स्वर्ण विहान। ॥ जयति॥

नयी प्रेरणा से दीपित मन,
नव स्वप्नों से हर्षित लोचन,
नए सत्य की उर में धड़कन,
ध्येय राष्ट्र जीवन कल्याण। ॥ जयति॥

(रचयिता—श्री सुमित्रानन्दन पन्त)

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