CURRICULUM VITAE OF DR. N.K. GOEL

Name: **NARENDRA KUMAR GOEL**

Designation: Professor, Department of Hydrology,
Coordinator, Dam Safety and Rehabilitation Programme
Indian Institute of Technology Roorkee,
Roorkee- 247667, India

Date of Birth: **April 24, 1959**

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Education: B. Tech. (Civil) 1980, GBPUA&T,

M. Tech. (Water Resources Engg.), 1982, IIT Delhi,

Certificate of Hydrology, 1984, CSU, USA,

Ph.D. (Hydrology), 1991; IIT Roorkee.

Post-Doctoral collaborative work at Uni. of Waterloo, Canada with Prof. Donald H. Burn and Tufts Uni. USA with Prof. Richard M. Vogel

Specialized Training Abroad:

i. August 1983- Jan. 1984 at CSU, USA in Stochastic Hydrology under the guidance of Prof. Warren Hall and Prof. J.D. Salas

ii. Nov. –Dec. 1987 at University College Galway, Ireland in the area of Flood Forecasting under the guidance of Prof. J.E. Nash

Professional Experience:

National Institute of Hydrology, Roorkee: May 1982 – June 1988, as Scientist B and C.

Indian Institute of Technology Roorkee: June 1988 onwards; Reader, Associate Professor, Professor, Professor (HAG) and Chair Professor, Bharat Singh Chair for Water Resources, Chair established by MOWR, RD & GR Govt. of India

Area of Specialization: Stochastic Hydrology, Extreme value estimation, Flood estimation and forecasting, Power generation projects and pipeline projects, hydrological analysis and planning

Awards:

- **Outstanding Alumnus of College of Technology, GBPUAT, 2019**
- **Chair Professor, Bharat Singh Chair for Water Resources**, (MOWR, GR&RD, GoI); 2013-2017
- **'Adjunct Professor'** by **University of Waterloo, Canada** in year 2003-2006.
- **ASCE-EWRI -2014** Best Case Study award
- **Khosla Research Prize** in the years 1999, 2001 and 2002.
- '**Star performer status'** for more than six times in a row by IIT Roorkee since 2001.

Membership:

- Member, Society of National Institute of Hydrology, MoJ, Government of India.
- Member, Dam safety review panel of Government of Chhattisgarh
- Member, Panel of experts, UPSC
- Editor, Journal of Hydrology, published by Indian Association of Hydrologists 2003-07
- Member, Expert Committee, Evaluation of mining projects, MoEF, GoI. (2006-08)

- Member, TAC, National Institute of Hydrology, MOWR, RD &GR, GOI (2009-11)
- Member, Indian National Committee on Hydrology, MOWR, RD &GR, GOI (2009-11)
- Member, Sub-committee on WRD, Bureau of Indian Standards, GOI (2012- Cont.)
- Member, State Expert Appraisal Committee, Uttarakhand, MOEF, GOI, (2013-2017)
- Member, Indian National Committee of IHP, GoI (2013- Contd.)
- Member, International Commission on Large Dams, India (2014 –contd.)
- Member, multi-disciplinary committee, MOWR, RD &GR, GOI on 'Reduction of flow in Pamba and Periyar rivers
- Member, working group on 'Design flood estimation', Central Water Commission, MOWR, RD &GR, GOI.

Technical Accomplishments:

- Guided **21 Ph.D. Dissertations** (including 6 in progress)
- Guided **75 M. Tech. dissertations**, including 1 in progress
- Published **2 books** (Edited proceedings of international conferences)
- Published **60+ technical papers** in refereed national and International Journals
- Published **70+ technical papers** in National and International seminar proceedings
- Published **15 Technical reports**
- Participated in **50+ consultancy projects** (over 30 as Principal Investigator) with a total financial outlay of over Rs. 300 million
- Participated in **8 research projects** (5 as PI and 3 as co-PI)
- Organized 60+ **sponsored short-term courses** for the officers of various organizations, including 10 International programmes.

Courses handled at post graduate level:

- Stochastic Hydrology
- Deterministic Hydrology
- Physical Hydrology
- Flood forecasting
- Hydrological Safety Evaluation of Dams
- Dam Safety surveillance, instrumentation, and monitoring
- Hydrologic elements and analysis
- Engineering Hydrology
- Urban Hydrology
- Natural hazard and impact assessment
- Hazard monitoring, prediction and micro-zonation.

Administrative Responsibilities:

(i) Chief Advisor Sports (2004-2005)

- Led a team of 15 faculty advisors and 3 sports officers
- Conceptualized, planned, and executed the infrastructure development for sports facilities worth Rs. 2.5 crores at IIT, Roorkee in a record time of about one year.
- Coordinated first ever inter IIT sports meet at IIT Roorkee. In this meet about 1200 students from 7 IITs participated
- IIT Roorkee ranked second amongst 7 IIT's.

(ii) Head, Department of Hydrology (2006-2008)

- Led a team of 10 faculty members
- Got the Department re-empaneled operational under ITEC and SCAPP programs of MoEA, GoI
- Initiated actions for recognition of the Department as Regional Training Centre of WMO
- Initiated collaboration with UNESCO-IHE Delft and coordinated PoWER project with 15 partner countries from IIT R side.
- Initiated collaboration with several field organizations likes NTPC Ltd., NHPC Ltd., THDC India, SJVN Ltd., DVC, State Govt. departments
- Initiated 'Purpose driven studies' with Govt. of Himachal Pradesh & Govt. of Orissa.
- Enhanced Institute -Industry interaction resulting in award of about 30 consultancy projects (more than Rs 4 crores)

(iii) Dean of Students' Welfare (2009-2011)

- Led a team of about over 80 faculty members to look after the Welfare (Bhawan i.e hostel, Mess and extra-curricular activities) of about 7000 students
- Execution and operation of 4 new students' hostels for 2500 students
- Conceptualization, planning and execution of "Multi-activity Centre' for students
- Conceptualization and planning of 'Students Live Centre cum sports complex'
- Strengthening of sports facilities and Setting up of SDSlabs in hobbies club
- Initiated a number Students welfare schemes like creation of Students' Counselling Cell, 'Earn while you learn' scheme for poor students, Child care centre, Counseling of academically poor students at Hostel and Department levels etc.

(iv) Chairman, Hospital Advisory Committee (2012 – 2016)

- Interaction with every section of the IIT community
- Facilitating medical services to about 15000 members of IITR Community through a team of about 60 medical and paramedical staff
- Got the auditing of Institute hospital done through independent agency HOSMAC for better resource management
- Got CGHS based MATR-2012 implemented, which was pending since last 10 years
- Carried out MoU's with local hospitals as well as super –specialty hospitals like Max, Fortis, Apollo, Metro etc.
- Initiated selection process for recruitment of doctors based on DACP scales

(v) Coordination and MoUs handled

- MoU between IIT Roorkee and University of Waterloo, Canada
- MoU between IIT Roorkee and National Institute of Hydrology
- MoU between IIT Roorkee and UNESCO-IHE Delft and PoWER members of about 15 countries
- Coordination with World Meteorological Organization, Geneva
- Coordinator, M Tech programme on Dam Safety and rehabilitation and DRIP project at IIT Roorkee.

DISTINGUISHED PERSONS WELL ACQUAINTED WITH MY WORK

(i) Prof. A.K. Chaturvedi, Director,
IIT Roorkee, Roorkee- 247667
director@iitr.ac.in +91-1332-285500

(ii) Dr. S. C. Saxena, Former Director, IIT Roorkee,
Presently Vice Chancellor, Jaypee Institute of information Technology
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(iii) Dr. Donald H. Burn, Professor
Professor Emeritus and Adjunct Professor,
Dept. of Civil & Environmental Engineering, University of Waterloo,
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(iv) Dr. Richard M. Vogel,
Research Professor and Professor Emeritus
Department of Civil and Environmental Engineering
Tufts University Medford, MA 02155,
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Annexure I

DETAILS OF PUBLICATIONS AND PROJECTS

Ph.D. THESES GUIDED:

1. Flow forecasting in Himalayan catchments by Arjun Kaushik, jointly with Dr Ankit Agarwal (2022; in progress)
2. Urban Flood Modelling by Tuhin Mukherjee, Jointly with Dr D S Arya (2022; in progress)
3. Multivariate nonstationary flood frequency analysis, Ankush (2021; in progress)
4. Short and medium range forecast of rainfall using ensemble models by Suman Gurjar, Jointly with Dr M K Goel (2020; in progress)
5. Flood estimation and forecasting by Bhanu Kumar Sharma (in progress)
6. Study of flood Scenario of Jhelum Basin with regard to Catchment area and climate change by Sheikh Umar under joint guidance of Dr M A Lone at NIT Srinagar (under examination)
7. Climate extreme studies in changing climate over India by Bratati Chowdhary, jointly with Dr Manohar Arora (Awarded, 2021)
8. Development of an operational flood forecasting system for Tehri dam by Niraj Kumar Agrawal jointly with Dr A K Lohani (Awarded, 2019)
9. Climate Variability Studies over parts of India with focus on Hydro-climatic variables by Litan Kumar Ray (Awarded, 2018)
10. Impact of Climate and catchment dynamics on runoff generation by Negash Wagesho from Ethiopia jointly with Dr. M.K. Jain (Awarded, 2012)
11. Flood estimation and forecasting in Mahanadi River basin using soft computing techniques by Anil Kar jointly with A.K. Lohani (Awarded, 2011)
12. Flood forecasting and early warning studies for parts of Bangladesh by Mizanur Rahman from Bangladesh jointly with Dr. D.S. Arya (Awarded, 2011)
13. Evaluation of temporal and spatial climatic variability over Indian Himalaya by S.K. Shrivastava, supervised jointly with Dr. Ranvir Singh and Dr. Pratap Singh (Awarded, 2011)
14. Hydrological modeling for flood flows by Mr. Shibayan Sarkar jointly with Dr. B.S. Mathur (awarded-2010)
15. Climate change studies: A spatio- temporal analysis for part of India by Ashoke Basistha jointly with Dr. D.S. Arya (Awarded- 2010)
16. Regional flood frequency estimation in India by Rakesh Kumar, supervised jointly with Dr. K.K.S. Bhatia (Awarded-2009)
17. ANN and fuzzy logic in hydrologic modeling and flow forecasting by A. K. Lohani, jointly with Dr. K.K.S. Bhatia (2008)
18. Effect of climatic changes on surface hydrological estimates by Mr. Manohar Arora, jointly with Dr. Pratap Singh (2005)
19. Estimation of extreme flows for ungauged catchments by Mr. V. K. Bhatt - jointly with Dr. B.S. Mathur (2003)
20. Operation of a multipurpose reservoir by Mr. S.K. Mishra, jointly with Dr. S. M. Seth and Dr D.K. Srivastava (1998)
21. Development of physically based flood frequency models by Mr. R.S. Kurothe, jointly with Dr. B.S. Mathur (1997)

M.E. THESES GUIDED:

1. Projection of flood seasonality changes in a Garhwal Himalayas river basin due to global warming, by Prachi Singhal 2021-22 (in progress) jointly with Ankit Aggarwal
2. Effect of additional spillway on downstream floods of Hirakud, by Lingaraj Nath; 2020-21
3. Design of Hydro-meteorological Network of Narayani River Basin, Nepal, by Dinkar Kayastha; 2020-21
4. Assessment of Water availability up to Daudhan dam site of Ken basin for Ken-Betwa link project by Shiva Kant Pandey, 2020-21
5. Challenges and opportunities of small-scale irrigation utilization in central Rift Valley basin of Dugda Worda, Ethiopia, by Obse Wegi Gebissa; 2020-21

6. Effect of Kalia Sot Dam, Bhopal on downstream floods under climatic and LULC changes by Satyajeet Shukla; CoEDMM (jointly with Harshit Lakra) 2020-21
7. Development of framework to address drought issues, by Arjun Kaushik; 2019-20
8. Regional flood frequency analysis for Narayani river basin, Nepal by Ram Kumar Kapair; 2019-20
9. Identification of hotspots and glacial lakes in Arunachal Pradesh by Vijitha Sree Thathireddy ; CoEDMM, (jointly with Ajanta Goswami) ; 2019-20
10. Daily streamflow forecasting using stochastic models by Ally Diwani; 2018-19
11. Flood risk assessment for dams by Aman Kumar Singh; 2018-19
12. Flood hazard mapping for Roorkee area by Chaitanya; COEDMM, 2018-19
13. Hydrological aspects June 28, 2017 flood at IIT Roorkee by Ila Prakash; COEDMM, 2017-18
14. Geomorphological analysis and hydrological modelling of three Himalayan catchments of Nepal and India by Santosh Kumar Sah; 2017-18
15. Turbine testing under field conditions; by Desh Deepak; 2017-18
16. Flood Estimation fin a river basin downstream of a major reservoir in coastal region by Jaya Ram Prajapati; 2016-17
17. Multivariate modelling of hydro-meteorological extremes by Sujan Tamrakar; 2015-16
18. Study on climate change in Sundarbans, Bangladesh by Nurul Hoque Upal; 2015-16
19. Glacial lake outburst flood studies over Indus basin by Mr. Shailesh Kumar; 2014-15
20. Climate Change Studies over Nepal by Mr. Sunil Poudel 2014-15
21. Flood estimation for rivers of Saurashtra region contributing into Gulf of Khambat by Miss Priyanka 2013-14
22. Analysis of Non-stationarity in hydro-meteorological data of Dhadhar river basin by Mr. Sunil Kumar, 2013-14
23. Simulation of June 2013 flood at Tehri dam, by Mr. Supindra Khatri 2013-14
24. Flood studies in and around Alaknanda basin by Mr. Y.K. Goel 2013-14
25. Flood estimation and forecasting studies for Tehri dam – Mr. Ashish Sinha 2012-13
26. Flood routing studies for VPHE project, Uttarakhand by Mr. Sujay Negi 2012-13
27. Simplified flood routing methods- Mr. M.M. Vishnu 2012-13
28. Hydrological reappraisal for Visnugad pipalkoti hydro-electric project by Sushil Himanshu 2011-12
29. Design flood estimation for Tehri dam using deterministic and statistical approaches by Ajay Kumar, 2011-12
30. Hydrological analysis for a coastal power project (2010-11) – Keshav Bobade
31. Regional flood frequency analysis of Nepal rivers (2009-10) , Badri Karki from Nepal
32. Stochastic modeling of flood flows for Myanmar rivers (2009-10) by Lai Lai Winn from Myanmar jointly with Dr. A.K. Lohani
33. Climate change scenario generation using statistical downscaling (2009-10) by. N.P. Gautam from Nepal jointly with Dr. Manohar Arora
34. Bivariate Flood frequency analysis using Copulas (2009-10) by Siddartha Shankar Mishra, jointly with Dr. Aditi Gangopadhyay
35. Design flood and Scour depth computation at pipeline crossing (2008-09) , Ekta Sahay jointly with Dr. D.S. Arya and Dr. Sanjay Kumar
36. Modelling of snow melt component in the runoff of river Bhagirathi at Tehri (2008-09), Neeraj Agarwal, jointly with Dr. D.S. arya and Dr. Manohar Arora
37. Predictions in ungauged basins of Orissa (2007-08) , A.K. Kar
38. Flood predictions in MMRDA region, Mumbai (2007-08), D. Chakravorty
39. Stochastic modeling of Nile Flows (2007-08) by Eltag from Ethiopia
40. Climate change influences on hydrological extremes (2005-06) by S.K. Gangwar jointly with Dr. D.S. Arya
41. Flood risk mapping by Dhruv Dhirendra (2005-06) jointly with Dr. D.S. Arya
42. Flood hazard Assessment of Chitwan District in Nepal (2004-05) by Bhupendra Gauchan from Nepal jointly with Dr. D.S. Arya
43. Flood risk mapping in the lower part of Chindwin river in Myanmar (2004-05) by Htay Htay Than from Myanmar, jointly with Dr. D. S. Arya
44. A critical appraisal of flood forecasting models by G.B. Pattnaik (2003-04) jointly with M.Perumal

45. Extreme value estimation for hydro-meteorological data by Shiv Kumar (2003-04)
46. Water availability aspect of Inter-basin water transfer by Goutam Chandra Das (2003-04) jointly with B.S. Mathur
47. Temporal and spatial analysis of rainfall in Uttaranchal (2003-04) by Ashok Basistha jointly with D.S. Arya
48. Stochastic analysis of daily rainfall data between Bargi and Hoshangabad by Y.K. Dhama (2002-2003) jointly with Dr. K.S. Ramasastri
49. Stochastic analysis of high frequency ground water data by S.M. Deshpande (2001-2002)
50. Estimation of flood quantiles from non stationary flood series by R.B. Jigajinni (2000-2001)
51. Hydrologic modelling of snow fed river basin by T. Thomas (1999-2000) jointly with Dr. S.M. Seth and Dr. Pratap Singh
52. Flood Frequency modelling for Beas basin upto Pandoh by R.K. Jaiswal (1999-2000) jointly with Dr. S.M. Seth and Dr. Pratap Singh
53. Streamflow forecasting using linear perturbation model & ANN approach by N. Vivekanandan (1999-2000) jointly with Dr. D.S. Arya
54. Flood estimation for Bagamati river at Pandhera Dhoban, Nepal by L.D. Shrestha from Nepal (1999-2000) jointly with Dr. B.S. Mathur
55. Frequency analysis of censored data by Aberra Chala Buba from Ethiopia (1998-99) jointly with Dr. D.K. Srivastava
56. Streamflow forecasting using ANN by Fikru Gemtecha from Ethiopia (1998-99) jointly with Dr. D.S. Arya
57. Stochastic modelling of ground water levels by A.K. Agarwal (1997-98) jointly with Dr. D.C. Singhal
58. Flood frequency analysis for ungauged sites of central India by Jemal Reshid Shafi from Ethiopia (1997-98)
59. Event based rainfall runoff modelling using geomorphological characteristics by M.K. Sharma (1996-97) jointly with Mr. R. D. Singh
60. Analysis of hydro-meteorological data by A.K. Diwvedi (1996-97) jointly with Mr. Hemant Chaudhary
61. Richard's equation assisted flood hydrograph computation by kinematic wave approach by Manoj Kumar Singh (1995-96) jointly with Dr. Deepak Kashyap
62. Flood frequency studies using L-moments by Bhopal Singh (1995-96)
63. Regional flood frequency analysis for Central India by Jyoti Prasad (1994-95).
64. Development of daily rainfall generation model by Vu Hong Chau from Vietnam, (1993-94).
65. Rainfall runoff modelling by Adil Yassin Mohamed frm Sudan, (1993-94), jointly with Mr. R.D. Singh.
66. Analysis of daily rainfall and runoff data of Serang river basin, Indonesia by Sutjipto from Indonesia,(1993-94).
67. Flood forecasting using geomorphological instantaneous unit hydrograph by Abdul Qayeum Karim from Afghanistan, (1992-93).
68. Flood frequency analysis using two step power transformation by Satyabrata Banerjee (1991-92).
69. Derivation of Nash model parameters from geomorphological instantaneous unit hydrograph by R.K. Panigrahi (1991-92) jointly with Mr. R.D. Singh
70. Studies on general extreme value distribution by Manik De (1990-91).
71. A comparative study of regional flood frequency methods by James U. Ikoi from Nigeria (1989-90).
72. Hydrological studies for Manibhadra Dam project by J.K.Rath (1989-90).
73. Regional flood frequency analysis of Mekong river basin, Laos by Panyasiri Sang from Lao PDR (1988-89).
74. Flood estimation in river Jhelum basin using statistical approach by M.A. Lone, (1988-89) jointly with Dr. B.S. Mathur
75. Comparison of monthly streamflow models by Rajeshwar Mehrotra (1988-89).

BOOK (S)/ Book Chapters:

1. Singhal, D.C., Goel, N.K., Srivastava, D.K., Singh, Ranvir, Joshi, H. and Mathur, B.S. (1997), ' Emerging Trends in Hydrology' Edited Proceedings of International Symposium on 'Emerging Trends in Hydrology' Sept. 25-27, 1997, Jain Printers, Roorkee. (Volume I)
2. Perumal, M., Singhal, D.C., Arya, D.S., Srivastava, D.K., Goel, N.K., Mathur, B.S., Joshi, H., Singh, R., Nautiyal, M.D. (2005)' Hydrological Perspectives for Sustainable Development', Edited Proceedings of International Conference ' Hydrological Perspectives for Sustainable Development' Feb. 23-25, 2005, Allied Publishers Pvt. Ltd.
3. 'Development of a Fuzzy Flood Forecasting Model for Downstream of Hirakud Reservoir of Mahanadi Basin, India' by A.K. Kar, A.K. Lohani, N.K. Goel, and G.P. Roy in Book entiteled 'River System Analysis and Management' by Nayan Sharma (Ed), Springer Science +Business Media Singapore 2017, ISBN 978-981-10-1472-7, pp 211-218.

TECHNICAL PAPERS IN REFEREED JOURNALS:

1. Hailesilassie1, W.T., Goel, N.K., Tenalem, A., and Sitrrak, T. (2022),'Future precipitation changes in Central Ethiopian Main Rift under CMIP5 GCMs', Journal of Water and Climate Change, https://doi.org/10.2166/wcc.2022.440.
2. Sheikh, U., Lone, M.A., Goel, N.K., and Zakwan, M. (2022), 'Trend analysis of Hydro-meteorological parameters in the Jhelum River basin ¸ Northwestern Himalayas', Theoretical and Applied Climatology, https://doi.org/10.1007/s00704-022-04014-7.
3. Umar, S, Lone, M.A., Goel, N.K. (2021), 'Modeling of annual rainfall extremes in the Jhelum River basin, Northwestern Himalayas', Sustainable Water Resources Management, 7:59 https://doi.org/10.1007/s40899-021-00539-3.
4. Ray, L. K., and Goel, N.K. (2021), 'Spatio-temporal change in rainfall over five different climatic regions of India', Journal of Water and Climate Change, 12(7), doi: 10.2166/wcc.2021.052
5. Umar, S, Lone, M.A., Goel, N.K. (2021), 'Modeling of peak discharges and frequency analysis of floods on the Jhelum river, North Western Himalayas', Modeling Earth Systems and Environment, 7:1991–2003 https://doi.org/10.1007/s40808-020-00957-w.
6. Chowdhury, B., Goel, N.K., and Arora, M. (2020), 'Evaluation and ranking of different gridded precipitation datasets for Satluj River basin using compromise programming and f-TOPSIS', Theoretical and Applied Climatology, 143 (1), 101-114; Correction 143(1) 115-117.
7. Ray, L.K. and Goel, N.K. (2019),'Nonstationary frequency analysis of extreme rainfall events across India', Paper under revision, ASCE Journal of Hydrologic Engineering, May 15, 2019.
8. Ray, L.K., Goel, N.K. and Arora, M. (2019), 'Trend analysis and change point detection of temperature over parts of India', Theoretical and Applied Climatology, 138 (1), 153-167.

9. Ray, L.K. and Goel, N.K. (2019), 'Flood frequency analysis of Narmada river basin in India under Non-stationary condition: A case study', Journal of Hydrologic Engineering, in production (DOI: 10.1061/(ASCE)HE.1943-5584.0001808).
4. Tamarakar, S., Goel, N.K. (2018), 'Development of intensity duration frequency relationships for Port Blair, Andaman and Nicobar Islands, India', Mausam 69,1, pp123-132.
5. Ruiz-Villanueva, V. Allen, S., Arora, M., Goel, N.K., and Stoffel, M. (2016), 'Recent catastrophic landslide lake outburst floods in the Himalayan mountain range', Progress in Physical Geography, 0309133316658614- Impact Factor 2.728
6. Gautam, N.P., Arora, M., Goel, N.K., and Kumar, A.R.S. (2016), 'Investigating the impact of climate change on future runoff of river Satluj', Journal of Hydrology and Meteorology 8 (1), 10-21. Impact Factor – Not available.
7. Kar, A.K., Lohani, A.K., Goel, N.K., and Roy, G.P. (2015), 'Rain gauge network design for flood forecasting using multi-criteria decision analysis and clustering techniques in lower Mahanadi river basin, India', Journal of Hydrology: Regional Studies, Vo. 4, pp. 313-332. Impact Factor (Journal of Hydrology) 3.882
8. Kumar, R., Goel, N.K., Chatterjee C., and Nayak, P.C. (2015),'Regional flood frequency analysis using soft computing techniques', Water Resources Management, Springer Science, DOI 10.1007/s11269-015-0922-1.- Impact Factor 2.437
9. Lohani, A.K., Goel, N.K., and Bhatia, K.K. S. (2014), 'Improving Real Time Flood Forecasting Using Fuzzy Inference System', Journal of Hydrology, Elsevier, Vol. 509, pp. 25-41. Impact Factor 3.882
10. Negash, W., Goel, N.K. and Jain, M.K. (2013), 'Temporal and Spatial Variability of Annual and Seasonal Rainfall over Ethiopia', Hydrological Sciences journal, Vol. 58(2) pp. 1-20. Impact Factor 2.156
11. Rahman, M. M., Goel. N.K., and Arya, D.S., (2012), "Study of Early Flood Warning Dissemination System in Bangladesh" Journal of Flood Risk Management, Wiley-Blackwell, DOI: 10.1111/jfr3.12012 Impact Factor 1.377
12. Kar, A.K., Winn, L.L., Lohani, A.K. and Goel, N.K. (2012) , 'Soft Computing- Based Workable Flood Forecasting Model for Ayeyarwady River basin of Myanmar', Journal of Hydrologic Engineering, ASCE, 17: 807- 822. Impact Factor 1.34
13. Negash, W., Goel, N.K. and Jain, M.K. (2012), 'Investigation of Non-Stationarity in Hydro-climatic Variables at Rift Valley Lakes Basin of Ethiopia', Journal of Hydrology, Elsevier,Vol. 445-445 pp. 113-133. Impact Factor 3.882
14. Negash, W., Jain, M.K., and Goel, N.K. (2012), 'Impact of Climate Change on Runoff Generation: An Application to Rift Valley Lakes Basin of Ethiopia', Journal of Hydrologic Engineering, ASCE, Vol. 18(8), pp. 1048-1063. Impact Factor 1.34

15. Rahman, M. M., Goel. N.K., and Arya, D.S., (2012), 'Development of Jamuneswari Flood Forecasting System –A case study in Bangladesh", Journal of Hydrologic Engineering, ASCE, Vo. 17 (10), pp. 1123-1140. Awarded ASCE -EWRI -2014 best case study Impact Factor 1.34
16. Gautam, N.P., Arora, M., Goel, N.K. and Kumar, A.R.S. (2012), 'Investigation of Impact of Climate Change on Future Runoff of River Satluj', Journal of Hydrology and Meteorology, Nepal, Vol. 8/1 pp. 10-21 Impact Factor Not Available
17. Rahman, M. M., Arya, D.S. and Goel. N.K. (2012), "Rainfall statistics evaluation of ECMWF and TRMM rainfall data over Bangladesh for flood related studies', Journal of "Meteorological Applications", Wiley InterScience, Vol. 19/4, pp.501-512. Impact Factor -1.273
18. Kar, A.K., Goel, N.K., Lohani, A.K. and Roy, G.P. (2011) , 'Application of Clustering Techniques Using Prioritised Variables in Regional Flood Frequency Analysis - A Case Study of Mahanadi Basin', Journal of Hydrologic Engineering; Vol. 17(1), pp. 213-223. Impact Factor 1.34
19. Rahman, M.M. , Arya, D.S. , Goel, N.K. and Dhamy, A.P. (2011),' Design Flow and Stage Computations in the Teesta River, Bangladesh Using Frequency Analysis and MIKE 11 Modelling, Journal of Hydrologic Engineering, ASCE, Volume 16, Issue 2, pp. 176-186.
20. Lohani, A.K., Goel, N.K., and Bhatia, K.K. S. (2011),' Comparative study of neural network, fuzzy logic and linear transfer function techniques in daily rainfall- runoff modeling under different input domains', Hydrological Processes, Vol. 25, pp. 175-193.
21. Kar, A.K., Lohani, A.K., Goel, N.K. and Roy, G.P. (2010), 'Development of Flood Forecasting System Using Statistical and ANN Techniques in the Downstream Catchment of Mahanadi Basin, India', J. Water Resource and Protection, 2010, 2, 880-887.
22. Rahman, M.M. , Arya, D.S. and Goel, N.K. (2010),'Limitation of 90 m SRTM DEM in drainage network delineation using D8 method—a case study in flat terrain of Bangladesh', Journal of Appl. Geomat. , Springer, Volume 2/ 2, pp. 49-58.
23. Sarkar, S., Goel, N.K., and Mathur, B.S. (2010) "Performance investigation of Nakagami-m Distribution to Derive Flood Hydrograph by Genetic Algorithm Optimization Approach", Journal of Hydrologic Engineering, ASCE, 15(8),658-666.
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13. Seth, S.M., **Goel, N.K.** and Bhatia K.K.S. (1984), 'Monthly streamflow generation', National Institute of Hydrology Technical Report no. CS-8.
14. Seth, S.M. and **Goel, N.K.** (1984), 'Partial duration series models', National Institute of Hydrology Technical Report no.RN-5.
15. Seth, S.M., Perumal, M. and **Goel, N.K.** (1983), 'Development and application of programme on power transformation method to flood frequency analysis - A comparative study with other normalization procedures', National Institute of Hydrology Technical Report.

SPONSORED RESEARCH PROJECTS HANDLED

1. Theory of Change Observatory on Disaster Resilience, joint project sponsored by Belmont Forum; Euro 1070000 (grant amount requested) Rs 9.4 Crores; participating as associated partner with other partners from Pen State University, USA, Cranfield University, UK, and University of Sao Paulo, Brazil; 2020-2023
2. Analysis of Climate Change and Urban Heat Island Impact in Dehradun, Uttarakhand, sponsored by DST; Rs 62 lakhs; 2018-19.

3. Capacity Building of IIT Roorkee in the Area of Dam Safety; Sponsored by Ministry of Water Resources, River Development and Ganga Rejuvenation; **Rs 10.92 Crores** (in progress) 2017-18
4. Meteorological Data Collection, Monitoring, Processing and Analysis to Evaluate Climate Variability in the State of Uttaranchal under U-PROBE sponsored by Department of Science and Technology, Government of India Amount Rs. 23.5 lakhs; 2002-03 Completed.
5. Development of spatial water and climate information system for the state of Uttaranchal under U-PROBE sponsored by Department of Science and Technology, Government of India Amount Rs. 13.68 lakhs Completed.; 2003- 04
6. Studying meandering and shifting behaviour of the Ganges River in plains of Uttarakhand UCOST, Dehradun, India- 2012-13 Completed. Rs. 2.5 Lakhs; Co-PI
7. Inventorisation of Industries Using Web and GIS based Techniques for Hardwar and Udham Singh Nagar Districts, UCOST, Dehradun, India- 2010-11 Completed.; 6.6 lakhs Co-PI
8. Development of Dynamic Flood frequency models- sponsored by Min. of Water Resources Rs. 3.60 lakhs; 1996 Completed.

CONSULTANCY PROJECTS HANDLED AS PI/ Co-PI

1. Development of operational Inflow forecasting system for Chamera 3 project; sponsored by NHPC Ltd., 2020-2023, 1.36 Crores
2. Operational Inflow forecasting system for Tehri dam, sponsored by THDCIL; 29.09 lakhs, 2020-21;
3. Development of Water Resources Information System; Third party Evaluation; Sponsored by Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation; 24.78 Lakhs. Completed; 2021- 2022.
4. Flood routing studies for Kol Dam, sponsored by NTPC Ltd. 2020-21 Rs 18.88 lakhs. Completed. 2021-2022.
5. Development of improved operational flood forecasting system for Tehri dam, sponsored by THDCIL 1.5 Crores (1.1 Crore Phase I 2011-12, and 0.5 Crores Phase II 2019-20); Completed.
6. Climate Proofing of Springshed Development Programme, sponsored by UNDP; 14.0 lakhs; Co-PI. 2019-2021
7. Vetting of reports of Disaster Risk Assessment of Uttarakhand, sponsored by Uttarakhand Disaster Recovery Project; Rs. 1.62 crores; 2017-18; Co- PI
8. Area drainage study in and around HPCL, Rajasthan Refinery Ltd., Pachpadra, Barmer; sponsored by EIL; Rs. 11.8 lakhs (2018-19); Contributed as Co- PI
9. Study of the migration/ meandering behavior of River Midhola in Distt Surat; sponsored by GAIL (India) Limited. (Rs 7.965 lakhs); 2017-18, Completed.

10. Performance Evaluation of Dam Rehabilitation and Improvement Project (DRIP); 2017-18 sponsored by MoWR, RD &GR; 23.6 lakhs Completed.
11. Estimation of PMF, design flood including determining spillway capacity for Gulf of Khambat development Project- Kalpasar project', sponsored by Kalpasar Department, 72.3 lakhs, 2012-13 Completed.
12. Ground water coloration studies near Shabajpur village, sponsored by Jubilant Life Sciences Limited, Gajraula, 14.97 lacs 2013-14 Completed.
13. Revision of guidelines of estimation of design basis flood for inland nuclear power plants, AERB, Rs. 10 lakhs, 2014-15; Completed.
14. Review of hydrological report of VSI airport, Port Blair, Airports Authority of India, Rs. 15.17 lakhs Completed.
15. Ground water and soil remediation measures near CTO-V, Hyderabad, Dr Reddy's, 13.1 lakhs 2014-15; Completed.
16. Hydrology and power potential studies for Vishnugad Pipalkoti HEP, sponsored by THDC Ltd. 13.23 lakhs, 2011-12 Completed.
17. Review of reports and drawings of South dump site for Chenani- Nashri tunnel J&K, sponsored by Leighton Contractors India Pvt. Ltd. and NHAI amount Rs. 6.5 lakhs, 2013-14 Completed.
18. Review of reports and drawings of dump sites for Chenani- Nashri tunnel J&K, sponsored by Leighton Contractors India Pvt. Ltd. and NHAI amount Rs. 25.3 lakhs, 2012-13 Completed.
19. Hydrological Assessment for Chenani- Nashri tunnel area, sponsored by Leighton Contractors India Pvt. Ltd. and NHAI amount Rs. 11.47 lakhs, 2011-12 Completed.
20. Hydrological study near Shamsabad area by GMR, Year 2010-11, Amount Rs.16.7 lacs Completed.
21. GLOF studies for two sub-basins in Twang basin, Arunachal Pradesh, Sponsored by SEW Infrastructure, Hyderabad. Rs. 15.6 lakhs, 2011-13Completed.
22. Data validation for SEW project sites, Sponsored by SEW Infrastructure, Hyderabad. Rs. 5.0 lakhs, 2011-12 Completed.
23. Velocity and Cross Section Measurements of Chilla Canal, sponsored by DLZ Power Pvt. Ltd., Pune, 2009-10, Rs. 5.6 lakhs Completed.
24. Meandering behavior of river Ramganga and Ganga near Farrukhabad, Sponsored by GAIL (india), limited, Rs. 21 lakhs – year 2009-10 Completed.
25. Processing and verification of discharge data of river Tamaklata and Alaknada, sponsored by R.K. Engineering, Roorkee, Rs. 5.5 lakhs, year 2009-10 Completed.
26. Ground water coloration studies near Shabajpur village, sponsored by Jubilant Organosys, Gajraula, 5.5lacs - year 2010 Completed.
27. Ground water coloration studies near Shabajpur village, sponsored by Jubilant Organosys, Gajraula, 6.7 lacs - year 2009 Completed.

28. Series extension and design energy computations for Tehri dam, sponsored by THDC Ltd., 2.2 lacks – year 2009-10 Completed.
29. Study and Analysis of observed data of Suketi Khad, Kansa Khad and River Beas Sponsored by Bhakra Beas Management Board, Year 2008-09, Amount Rs. 7.86 lacks Completed.
30. Hydrological Survey at Koteswar Power Station – Water Supply and Geophysical Investigations Sponsored by Power Grid Corporation of India, Year 2008-09, Amount Rs. 2.25 lacks Completed.
31. Review of Gomti Nagar (extension) Drainage Design Sponsored by Lucknow Development Authority, Year 2008-09, Amount Rs. 6.75 lacks - Completed.
32. Review of Hydrological Aspects of TATO – II and SIYOM HE-Project Sponsored by Reliance, Year 2008-09, Amount Rs. 6.75 lacks Completed.
33. Reconnaissance Study Around GHIAL Sponsored by GMR, Year 2008-09, Amount Rs.1.12 lacs Completed.
34. Hydrological Studies at Cuttack, Orissa, Sponsored by M/S WAPCOS, Year 2008-09, Amount Rs. 5.05 lacs Completed.
35. River Migration Studies, Design Flood Studies, Sponsored by L&T, Year 2008-09, Amount Rs. 29 lacs Completed.
36. Review of Hydrology of Tehri dam, sponsored by THDC, Year 2008-09, Amount Rs. 4.5 lacks Completed.
37. Urban drainage design for Jaipur city, sponsored by Jaipur Development Authority, Year 2008-09, Amount 7.86 lacs Completed.
38. Evaluation Study of completed Research schemes under the R&D Programme of MOWR, sponsored by Ministry of Water Resources, New Delhi, year 2006-07, amount Rs. 13.5 lakhs Completed.
39. Hydrological study for Song dam, Amount Rs. 1.0 lacks Completed.
40. State level master plan for SHP Potential sites in Chhattisgarh, Co-PI. Completed.
41. Strengthening Disaster Mitigation and Management at State level in India, Co-PI, Asian Disaster Preparedness Center, (Flood Plans for UP) Completed.
42. Regional flow regimes estimation for small scale hydropower assessment (REFRESHA) Co-PI, Completed.
43. External Drainage Design for Kosi Kotwan Industrial Estate of UPSIDC Co-PI Completed.
44. Preparation of detailed project for the conservation and management of Dal - Nagin lake in Srinagar (J &K) Co-PI. Completed.
45. External drainage design for TRONICA city, UPSIDC project, Co-PI (1998) Completed.
46. Testing of pan Evaporimeters (1998), M/s Delite Engineering Works, Roorkee. Completed.
47. Hydrology study for integrated steel plant, Satarda, Usha Ispat Ltd. (1997), Co-PI, Completed.
48. Development of hydrological watershed simulation model (phase-l) Review and recommended approach, Ministry of Agriculture, New Delhi, (1992), Co-PI. Completed.
49. Design flood estimation for Kishau dam, National Institute of Hydrology (1989), Co-PI. Completed.

50. Water availability studies for Mahanadi River basin at three sites, National Institute of Hydrology (1986), Co-PI. Completed.
51. Design flood estimation for Narmada Sagar and Sardar Sarovar Project, National Institute of Hydrology, (1985), Co-PI. Completed.

SPONSORED SHORT TERM COURSES

1. Design flood estimation for gauged catchments, August 17-19, 2020, Sponsored by Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, GoI.
2. Design flood estimation for ungauged catchments, August 20-21. 2020, Sponsored by Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, GoI.
3. Design flood estimation for gauged catchments, September 16-18, 2019, Sponsored by Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, GoI.
4. Design flood estimation for ungauged catchments, September 19-20, 2019, Sponsored by Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, GoI.
5. Open data Sources: Spatiotemporal analysis; March 19-24, 2018, sponsored by National Hydrology project, Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
6. Water Resources Management; Jan. 8-27, 2018 for participants of Africa, sponsored by **East and Southern African Division**, Ministry of External Affairs, Govt. of India
7. Investigation, remediation and Management of Soil and groundwater Contaminated sites; Nov. 20-22, Sponsored by Central Pollution Control Board.
8. Open data Sources: Spatiotemporal analysis; Oct. 9-14, 2017, sponsored by National Hydrology project, Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
9. River basin planning using HEC software; February 20-25, 2017 sponsored by National Hydrology project, Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
10. River basin planning using HEC software; September 5-10, 2016 sponsored by National Hydrology project, Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
11. River basin planning using HEC software; July 11-16, 2016, sponsored by National Hydrology project, Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
12. River basin planning using HEC software; May 16-23, 2016, sponsored by National Hydrology project, Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
13. Flood forecasting and Warning; October 26-30, 2015, International short term training course sponsored by **World Meteorological Organization, Geneva**
14. Flood estimation and forecasting; Sept. Feb. 22-27, 2015 for the officers of Tamil Nadu water Resources Department

15. Hydrological analysis and planning for water resources projects; July 13-18, 2014 for the officers of Tamil Nadu water Resources Department
16. Climate change issues and impacts on water resources management in coastal and seasonal wetlands, April 7-17, 2014 for the officers of **BWDB, Bangladesh**
17. GIS and Remote sensing applications in water resources projects, Feb. 9-14, 2014 for the officers of Tamil Nadu water Resources Department
18. Climate change issues and impacts on water resources management in coastal and seasonal wetlands, June 9-19, 2013 for the officers of **BWDB, Bangladesh**
19. Climate change issues and impacts on water resources management in coastal and seasonal wetlands, March 11-20, 2013 for the officers of **BWDB, Bangladesh**
20. Remote sensing and GIS applications in hydro-power projects, Jan. 21-23, 2013 for the officers of NHPC Ltd.
21. Remote sensing and GIS applications in hydro-power projects, Jan. 14-18, 2013 for the officers of NHPC Ltd.
22. Hydrological analysis for water resource planning and management in environmental aspects, June 11-22, 2012 for the officers **BWDB, Bangladesh**
23. Climate change effect on flood estimates and hydrological variables, March 5-14, 2012 for the officers **BWDB, Bangladesh**
24. Crop Water Management, Dec. 13-17, 2011 for the officers of minor Irrigation, Govt. of Orissa.
25. Estimation of design flood and design of spillways for minor irrigation projects Dec. 1-5, 2011 for the officers of minor Irrigation, Govt. of Orissa.
26. Remotes sensing and GIS applications for hydro-power projects, October 19-21, 2011 for the officers of NHPC Ltd.
27. Hydrological and water resources planning for minor irrigation projects, Sept 26-30, 2011 for the officers of minor Irrigation, Govt. of Orissa.
28. Remotes sensing and GIS applications for hydro-power projects June 20-22, 2011 for the officers of NHPC Ltd.
29. Flood estimation in a changing climate March 5-12, 2011 for the officers of **Institute of Water Modeling, Govt. of Bangladesh**
30. Urban flood modeling and drainage design, March 22-27, 2010, sponsored by **Govt. of Sri Lanka**
31. Remote sensing and GIS applications for Hydro-power projects, Feb. 22-27, 2010 sponsored by NHPC Ltd.
32. Ground water resource evaluation in Hard rock areas, Oct. 19- 24, 2009, sponsored by ground water Department, Govt. of Andhra Pradesh
33. Hydrological Analyses and Planning for Water Resources Projects with Exposure to Emerging Tools, Nov. 16 – 21, 2008, sponsored by Maharashtra Water Resources Department

34. Urban Flood Modeling and Drainage Design, Sept. 22 – 27, 2008, sponsored by MMRDA
35. Planning Analyses and Modeling of Groundwater in Hard Rock Areas, Sept. 01- 06, 2008 Sponsored by GSDA, Pune, Govt. of Maharashtra
36. Planning Analyses and Modeling of Groundwater in Hard Rock Areas, Aug. 18- 23, 2008, sponsored by Department of Mines and Geology, Govt. of Karnataka
37. Groundwater Planning, Analyses and Modeling in Hard Rock Areas, sponsored by Department of Mines and Geology, Govt. of Karnataka, July 21 – 26, 2008
38. Hydrological Analyses and Planning for Hydro Power Project, June 9-14, 2008, sponsored by NHPC Ltd.
39. Hydrological Analyses and Planning for Hydro Power Project, Dec. 17-22, 2007, sponsored by NHPC Ltd.
40. Hydrological Analyses and Planning for Hydro Power Project with emphasis on Design flood Estimation, Oct. 1-6, 2007, sponsored by Damodar Valley Corporation
41. Design flood analysis for hydropower projects, Aug. 20-25, 2007 sponsored by NTPC Ltd.
42. Hydrological Analyses and Planning for Hydro Power Project with emphasis on Design flood Estimation, Jul 2-7, 2007, sponsored by NHPC Ltd.
43. Hydrological Analyses and Planning for Hydro Power Project with emphasis on Design flood Estimation. Feb. 19-24, 2007, sponsored by Satluj Jal Vidyut Nigam Ltd.
44. Hydrological analyses and planning for Hydropower projects with emphasis on design flood estimation, Dec. 18-23, 2006 sponsored by Damodar Valley Corporation.
45. Urban flood disaster modeling and management Oct. 16-21, 2006 in joint collaboration with **UNESCO-IHE, Netherlands,** funded by NUFFIC.
46. Hydrological analyses and planning for Hydropower projects with emphasis on design flood estimation, July 31-Aug. 5, 2006, sponsored by NHPC Ltd.
47. Hydrological analyses and planning for Hydropower projects, June 5-10, 2006, sponsored by NTPC Ltd.
48. Flood estimation using Unit Hydrograph Techniques, April 15-19, 1985 at National Institute of Hydrology as Scientist of NIH.
49. Flood frequency analysis, May 13-17, 1985 at National Institute of Hydrology as Scientist of NIH.
50. Flood frequency analysis, Oct. 7-10, 1985 at Guwahati as Scientist of NIH.
51. Flood frequency analysis, Dec. 16-20, 1985 at Calcutta as Scientist of NIH
52. Observation, processing and analysis of precipitation data, Feb. 24- 28, 1986 at National Institute of Hydrology as Scientist of NIH.
53. Flood frequency analysis, August 25-30, 1986, at Bhubaneswar as Scientist of NIH
54. Flood routing flood forecasting, Nov. 10- 14, 1986 at at National Institute of Hydrology as Scientist of NIH.
55. Flood estimation using Unit Hydrograph Techniques, Nov. 24- 28, at KERS, Mysore as Scientist of NIH
56. Design storm and design flood, Jan. 5-9, 1987 at National Institute of Hydrology as Scientist of NIH.

57. Reservoir operation, April 6-10, 1987 at National Institute of Hydrology as Scientist of NIH.
58. Design storm and design flood, August 10-14, 1987 at KERS, Mysore as Scientist of NIH.
59. Flood frequency analysis, Oct. 5-9, 1987 at Hyderabad, as Scientist of NIH.
60. Flood estimation using Unit Hydrograph Techniques, Feb. 8-12, 1988 at Lucknow

National and International Conferences organized

1. National Seminar on 'Hydrological Hazards- Prevention and Mitigation', at IIT Roorkee, March 17- 18, 1993, as Organizing Secretary.
2. International Symposium on 'Emerging Trends in Hydrology' at IIT Roorkee, Sept. 25-27, 1997; as Joint Organizing Secretary.
3. International Symposium on 'Hydrological Perspectives for Sustainable Development' at IIT Roorkee, Feb. 23-25, 2005, as member of core organizing committee.
4. Third National Dam Safety conference at IIT Roorkee in collaboration with Central Water Commission, and UJVNL February 18-19, 2017.

International exposure:

Aug. 1983 - Jan. 1984	Colorado State University, Fort Collins, U.S.A., Also visited USGS, University of Texas, Purdue university, Harvard, MIT etc. across USA
Nov. 1987 - Dec. 1987	University College Galway, Ireland
Dec. 1998 - March, 1999	University of Waterloo, Waterloo, Canada, Tufts University, Medford, MA, USA
May 2001 to Aug. 2001	University of Waterloo, Canada
June 2003 to July 2003	University of Waterloo, Canada
Oct. 2005	Norway, UNESCO-IHE Delft
Sept. 2006	Nanjing, China, AIT, Bangkok
March- April, 2007	UNESCO- IHE Delft, WMO, Geneva, Switzerland
June 2007	UNESCO-IHE, Delft
Sept. 23-25, 2011	Dhaka, Bangladesh, Institute of Water Modelling
July 13-22, 2012	TUHH, Germany, WMO Geneva, Dubai
Nov. 17-21, 2016	Wuhan, China; Three Gorges Dam

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