Dr. ROSHAN K. SRIVASTAV
Assistant Professor
Department of Civil and Environmental Engineering
Indian Institute of Technology Tirupati
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Mobile: +91-9750447774

EDUCATION

Indian Institute of Technology, Madras
PhD, Hydrology and Water Resources Engineering, 2004 - 2011
Title: Simulation-Optimization Framework for Hybrid Stochastic Streamflow Modeling
Guide/s: Dr.K.Srinivasan; Dr. K.P.Sudheer

Motilal Nehru National Institute of Technology
M.Tech, Water Resources Engineering, 2002 - 2004
Research: Experimental and Computational Hydraulics
Guide: Dr. V.C. Agarwal

University College of Engineering, Osmania University
BE, Civil Engineering, 1998 - 2002

RESEARCH/WORK EXPERIENCE

Assistant Professor at IIT Tirupati
June 2018 – Present

- Research in Integrated Water Resources Management, Reservoir Operation, Hydro-climatology, Design of Water Infrastructure, System Dynamics, Water Security

Associate Professor at VIT University
May 2015 – June 2018

- Research in Hydro-climatology, Flood forecasting, Reservoir Operation, Stochastic hydrology, Planetary Boundary Layer, Application of Machine Learning Techniques.

Post-Doctoral Fellow at University of Western Ontario
February 2013 –March 2015

- Research in Weather Generators, System Dynamics, Hydroclimatology, Integrated Water Resources Management
- Recipient of Canada's Premier Research Internship **MITACS ACCELERATE**
  (July 2013 – Jun 2014)

Associate Professor at VIT University
July 2011 - January 2013 (1 year 7 months)

- Research in Flood forecasting, Reservoir Operation, Stochastic hydrology

Assistant Professor at VIT University
February 2010 - June 2011 (1 year 5 months)

- Research in Stochastic hydrology, Reservoir Operation, Watershed Modelling

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Funded/Consultancy Projects

December 2022 – November 2023

- Reservoir Operation for Odissa State
- Agency/Industry: Vassar Labs
- Type: Consultancy

September 2021 – August 2023

- Modelling Forest Phenological Parameters from Time Series Remote Sensing Data
- Agency/Industry: ISRO-SAC
- Type: Sponsored

December 2020 – November 2025

- Project Director for Technology Innovation Hub on Positioning and Precision Technologies – My focus is to develop tools for Water Resources Management
- Agency/Industry: DST
- Type: Section 8 Company at IIT Tirupati

October 2019 – September 2021

- A Desktop Tool for Non-Stationary Intensity-Duration-Frequency Curves under Climate Change
- Agency/Industry: SERB-DST
- Type: Sponsored

October 2019 – September 2022

- Effect of Climate Change on Urban Watersheds – Statistical Downscaling Approach
- Agency/Industry: National Research Council Canada
- Type: Sponsored

December 2017 - November 2018

- Streamflow monitoring and modeling for the development of micro-watershed - Vellore District
- Agency/Industry: SYSCON Instruments Pvt. Ltd.
- Type: Industry Sponsored Research

January 2017

- Hydrological Study / Water Availability Study of Brahmani River at 2x660 MW Thermal Power Plant, Dhenkanal, Odisha

- Agency/Industry: National Institute of Hydrology, Regional Deltaic Centre, Kakinada, A.P.
- Type: Consultancy

December 2016
- Potential water resources around a multistoried construction site, Farrakka District, West Bengal
- Agency/Industry: M/s. Sumana Enterprise, Govt. Contractor, Farrakka District, West Bengal
- Type: Consultancy

April 2016 - June 2016
- Spatio-Temporal Groundwater Analysis: A case study in Kutrumali and Sijimali hilltops, Odisha
- Agency/Industry: Larsen & Toubro Pvt Ltd, Orissa
- Type: Industry Sponsored Research

Research Proposal under Review
- Joint Proposal between Norway-TERI-IIT Tirupati on Ganga Cleaning and Agri-Water Project. The project focuses on developing Intelligent Mapping, Modelling, and Management: i3M prospects for Safeguarding Water of the Hindon River Basin **(5 Crores)**
    - Role: Development of integrated watershed model for Hindon River Basin
- Joint Proposal between IIT Tirupati - National Institute of Hydrology submitted to Ministry of Earth Sciences: The project focuses on development of Statistical Downscaling Tools for Prediction of Streamflows **(1 Crore)**
    - Role: Development of Statistical downscaling tools for prediction of streamflows under changing climate conditions.

Research Assistant at Indian Institute of Technology, Madras
August 2004 - December 2009 (5 years 5 months)
- Comparison of Alternate Hedging rules for Single and Multi-Purpose Single Reservoirs - (Project Coordinator - Dr. K. Srinivasan)
- Multi-objective Optimization of Storage-based Hydropower Plants - (Project Coordinator - Dr. K. Srinivasan)
- Reservoir Performance Analysis using Stochastic Modeling of Streamflows - (Project Coordinator - Dr. K. Srinivasan)
- Performance-Based Optimal Operation of Multi-Purpose Reservoir System - (Project Coordinator - Dr. K. Srinivasan)
- Evaluation of Alternate Hedging Rules for Optimal Crop Yield - (Project Coordinator - Dr. K. Srinivasan)
- Heuristics Based Optimal Design of Water Distribution Network - (Project Coordinator - Dr. K. Srinivasan)

- Application of soft computing to Hydrology, Water Resources, and Air Quality Models

PUBLICATIONS

Referred International Journals (Published, In-press)

1. **Srivastav, RK.,** Sudheer KP., Chaubey I., (2007), A simplified approach to quantifying predictive and parametric uncertainty in artificial neural network hydrologic models, Water Resources Research, 43(10): Art.No.W10407 doi:10.1029/2006WR005352 (Impact Factor: 4.397; Citations: 67)

2. **Srivastav, RK.,** Srinivasan K., Sudheer KP., (2011), Simulation-optimization framework for multi-season hybrid stochastic models, Journal of Hydrology, 404(3-4), 209-225, doi:10.1016/ j.jhydrol.2011.04.031 (Impact Factor: 3.483 ; Citations: 10)

3. **Roshan K. Srivastav**, Andre Schardong, Slobodan P. Simonovic (2014), Equidistance Quantile Matching Method for Updating IDF Curves under Climate Change, Water Resources Management, doi: 10.1007/s11269-014-0626-y (Impact Factor: 2.848; Citations: 53)

4. **Roshan K. Srivastav,** Slobodan P. Simonovic (2014), Multi-site, multivariate weather generator using maximum entropy bootstrap, Climate Dynamics, doi: 10.1007/s00382-014-2157-x (Impact Factor: 4.708; Citations: 28)

5. **Roshan K. Srivastav,** Slobodan P. Simonovic (2014), An Analytical Procedure for Multi-Site, Multi-Season Streamflow Generation using Maximum Entropy Bootstrapping, Environmental Modeling and Software Journal, 59, 1-17. (Impact Factor: 4.404; Citations: 26)

6. Schardong, A., **Roshan Srivastav**, Simonovic, S. P. (2014), Updated Intensity-Duration-Frequency curves for the City of Saint Paul under the effect of climate change, Brazilian Journal of Water Resources, 19(4), p. 176-185 (In Portuguese) (Impact Factor:xxxx ; Citations: 0)

7. Sohom Mandal, **Roshan K. Srivastav**, Slobodan P. Simonovic, (2016), Use of Beta Regression for Statistical Downscaling of Precipitation in the Campbell River Basin, British Columbia, Canada, Journal of Hydrology, 538, 49-62 (Impact Factor: 3.483; Citations: 22)

8. Slobodan P. Simonovic, Andre Schardong, Dan Sandink, **Roshan Srivastav** (2016), A web-based tool for the development of Intensity Duration Frequency Curves under changing climate, Environmental Modelling and Software, 81, 136-153 (Impact Factor: 4.404; Citations: 43)

9. Dan Sandink, Slobodan P. Simonovic, Andre Schardong, **Roshan Srivastav** (2016), A decision support system for updating and incorporating climate change impacts into rainfall intensity-duration-frequency curves: Review of the stakeholder involvement process, Environmental Modelling and Software, 84, 193-209 (Impact Factor: 4.404; Citations: 24)

10. **Roshan Srivastav,** Srinivasan K., Sudheer KP (2016), Simulation-Optimization Framework for Multi-site Multi-season Hybrid Stochastic Streamflow Modeling, Journal of Hydrology, 552, 506-531. http://dx.doi.org/10.1016/j.jhydrol.2016.09.025 (Impact Factor: 3.483; Citations: 6)

11. Sarah Irwin, **Roshan K. Srivastav**, Slobodan P. Simonovic, Donald H. Burn (2017), Delineation of Precipitation Regions using Location and Atmospheric Variables in Two Canadian Climate Regions: The role of attribute selection, Hydrological Sciences Journal, 62(2), 191-204 (Impact Factor: 2.222; Citations: 4)

12. Bhatia, N.; Srivastav, R.; Srinivasan, K.(2018) Season-Dependent Hedging Policies for Reservoir Operation—A Comparison Study. *Water*,*10*,1311 (Impact Factor:2.524;Citations: 4)

13. Bhatia, N.; Jency M. Sojan; Slobodon P. Simonovic; Roshan Srivastav (2020) Role of Cluster Validity Indices in Delineation of Precipitation Regions. *Water*, 12, 1372. (Impact Factor: 2.524; Citations: 0)

14. Wagh, P.; Sojan, J.M.; Babu, S.J.; Valsala, R.; Bhatia, S.; Srivastav, R. (2021) Indicative Lake Water Quality Assessment Using Remote Sensing Images - Effect of COVID-19 Lockdown. Water, 13, 73. (Impact Factor: 2.524; Citations: 0)

15. Nagaraj, M.; Srivastav, R. (2022) Non-stationary modelling framework for regionalization of extreme precipitation using non-uniform lagged teleconnections over monsoon Asia. Stoch Environ Res Risk Assess (2022). (Impact Factor: 3.821; Citations: 1)

16. Meghana Nagaraj and Roshan Srivastav, (2022). “Spatial Multivariate Selection of Climate Indices for Precipitation over India”. Environ. Res. Lett. 17 094014 10.1088/1748-9326/ac8a06 (Impact Factor: 6.947; Citations: 1)

17. Chordia, Jay, Urmila R. Panikkar, Roshan Srivastav, and Riyaaz Uddien Shaik. 2022. "Uncertainties in Prediction of Streamflows Using SWAT Model—Role of Remote Sensing and Precipitation Sources" *Remote Sensing* 14, no. 21: 5385. https://doi.org/10.3390/rs14215385 (Impact Factor: 5.349; Citations: 1)

18. Jency M Sojan, Roshan Srivastav, Meghana N, 2022. “Regional Non-Stationary Future Extreme Rainfall Under Changing Climate over Asian Monsoon Region”. Atmospheric Research, 106592, ISSN 0169-8095. https://doi.org/10.1016/j.atmosres.2022.106592 (Impact Factor: 5.969; Citations: 0)

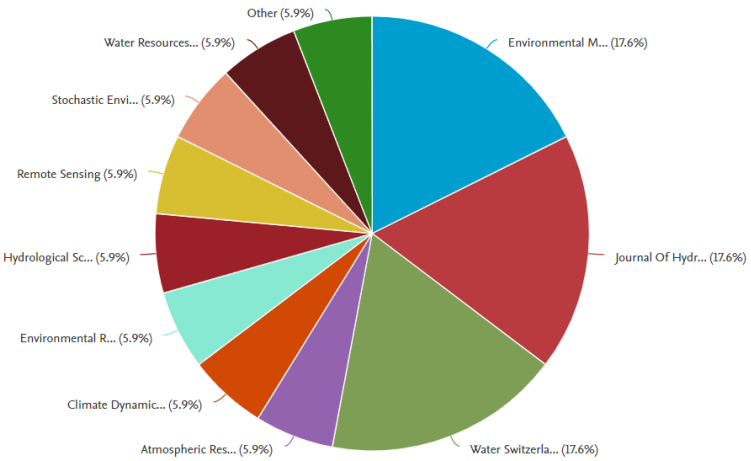
Documents Summary (SCOPUS Engine)

Srivastav, Roshan K.
Indian Institute of Technology Tirupati, Tirupati, India
Author ID:55523101947

Source	Documents
Environmental Modelling And Software	3
Journal Of Hydrology	3
Water Switzerland	3
Atmospheric Research	1
Climate Dynamics	1
Environmental Research Letters	1
Hydrological Sciences Journal	1
Remote Sensing	1
Stochastic Environmental Research And Risk Assessment	1

Documents by source

17



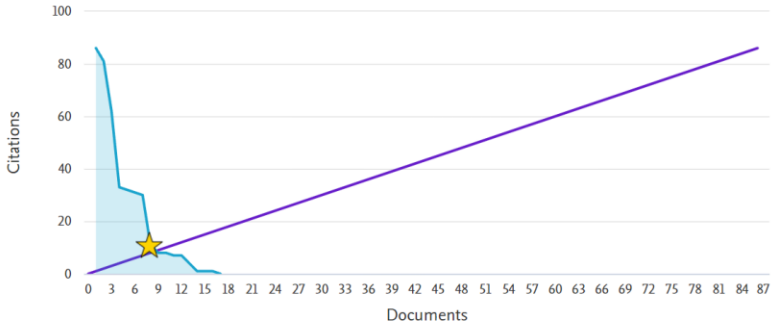
H-index

Documents	Citations	Title
1	86	Equidistance Quantil...
2	81	A simplified approac...
3	62	A web-based tool for ...
4	33	A decision support sy...
5	32	Use of beta regressio...
6	31	An analytical proced...
7	30	Multi-site, multivaria...
8	11	Simulation-optimiza...
9	8	Indicative lake water ...

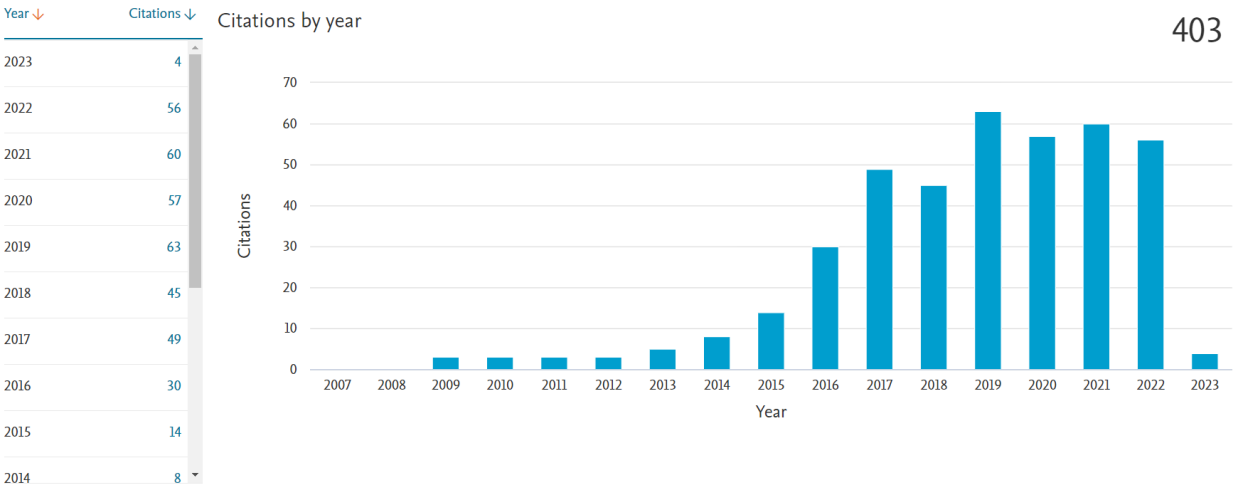
This author's *h*-index

8

The *h*-index is based upon the number of documents and number of citations.



Citations



Note: Google Scholar the results will be higher

Books/Reports/Chapters

1. Roshan Srivastav, Purna C Nayak. Editor for the book – "Applications of Machine Learning in Hydroclimatology".
2. Sarah Irwin, **Roshan K. Srivastav** and Slobodan P. Simonovic (2015). Instructions for Operating the Proposed Regionalization Tool "Cluster-FCM" Using Fuzzy C-Means Clustering and L-Moment Statistics. Water Resources Research Report no. 092, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, 54 pages. ISBN: (print) 978-0-7714-3101-2; (online) 978-0-7714-3102-9.
3. **Roshan K. Srivastav** and Slobodan P. Simonovic (2014). Simulation of Dynamic Resilience: A Railway Case Study. Water Resources Research Report no. 090, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, 91 pages. ISBN: (print) 978-0-7714-3089-3; (online) 978-0-7714-3090-9.
4. **Roshan K. Srivastav**, Andre Schardong and Slobodan P. Simonovic (2014). Computerized Tool for the Development of Intensity-Duration-Frequency Curves under a Changing Climate: Technical Manual v.1, Water Resources Research Report no. 089, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, XX pages. ISBN: (print) 978-0-7714-3087-9; (online) 978-0-7714-3088-6.
5. Andre Schardong, **Roshan K. Srivastav** and Slobodan P. Simonovic (2014). Computerized Tool for the Development of Intensity-Duration-Frequency Curves under a Changing Climate: Users Manual v.1, Water Resources Research Report no. 088, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, XX pages. ISBN: (print) 978-0-7714-3085-5; (online) 978-0-7714-3086-2.
6. Sarah Irwin, **Roshan K. Srivastav** and Slobodan P. Simonovic (2014). Instruction for Watershed Delineation in an ArcGIS Environment for Regionalization Studies. Water Resources Research Report no. 087, Facility for Intelligent Decision Support, Department of

Civil and Environmental Engineering, London, Ontario, Canada, 45 pages. ISBN: (print) 978-0-7714-3071-8; (online) 978-0-7714-3072-5.

7. **Roshan K. Srivastav** and Slobodan P. Simonovic (2014), Generic Framework for Computation of Spatial Dynamic Resilience. Water Resources Research Report no. 085, Facility for Intelligent Decision Support, Department of Civil and Environmental Engineering, London, Ontario, Canada, 81 pages. ISBN: (print) 978-0-7714-3067-1; (online) 978-0-7714-3068-8.

International Conferences

1. R Urmila Raghava Panikkar and **Roshan Srivastav** (2021). Effect of Anthropic Induced Changes in Watershed Characteristics on Streamflow Generation, AGU 2021 Fall Meet, New Orleans, LA, USA, Dec 13-17, 2021 (Awarded Berkener Travel Fellowship)
2. Jay Chordia, Debayan Mandal, and **Roshan Srivastav** (2021), Quantification of Streamflow Uncertainty in SWAT Models – Role of Hydroclimatic Data Sources, AGU Fall Meeting 2021, online, 13–17 Dec 2021, Oral Session H13H-02. (Awarded AGU Travel Grant)
3. Meghana Nagaraj, K. Srinivasan and **Roshan Srivastav** (2021). Regionalization of Non-Stationary Intensity-Duration-Frequency Curves for Monsoon Asia, AGU 2021 Fall Meet, New Orleans, L.A., USA, Dec 13-17, 2021 (Awarded Berkener Travel Fellowship)
4. Meghana Nagaraj, Jency M. Sojan, and **Roshan Srivastav** (2021). Non-stationary Modeling of Extreme Precipitation over Monsoon Asia - Role of Teleconnection Time Lags, virtual EGU General Assembly 2021,Vienna, Austria.
5. Poonam Wagh and **Roshan Srivastav** (2021). Statistical Downscaling of Temperature Using Global Climate Model Outputs - Effect of Bias correction, virtual EGU General Assembly 2021, Vienna, Austria.
6. Jency M. Sojan and **Roshan Srivastav** (2021). Intensity-Duration-Frequency (IDF) Curves Under Changing Climate - A Non-Stationary Modelling Approach, virtual EGU General Assembly 2021, Vienna, Austria.
7. Sriram Babu J., Poorna Chander B., **Roshan Srivastav** (2021). Remote Sensing-based Spatiotemporal Analysis of Near-Surface Temperatures for Cities Located in Different Climatic Zones, virtual EGU General Assembly 2021
8. Poonam Wagh; Debayan Mandal and **Roshan Srivastav** (2020), Quantifying the predictive and parametric uncertainty of SWAT model in streamflow predictions, AOGS 17th Annual Meeting, South Korea (postponed due to COVID 19) (**Awarded Student Fund Support**)
9. Jency M. Sojan; and **Roshan Srivastav** (2020), A GIS-Based Framework for Integrated Urban Flood Risk Management, AOGS 17th Annual Meeting, South Korea (postponed due to COVID 19) (**Awarded Student Fund Support**)
10. Sriram Jallu; Sharath Chandra Madanu; **Roshan Srivastav** (2020), Remote sensing based spatiotemporal analysis of Near-surface Temperatures for cities located in Different Climatic zones, AOGS 17th Annual Meeting, South Korea (Postponed due to COVID 19) (**Awarded Student Fund Support**)

11. Sharath Chandra Madanu; Sriram Jallu; **Roshan Srivastav** (2020), Uncertainty Evaluation of Different Satellite precipitation inputs on streamflow in Peachtree river basin, AOGS 17th Annual Meeting, South Korea (Postponed due to COVID 19) (Awarded Student Fund Support)
12. Meghana Nagaraj, K. Srinivasan and **Roshan Srivastav** (2019), Non-Stationary Modeling of Extreme Precipitation over Monsoon Asia, AOGS 16th Annual Meeting, Singapore (July, 2019)
13. Parthiban L., **Roshan Srivastav** (2017), Spatio-temporal variation of change factors in precipitation and temperature using CMIP5 data for Indian subcontinent, AOGS 14th Annual Meeting, Singapore (August 6-11, 2017)
14. Midhun Prasad K, **Roshan Srivastav** (2017), A study of spatiotemporal patterns of sea level across the coast of India, AOGS 14th Annual Meeting, Singapore (August 6-11, 2017)
15. Debayan Mandal, Venkatesh B, **Roshan Srivastav** (2017), Impact of Climate Variability and Land-use changes on river flow characteristics – A case study of the San Jacinto River Basin, AOGS 14th Annual Meeting, Singapore (August 6-11, 2017)
16. Prachi Rana, Shreya Bhusnur, Sayantan Samanta, Nikhil Bhatia, **Roshan Srivastav** (2017), Phosphate and Nitrate Modelling Using Swat in San Jacinto Basin, Texas, USA, AOGS 14th Annual Meeting, Singapore (August 6-11, 2017)
17. Nandha Kumar G, Venkatesh B, **Roshan Srivastav** (2017), Sensitivity Analysis of SWAT Model Parameters Using Surrogate Models, AOGS 14th Annual Meeting, Singapore (August 6-11, 2017)
18. Ramasamy T., **Roshan Srivastav** (2017), Spatio-Temporal analysis of Standardized Precipitation Index for India using gridded data, AOGS 14th Annual Meeting, Singapore (August 6-11, 2017)
19. Nikhil Bhatia, Vijay P. Singh, **Roshan Srivastav**, (2016), Quantifying the impact of Teleconnections on Hydrologic Regimes in Texas, AGU Fall Meeting, San Francisco, California (December 12–16, 2016)
20. Nikhil Bhatia, Vijay P. Singh, **Roshan K. Srivastav**, (2016), Influence of Climate Oscillations on Extreme Precipitation in Texas, AGU Fall Meeting, San Francisco, California (December 12–16, 2016)
21. Debayan Mandal, Nikhil Bhatia, and **Roshan Srivastav**, (2016), Quantifying the Uncertainty in Streamflow Predictions Using Swat for Brazos–Colorado Coastal Watershed, Texas, AGU Fall Meeting, San Francisco, California (December 12–16, 2016)
22. Debayan Mandal, Nikhil Bhatia**, Roshan K. Srivastav**, (2016), Quantifying the uncertainty in streamflow predictions using SWAT for Brazos–Colorado Coastal Watershed, AGU Fall Meeting, San Francisco, California (December 12–16)
23. Sayantan Samanta, Nikhil Bhatia, **Roshan K. Srivastav**, (2016), Quantifying the impact of Land Use Changes and Climate Variability on Regional Hydrology of San Jacinto River Basin, Texas, AGU Fall Meeting, San Francisco, California (December 12–16)

24. Divyaditya Singh Sisodia, Nikhil Bhatia, Angshuman Gautam, **Roshan K. Srivastav**, (2016), Prediction of Groundwater Levels Using Principal Component Analysis and Artificial Neural Network, AOGS Annual Meeting, Beijing, China (July 31–August 5)
25. Dhiraj Jhunjhunwala, Nikhil Bhatia, Sayantan Samanta, **Roshan K. Srivastav**, (2016), Quantification of predictive uncertainty semi-distributed SWAT model, AOGS Annual Meeting, Beijing, China (July 31–August 5)
26. Sayantan Samanta, Indrayudh Mondal, Nikhil Bhatia, **Roshan K. Srivastav**, (2016), Application of Soil Water Assessment Tool (SWAT) for ungauged river basins, AOGS Annual Meeting, Beijing, China (July 31–August 5)
27. Prachi Rana, Nikhil Bhatia, Jianxun He, **Roshan K. Srivastav**, (2016), A hybrid Artificial Neural Network for long lead–time flood forecasting, AOGS Annual Meeting, Beijing, China (July 31–August 5)
28. Indrayudh Mondal, Sayantan Samanta, Nikhil Bhatia, **Roshan K. Srivastav**, (2016), Temporal hydrologic variations in Upper Colorado River Basin with major land–use and land–cover changes, AOGS Annual Meeting, Beijing, China (July 31–August 5)
29. Nikhil Bhatia, Vijay P. Singh, **Roshan K. Srivastav**, (2016), Climate variability and its impacts on recent major flood events in the United States, Symposium for Agricultural and Applied Economics Research, Texas A&M University, College Station, Texas (April 15)
30. Nikhil Bhatia, Vijay P. Singh, **Roshan K. Srivastav**, (2016), Quantifying the impact of Climatic Cycles on Hydrologic Extremes in Texas, Water Daze Conference, Texas A&M University, College Station, Texas (March 30)
31. Nikhil Bhatia, Sarah Irwin, **Roshan K. Srivastav**, Slobodan P. Simonovic, (2015), Role of Clustering Indices in Delineation of Precipitation Regions, Joint Assembly, Montreal, Canada (May 3–7)
32. Abhishek Reddy, **Roshan K. Srivastav** (2015), Impact of Rainfall, Land-Cover and Population Growth on Groundwater - A Case Study from Karnataka State, India, 2015 AGU Fall Meeting, December 14-19, San Francisco.
33. Nikhil Bhatia, **Roshan K. Srivastav**, Slobodon P. Simonovic (2015), Role of Clustering Indices in Delineation of Precipitation Regions, 2015 Joint Assembly, America Geophysical Union, 3-7 May, Montreal, Canada.
34. Andre Schardong, **Roshan K. Srivastav**, Slobodan P. Simonovic (2014), Generalized tool for updating Intensity-Duration-Frequency curves under climate change, 6th International Conference on Flood Management – ICFM6, September 16-18, Brazil.
35. **Roshan K. Srivastav**, Slobodon P. Simonovic (2014), Generating Spatio-Temporal Maximum Entropy Ensembles using R, Spatial and spatio-temporal modeling of meteorological and climate variables using Open Source Software (R+OSGeo), International conference and workshop, DailyMeteo.org, June 23-27, University of Belgrade, Serbia.

36. Sarah Irwin, **Roshan K. Srivastav**, Slobodon P. Simonovic (2014), Regionalization of precipitation using relevant atmospheric variables in Canada, Canadian Meteorological and Oceanographic Society, June 1-5, Rimouski, Quebec, Canada.
37. **Roshan Srivastav**, Andre Schardong, Slobodon P. Simonovic (2014), Creating an Intensity-Duration-Frequency (IDF) tool for Canadian Cities, Livable Cities Forum – Building Resilient Communities, April 2-4, Vancouver, Canada
38. Sridharan, Dhilip T., **Srivastav, RK.**, Joshy, K.A., and Srinivasan, K. (2013), Optimal long-term operation policy for monsoon-fed hydropower reservoirs, 18th International Conference on Hydraulics, Water Resources, Coastal and Environmental Engineering, Chennai, December 04-06.
39. Nikhil Bhatia, **Srivastav, RK.** (2012), ANN-based Interval Forecast for Rainfall-runoff Models, AOGS - AGU (WPGM) Joint Assembly, Singapore (August 13-17).
40. Swetank Pandey, **Srivastav, RK.**(2012), Prediction of Groundwater levels using Support Vector Machine, AOGS - AGU (WPGM) Joint Assembly,(August 13-17).
41. Dhilip Anand T., Srinivasan K., **Srivastav, RK.**, (2011), Simulation-Optimization Framework for Optimal Hydro Power Operation of Srisailam Reservoir, 4th International Perspective on Water Resources & the Environment, January 4-6, Biopolis Conference Center, Singapore.
42. RavideepSingla, Saravanakumar MP., **Srivastav, RK.,** (2011), Artificial Neural Network model for Stabilization/Solidification of Lead-Contaminated Soils, 4th International Perspective on Water Resources & the Environment, January 4-6, Biopolis Conference Center, Singapore.
43. **Srivastav, RK.,** Varun Raj, Chandre CG., Srinivasan. K, (2010), Parametrization-Simulation-Optimization Approach for Reservoir Hedging Policy, Ninth International Conference on Hydro-Science and Engineering, August 2-5, IIT Madras, Chennai, India.
44. **Srivastav, RK.,** Srinivasan K., Sudheer KP., (2010), Simulation-Optimization Framework for Stochastic Modeling of Annual Streamflows, 3rd International Perspective on Current & Future State of Water Resources & the Environment, ASCE, January 5-7, IIT Madras, Chennai, India.
45. **Srivastav, RK.,** Srinivasan K., (2010), Threshold Bootstrap versus Moving Block Bootstrap - Application to Annual Streamflows, 3rd International Perspective on Current & Future State of Water Resources & the Environment, ASCE, January 5-7, IIT Madras, Chennai, India.
46. **Srivastav, RK.,** Srinivasan K., Sudheer KP., (2009), Genetic Algorithm Based Framework for Automation of Stochastic Modeling of Multi-Season Streamflows, 2009 Joint Assembly, AGU, May 24-27, Toronto, Canada. (**Selected for AGU Berkner Fellowship**)
47. Sudheer, KP., **Srivastav, RK.,** Soundharajan, B., and Jain, SK. (2006), Ground Water Perspective of Chennai: A Coastal City in India, 2nd GWSP-Asian Network Workshop: Global Water System Hotspots in the Asian Region: Mega-Cities and Dams, June 8-11, Guangzhou, China.
48. **Roshan Karan Srivastav** and Agarwal, VC., (2006), Characteristics of a Repelled Hydraulic Jump in a Horizontal Rectangular Channel, 15th Congress of the Asia and Pacific Division of

the International Association of Hydraulic Engineering and Research & International Symposium on Maritime Hydraulics (ISMH), August 7-10, IIT Madras, Chennai, India.

National Conferences

1. Jency M. Sojan; Poonam Wagh and Roshan Srivastav (2020), A Conceptual Framework for the Integrated Urban Flood Monitoring and Modelling, Kerala FloodCon 2020, India (January 23 and 24, 2020) **(Won Best Poster Award)**
2. Asmita Naitam; Hitesh Bugata; and Roshan Srivastav (2020), Role of downscaling in Urban Flood Management, Kerala FloodCon 2020, India (January 23 and 24, 2020) **(Won Best Poster Award)**
3. Parthiban L and **Roshan Srivastav**, (2016), Impact of Climate Change on Precipitation over Tamilnadu, National Conference on Water Resources Management in Coastal regions, Kakinada, Andhra Pradesh, India (December 8-9, 2016)
4. Ramasamy T and **Roshan Srivastav**, (2016), Spatio-Temporal analysis of Standardized Precipitation Index – A Case Study of Tamil Nadu, Kakinada, Andhra Pradesh, India (December 8-9, 2016)
5. Shiyamala Gowri and **Roshan Srivastav**, (2016), Regional Flood Frequency Analysis for Southern Peninsular Region of India, Kakinada, Andhra Pradesh, India (December 8-9, 2016)
6. Arthy, M., Jothimani, P., Sarvanakumar, M. P., **Roshan K. Srivastav**, (2011), Multi-variate Statistical Analysis of Surface Air Temperature, Indian Northeast Monsoon – Recent Advances and Evolving Concepts INEMREC-2011,24-25 February 2011, Chennai, India.
7. **Srivastav, RK**., Chaitali Misra, (2007), Application of Feed-Forward Neural Network to Rainfall-Runoff Models, National Conference on Water and Waste Management, April 23-24, JNTU, Kakinada, India.

Presentations at Workshops, Training Programmes, Research Showcase, Webinars

1. **Roshan Srivastav** (2020), Remote Sensing and GIS applications in Water Resources and Environmental Engineering, Annamacharya Institute of Technology and Sciences, September 9, Tirupati
2. **Roshan K. Srivastav**, Andre Schardong, Slobodon P. Simonovic (2014), Workshop on IDF CC Tool for deriving rainfall Intensity-Duration-Frequency Curves for future climate scenarios, December 9, Halifax, Canada
3. **Roshan K. Srivastav**, Andre Schardong, Slobodon P. Simonovic (2014), Workshop on IDF CC Tool for deriving rainfall Intensity-Duration-Frequency Curves for future climate scenarios, October 24, Mississauga, Canada
4. **Roshan K. Srivastav**, Andre Schardong, Slobodon P. Simonovic (2014), Workshop on IDF CC Tool for deriving rainfall Intensity-Duration-Frequency Curves for future climate scenarios, October 9, Vancouver, Canada

5. Andre Schardong, **Roshan K. Srivastav**, Slobodon P. Simonovic (2014), Computerized Tool for the development of Intensity-Duration-Frequency curves under Climate Change, Sustainability and Environment Research Showcase, Western University.
6. Sarah Irwin, **Roshan K. Srivastav**, Slobodon P. Simonovic (2014), Regionalization of precipitation using relevant atmospheric variables in Canada, Sustainability and Environment Research Showcase, Western University.
7. **Srivastav, RK.,** (2012), Introduction to Artificial Neural Network, Two Day National Workshop on "Advanced Optimization Through Intelligent Techniques: A Research Perspectives, March 1-2, School of Mechanical and Building Sciences, VIT University, Vellore.
8. **Srivastav, RK.,** Sudheer, KP., Srinivasan, K., (2008), Tutorial on Feed-Forward Neural Network using MATLAB - Application to Rainfall-Runoff models, Quality Improvement Programme (QIP) (conducted for Teachers of Engineering and Technology Institutes)- Short-term training Programme on Modeling Approaches for Environmental and Water Resources Systems Management, August 4-9, Department of Civil Engineering, IIT Madras
9. Srimuruganandam, B., **Srivastav, RK.,** Shiva Nagendra, SM., (2008), Tutorial on Air Quality Models, Quality Improvement Programme (QIP) (conducted for Teachers of Engineering and Technology Institutes)- Short-term training Programme on Modeling Approaches for Environmental and Water Resources Systems Management, August 4-9, Department of Civil Engineering, IIT Madras
10. **Srivastav, RK.,** (2008), Quantifying Uncertainty in ANN-based hydrologic models, Indo-German Workshop, January 10, Department of Ocean Engineering, IIT Madras

Invited Presentations and Demonstrations

- Invited Speaker on “Water Security and Climate Change”, International Conference on Water Resilience: Challenges and Way Forward (WaR-2020), October 8-9, 2020.
- Application of GIS and Remote Sensing in Civil Engineering, Short-term Training Program (STTP), Sep 9-10 2019, AIT&S, Tirupati.
- Tutorial on ANN applications to Flood Forecasting, Faculty Development Program on Machine Learning Tools, March 12-14, 2018, Continuing Education Cell, VIT University.
- Introduction to MATLAB Programming, Faculty Development Program on Computational Programming, November 8-9, 2017, Continuing Education Cell, VIT University.
- Tutorial on Environmental Management Tool - Application of Neural Network to Air Quality Models, Quality Improvement Programme (QIP) (conducted for Teachers of Engineering and Technology Institutes)- Short-term training Programme on Modeling Approaches for Environmental and Water Resources Systems Management, August 4-9, 2008, Department of Civil Engineering, IIT Madras.
- Tutorial on Water Resources Management Tool - Application of Neural Network to Flood Forecasting models, Quality Improvement Programme (QIP) (conducted for Teachers of

Engineering and Technology Institutes)- Short-term training Programme on Modeling Approaches for Environmental and Water Resources Systems Management, August 4-9, 2008, Department of Civil Engineering, IIT Madras.

- Tutorial on Feed-Forward Neural Networks using MATLAB, Soft Computing Approaches in Engineering Applications, January 2007, Department of Civil Engineering, IIT Madras.

COMPUTER SKILLS

Developed many useful routines in R, MATLAB, C/C++/C#, PYTHON related to data statistics, automation of processes, custom plots. Further developed several simulation routines in C/C++ and/or MATLAB related to water resources systems (Single and/or Multi-purpose Rule-Curve based reservoir operation, Irrigation Systems, Hydropower Systems and Water Distribution Networks), Multi-Site Matched Block Bootstrap, 2D Bootstrap, Threshold Bootstrap, Multi-site multivariate maximum entropy bootstrap, Interpolation of GCM data, Kernel regression-based statistical downscaling, Quantile-Matching for updating IDF curves under changing climate.

Programming Languages: C/C++, PYTHON
Computing Languages: MATLAB, R

Technical Packages: EPANET, WATERGEMS, HEC-RAS, MIKE-FLOOD, MIKE-URBAN, MIKE-SHE, SPSS, LINGO, AutoCAD, ITSM, SAMS 2007, VENSIM
Others: ORIGIN 7.0, LATEX

HONORS AND AWARDS

- **MITACS Accelerate Fellowship**
  Canada's premier research internship program, July 2013 – Jun 2014
- **Berkner Fellowship**
  American Geophysical Union May 2009
- **Ph.D. Fellowship from Ministry of Human Resource Development (MHRD)**
  MHRD, Government of India, August 2004

Reviewer for Peer-Reviewed Journals

- Journal of Hydrology, Elsevier
- Climate Change, Springer
- Water Resources Research, AGU
- Water Resources Management, Springer
- Journal of Hydrologic Engineering, ASCE
- Canadian Water Resources Journal
- Journal of Earth System Science, Indian Academy of Sciences
- Journal of Hydrometeorology, AMS

PERSONAL DETAILS

Place of Birth: Secunderabad
Date of Birth: Jan 9, 1979
Marital Status: Married
Languages Known: Hindi (Mother Tongue), Telugu, English

REFERENCES

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KEY PROJECTS

Ph.D. Dissertation (2004-2011): Multi-Objective Simulation-Optimization Framework for Generation of Multi-Site Streamflows for Watershed Management
Supervisor: Dr. K. Srinivasan and Dr. K. P. Sudheer
Output: Two International Journal, Two International Conferences

The research involves the development of a multi-objective simulation-optimization framework, that would enable the selection of the most appropriate hybrid stochastic streamflow model for a given time series record of single-site/multi-site, annual/periodic streamflows that would be able to preserve the summary statistics, the complex dependence structure, the marginal distributions of streamflows, and enable accurate prediction of the estimates of reservoir storage capacity and critical drought characteristics for use in water resources planning. Further, the proposed framework aims to minimize the drudgery, judgment, and subjectivity involved in the selection of the most appropriate hybrid stochastic model. This framework integrates the parametric-based hybrid stochastic simulation models (which form the core of the framework)

with a multi-objective optimization model (which is the driver). The hybrid models are chosen as the simulation model for the framework, since (i) it is known to model the dependence structure present in the streamflows well, in addition to reproducing the summary statistics and the marginal distribution characteristics; (ii) a wide model-cum-parameter space is available to identify the most appropriate hybrid models.

The parametric-based hybrid stochastic simulation models considered in the framework are: (i) annual streamflows: Hybrid moving block bootstrap (HMBB); (ii) multi-season streamflows: Hybrid Matched-block bootstrap (HMABB); and (iii) multi-site multi-season streamflows: Multi-Season Hybrid Matched-block bootstrap (MSHMABB). This framework obtains the parameters of the hybrid model by explicitly employing the objective functions which are related to the water-use characteristics (such as the prediction of reservoir storage capacity at the specified demand levels and the prediction of run length and run sum at the specified truncation levels), unlike the traditional approaches, that make use of statistical performance-based objective functions (Least Squares, Method of Moments and MLE) to estimate the model parameters. The framework can handle both the discrete (block sizes and bandwidth of the non-parametric component) and the continuous variables (parameters of the parametric component). There is no general functional relationship between the accuracy of storage capacity predictions and the reproduction of basic statistical characteristics of streamflows and/or the stochastic model parameters, especially for the complex hybrid models considered in this study. Hence traditional optimization techniques cannot be adopted. Thereby, it is proposed to adopt evolutionary search based NSGA-II optimization technique as the multi-objective optimization model. The framework yields a significant number of non-dominant solutions that provide the decision maker a considerable range of trade-off solutions to be considered for implementation.

The efficacy of the proposed framework is tested in two stages using both the hypothetical (annual streamflows only) and real case examples for single-site/multi-site, annual/periodic streamflows. In the first stage, the performance of the models from the proposed framework i.e., the automated hybrid models (AHM) is assessed based on split-sample validation. In the second stage, the performance of the AHM model is brought out using real case examples. Both the stages the AHM models are compared with that of the best MLE-based hybrid models (MMHM) selected manually (by trial-and-error) and the best parametric models. The comparison of AHM with MMHM brings out the effect of automation in improvising the overall performance of the AHM models. The models obtained from the framework outperforms the existing parametric models, disaggregation models, and hybrid models in modeling streamflows at various temporal and/or spatial scales (annual, multi-season and multi-site multi-season).

PROJECT DETAILS – Few Projects

Simple Proxies for Risk Analysis and Natural Hazard Estimation (2013-2014)
Project Co-ordinator – Prof. Slobodan P. Simonovic
Role: Develop a generic tool for computation of spatial dynamic resilience
Output: Report Published

Increasing catastrophic events across the world due to natural calamities (extreme events such as floods, droughts, hurricanes, and tornadoes) has led to the loss of thousands of human lives and shattered the global economic growth. Most of the scientist and researchers believe that this could be due to the effects of climate change. According to the Intergovernmental Panel for Climate Change fifth assessment report (IPCC 2013) the climate characteristics and patterns are changing in time and space. Further, it is reported that the increase in greenhouse gases would lead to more catastrophic events in near future with varying degree of exposures. Therefore it is necessary to study and quantify these adverse impacts on complex natural and/or man-made systems such as ecology, cities, and industries. To assess these disasters to extreme events we need to study complex systems that are vulnerable to multiple failures.

The research is part of the project "Simple Proxies for Risk Analysis and Natural Hazard Estimation" supported by MITACS and Property and Casualty Insurance Compensation Corporation. Further, this research focuses on the concept of resilience for understanding the complex behavior of a system with various impacts caused by natural disasters. The proposed framework would quantify the dynamic behavior of the system which would be very useful in understanding the impacts and improving the decision-making process. This would ultimately lead to better understanding of the complex system under the influence of given impact(s). The objective of the study is to (i) incorporate an understanding of impacts and its behavior and interactions with the system through system dynamics model; (ii) develop a generic framework to quantify spatial and temporal dynamic resilience index through mapping tools.

Computerized Tool for the Development of Intensity-Duration-Frequency-Curves under Climate Change (2013-2014)

Project Co-ordinator – Prof. Slobodan P. Simonovic

Role: Develop and Test (i) new method to update the IDF curves under climate change; (ii) new method for selection of GCM models

Expected output: One report, One International Conference/Workshop, Two International Journal papers (One Accepted)

Previous work was devoted to: (i) the development of an appropriate methodology for the assessment of climate change impacts; (ii) the implementation of the developed methodology to the process of development of intensity-duration-frequency (IDF) curves under changing climate; and (iii) verification of the developed methodology using a number of municipalities across Canada. The development research and verification work have clearly identified an opportunity to be explored through the proposed project. The consultations with Halifax, London, Hamilton and Coquitlam, involved in the verification work have identified that: (i)there is a need by almost every municipality in Canada for the update of IDF curves, which will address the changing climatic conditions;(ii) there is a lack of necessary expertise within the municipalities for the implementation of the current research to the practical needs of IDF update process;(iii) there is an opportunity to generalize (even standardize) the IDF update process and democratize the results of previous research;(iv) the potential existence of generalized tool for IDF update will be

helpful in the selection of effective adaptation options that can save money and minimize damage (human and material) from the extreme consequences of climate change; (v) there is an opportunity to obtain the feedback from practice that may lead to further research and innovation in the process of adaptation to changing climatic conditions. The proposed project will respond to the needs identified above by achieving the following objectives: (i) Improvement of the procedure for updating IDF curves (integration of climate information, sophisticated downscaling mechanism, and observed precipitation); (ii) Development of completely computerized tool for the implementation of the IDF updating procedure; (iii) Documenting the tool; and (iv) Distributing the tool and providing the necessary training to maximize application and uptake of knowledge.

Climate Change Impact on Reservoir Management in Canada (2013-2014)
Project Co-ordinator – Prof. Slobodan P. Simonovic
Role: To train and mentor one master student and one Ph.D. scholar
Expected output: One report, One International Conference, Two International Journal papers

The research under this project aims to estimate the changes in the frequency and magnitude of flooding events for Canadian rivers due to the effects of climate change. The research will address issues related to how climate change, land-use change, and other anthropogenic activities affect aquatic ecosystem services. It will provide insight and understanding of the complex impacts that climate change has on flood events of Canadian rivers.

A better understanding of the potential changes in flood events is of particular interest in flood risk assessment, environmental policy, and disaster management decision-making. Floods are the most common natural disasters. Their frequency, magnitude, and cost are on the rise all over the world. Riverbanks and floodplains are very attractive for habitation as well as for agriculture, transportation, power generation, recreation, and disposing of wastes. Hence, society is at risk of exposure to extreme flood events. Climate change, and global warming of the atmosphere will increase the capacity of the atmosphere to hold water, and this will also accelerate many of the processes involved in the redistribution of moisture in the atmosphere. These changes alone suggest that flood generating processes linked to the atmosphere are likely to increase. The research outlined in this proposal will provide an opportunity for advanced multidisciplinary training of personnel in several important and unique areas. While it is clear that good governance requires useful and reliable science for decision-making, it is equally clear that the effects of poor planning could be disastrous. Increased flooding risk caused by climatic change can lead to serious economic and social dangers. We must plan well, and good planning requires understanding and foresight. This research will help identify the change in flood frequency of Canadian rivers and provide the Canadian public and private sectors with scientifically credible information that will connect science, governance, economics, and the environment.

Comparison of Alternate Hedging rules for Single\Multi-Purpose Single Reservoirs (2009-2010)
Advisor: Dr. K. Srinivasan

Role: Research Assistant
Output: One International Conference

In this research study, a comparison of different alternate hedging rules such as two-point linear hedging, two-point nonlinear hedging, modified two-point hedging, discrete hedging and generalized hedging for the single and multi-purpose reservoir is carried out for Hemavathi reservoir in the Cauvery river basin in India. A MOGA-based optimization framework is developed to obtain the best parameters for each of the hedging rules based on the objective functions related to the reservoir performance such as volume reliability and period vulnerability. Resilience and event deficit related performance measures are used as constraints.

Multi-objective Optimization of Storage-based Hydropower Plants (2008-2009)
Advisor: Dr. K. Srinivasan
Role: Research Assistant
Output: Two International Conferences

The research study deals with the operation of hydropower in the storage-based hydro plants, wherein long-term impounding developments allow for the seasonal regulation capability of stream flows available in the river. In this study, it is proposed to maximize average annual energy and also the low storage period energy produced during the operation horizon, while protecting the firm energy requirements. The firm energy commitments at different reliability levels are estimated which can help achieve a trade-off between the average annual energy production and the energy produced especially during the low-storage periods. The effects of minimizing the spill on the summer energy and the average annual energy production are investigated for Srisailam reservoir in the Krishna river basin in India.

Reservoir Performance Analysis of Modeling of Surface Streamflows (2007-2008)
Advisor: Dr. K. Srinivasan - sponsored project funded by Ministry of Water Resources, India
Role: Assisted Faculty

In this project, versatile user-friendly software for periodic stochastic modeling of river flows, with built-in decision-aids at various stages of modeling is developed. Trade-off relationships are established among the performance indicators such as reliability, resilience, and vulnerability for a few existing systems for standard operating policy and a few selected hedging policies.

Performance-Based Optimal Operation of Multi-Purpose Reservoir System with Streamflow Predictions (2007 – 2008)
Advisor: Dr. K. Srinivasan
Role: Research Assistant
Expected Output: One International Journal

A multi-objective optimization framework has been developed for the effective operation of Bargi reservoir in the Narmada river basin in India considering the three purposes, namely,

municipal water supply, irrigation release and energy production. The approach used is known as parameterization-simulation optimization (PSO) approach. Trade-off solutions for the multi-purpose operation of Bargi reservoir are obtained using the framework, considering the rule curve parameters, as well as the hedging factors as decision variables and the priority of water use, is specified in the different periods. Shortage ratio for irrigation release and Shortage ratio for hydro-energy production are considered as the objective functions.

Quantification of Uncertainty in ANN based Hydrologic models (2006 – 2007)
Advisor: Dr. K. P. Sudheer
Role: Research Assistant
Output: One International Journal

In this research study, an effective and simple way to perform uncertainty analysis for the ANN-based hydrologic model is developed for hourly flows from Kolar river basin located in India. The method is based on the concept of bootstrap technique which effectively quantifies the uncertainty in the model output and the parameters arising from variation in input data used for calibration. In the current study, the uncertainty due to model architecture and the input vector is not directly considered; they have been minimized during the model calibration. The results from the case study suggest that the sampling variability of the training patterns, as well as the initial guess of the parameters of ANN, do not have a significant impact on the model performance. However, despite good generalization properties for the models developed in this study, most of them fail to capture the hydrograph peak flow characteristics. The proposed method of uncertainty analysis is very efficient, can be easily applied to an ANN-based hydrologic model, and clearly illustrates the strong and weak points of the ANN model developed.

Evaluation of Alternate Hedging Rules for Optimal Crop Yield (2006 – 2007)
Advisor: Dr. K. Srinivasan
Role: Research Assistant

In this research study, an optimization framework to investigate the effect of alternate hedging rules on optimal crop yield, optimal allocation of land area and optimal net benefits is developed for Nagarjuna Sagar Reservoir in the Krishna river basin in India. An integrated two-level optimization framework is proposed, consisting of multi-objective genetic algorithm (MOGA) based optimization model at reservoir level for obtaining the releases using different alternate hedging rules and the optimal allocation of land area to be irrigated and at the field level dynamic programming is adopted to arrive at the optimal allocation of irrigation water among the multiple crops for the known cropping pattern.

Heuristics Based Optimal Design of Water Distribution Network (2005 – 2006)
Advisor: Dr. K. Srinivasan
Role: Research Assistant

In this research study, a comparison on the performance of heuristic-based design of Water Distribution Networks using MOGA optimization is carried out. Since a heuristic method cannot guarantee optimal solution by itself; it has been combined with GA to obtain a near-global optimal solution. Three methods are compared in the context of the optimal design of water distribution networks. The first method involves the use of only the evolutionary algorithm NSGA-II. The second method involves the use of a heuristic method, Critical Path method in combination with NSGA-II. The third method is a combination of another heuristic method Marginal Cost method with NSGA-II. The heuristic-based optimization methods result in a substantial saving in terms of computational time, which can be exploited in optimal design and rehabilitation problems in case of large networks.