

Ganeshchandra Mallya

Education

- 2011–2020 **Ph. D. Candidate in Civil Engineering**, *Purdue University*, West Lafayette, GPA – 3.86.
- 2009–2011 **Masters of Science in Civil Engineering**, *Purdue University*, West Lafayette, GPA – 3.81.
- 2002–2006 **Bachelor of Engineering**, *National Institute of Technology*, Surathkal, India, Ranked 1 out of 34 students.

Ph. D. Thesis

- Title *Drought Characterization using Probabilistic Models*
- Advisors Dr. Rao S. Govindaraju & Dr. Shivam Tripathi
- Description
- Retrospective drought analysis over Indian Monsoon Region.
 - Development of a probabilistic drought index that accounts for model uncertainty.
 - Identifying homogeneous drought regions using a Bayesian framework.

Masters Thesis

- Title *Hidden Markov model-based probabilistic assessment of droughts.*
- Advisors Dr. Rao S. Govindaraju & Dr. Shivam Tripathi
- Description A probabilistic HMM-based drought index (HMM-DI) was developed to study the frequency and severity of droughts and their spatio-temporal variations over Indiana.

Experience

- 2009–Present **Graduate Research Assistant**, *Purdue University*, West Lafayette, IN.
- Research emphasis on the use of statistical models for: (a) probabilistic drought characterization, (b) watershed health assessment, (c) risk-based TMDL analysis under evolving climate.
- Key roles and responsibilities:
- Defined the scope of the research problems. Performed literature review, data assimilation, analyses, and visualization. Authored papers for peer reviewed journals.
 - Prepared progress reports and collaborated with Program Managers of funding agencies.
 - Mentored new undergraduate and graduate students.

2011–Present **Graduate Teaching Assistant**, *Purdue University*, West Lafayette, IN.

1. CE 340 - Hydraulics (Spring 2011): I was a quarter time TA under the supervision of Dr. Venkatesh Merwade, and my duties included grading homeworks and exams.
2. CE 343 - Hydraulics Lab (Spring 2011 and Spring 2014): I was a quarter time TA (1 session/week with 20 students) during Spring 2011 and a half time TA (2 sessions/week, with 20 students each) during Spring 2014, under the supervision of Dr. Dennis Lyn. My duties for each session during the included an hour long lecture on the theory and concepts, followed by a guided 2 hour experiment, grading lab reports, and conducting office hours.
3. CE 440 - Urban Hydraulics (Fall 2011 - 2017, 2019): I was a quarter-time (~40 students) and half-time TA (~65 to 80 students) under the supervision of Dr. Rao S. Govindaraju. My primary duties included designing and grading homeworks, projects, and exams, and holding office hours. I also had the opportunity to give 3-4 guest lectures during each semester. I contributed in digitizing course materials, as well as preparing tutorials for softwares such as SewerCAD and StormCAD, and creating Youtube videos (~6000 views).
4. Hydraulics Lyles TA (Spring and Fall 2018, Spring 2019):
 - (a) I was a half time TA (~150 students) during Spring 2018 under the supervision of Dr. Antoine Aubeneau, and my duties included holding recitation/office hours (20 hrs/week), and helping with proctoring and grading exams.
 - (b) During Fall 2018, under the supervision of Dr. Cary Troy (~190 students) my duties included holding office hours (5 hrs/week), holding active learning sessions, helping with in-class demonstrations, designing and grading homeworks, quizzes, and exams.
 - (c) During Spring 2019, under the supervision of Dr. Aubeneau (~135 students) my duties included holding office hours (15 hrs/week), designing homeworks and quizzes, and helping with proctoring and grading exams.

2011-2017 **Graduate Student Mentor**, *Purdue University*, West Lafayette.

As a doctoral student I was fortunate to play the role of a research mentor to the following undergraduate students who were visiting Purdue University as part of different exchange programs.

1. Rashad Riley (Summer 2011) from Central State University studied the effects of droughts on water quality in streams and we presented his work at the SURF symposium. We analyzed near real-time hydrologic and water quality data collected using a Radiosonde at Massie Creek, OH, and then investigated the water quality in the creek during extended periods of drought.
2. Vipul Talwaria (Summer 2016) from Indian Institute of Technology, Bombay was involved in the assessment of watershed health over ungauged basins in the Midwest. Vipul's work mainly focused on data gathering and analysis. During his stay, Vipul performed literature review, data analyses, and familiarized with softwares such as ArcGIS, Python, and Matlab. We presented his work at the PURE 2016 symposium and at the ASCE-EWRI 2017 conference.
3. Shubham Kumar (Summer 2017) from Indian Institute of Technology, Bombay developed a short-term water demand forecasting model using Artificial Neural Networks. In addition to data processing in R, Shubham contributed towards literature review and development of an ANN model in Matlab. We compared the results of the ANN model to those obtained from other machine learning models. The work was presented at the PURE 2017 symposium.
4. Santiago Cifuentes (Fall 2017) from Universidad Nacional de Colombia developed a SWAT model for the Bogota River Watershed. Santiago, learned how to download and process and visualize different hydro-meteorological datasets using Matlab and ArcGIS, and then used these datasets as inputs to calibrate and validate a SWAT model. The work was particularly challenging as it was a data-sparse region and the watershed contained 8 major reservoirs. The work was presented at the UREP-C 2017 symposium.

2006–2008 **Assistant Systems Engineer**, *Tata Consultancy Services Ltd.*, Bangalore and Mumbai, India.

Developed and maintained the niche financial product of TCS called BaNCS, that capitalizes on its modern architecture and technology and provides a highly scalable and flexible end-to-end banking solution for global banks and financial institutions.

Technologies used: Oracle 9ids reports builder, Powerbuilder, Oracle9i/10g, SQL, PL/SQL, Unix.

Publications, Book Chapters, and Conference Presentations

(¹Undergraduate student mentored by Mallya, G.)

o Peer reviewed journal publications.

1. Mallya, G., Gupta, A., Hantush, M., Govindaraju, R.S., 2020. Uncertainty Quantification in Reconstruction of Sparse Water Quality Time-Series: Implications for Watershed Health and Risk-Based TMDL Assessment. *Environmental Modelling and Software*. Accepted - under production. <https://doi.org/10.1016/j.envsoft.2020.104735>
2. Mallya, G., Hantush, M., Govindaraju, R.S., 2018. Composite measures of watershed health from a water quality perspective. *Journal of Environmental Management* 214, 104-124. <https://doi.org/10.1016/j.jenvman.2018.02.049>
3. Mallya, G., Mishra, V., Niyogi, D., Tripathi, S., Govindaraju, R.S., 2016. Trends and variability of droughts over the Indian monsoon region. *Weather and Climate Extremes* <https://doi.org/10.1016/j.wace.2016.01.002>
4. Mallya, G., Tripathi, S., Govindaraju, R.S., 2015. Probabilistic drought classification using gamma mixture models. *Journal of Hydrology* 526, 116-126. <https://doi.org/10.1016/j.jhydrol.2014.11.008>
5. Mallya, G., Zhao, L., Song, X., Niyogi, D., Govindaraju, R.S., 2013b. 2012 Midwest Drought in the United States. *Journal of Hydrologic Engineering* 18, 737-745. [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0000786](https://doi.org/10.1061/(ASCE)HE.1943-5584.0000786)
6. Mallya, G., Tripathi, S., Kirshner, S., Govindaraju, R.S., 2013a. Probabilistic Assessment of Drought Characteristics Using Hidden Markov Model. *Journal of Hydrologic Engineering* 18, 834-845. [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0000699](https://doi.org/10.1061/(ASCE)HE.1943-5584.0000699)

o Book chapters

1. Mallya, G., Tripathi, S., Govindaraju, R.S., 2019. Chapter 6 - Detection of Temporal Changes in Droughts Over Indiana, in: Teegavarapu, R. (Ed.), *Trends and Changes in Hydroclimatic Variables*. Elsevier, pp. 305-360.
2. Mallya, G., Tripathi, S., Govindaraju, R.S., 2018. An Analysis of Spatio-Temporal Changes in Drought Characteristics over India, in: Singh S., Dhanya C. (eds) *Hydrology in a Changing World*. Springer Water. Springer, Cham.

o Conference proceedings and presentations

1. Mallya, G., Gupta, A., Hantush, M., Govindaraju, R.S., Water Quality and Streamflow Estimation at Ungauged Watersheds using Machine Learning. *World Environmental and Water Resources Congress 2019*, Pittsburg, PA, May 19-23, 2019

2. Gupta, A., Mallya, G., Hantush, M., Govindaraju, R.S., Propagation of Uncertainty in Streamflow to Water Quality Estimates. World Environmental and Water Resources Congress 2019, Pittsburg, PA, May 19-23, 2019
3. Mallya, G., Hantush, M., Gupta, A., Govindaraju, R.S., 2018. A web-based decision support tool for risk-based TMDL assessments. World Environmental and Water Resources Congress 2018, Minneapolis, MN, June 3-7, 2018
4. Palacio¹, S. C., Mallya, G., Govindaraju, R.S., 2017. Developing a SWAT Model for the Bogota River Watershed. Presented at the Undergraduate Research Experience (UREP-C) Program Symposium, West Lafayette, IN, November 29, 2017.
5. Mallya, G., Talwaria¹, V., Hantush, M., Govindaraju, R.S., 2017. Estimating Health of Ungauged Watersheds Using Machine Learning. Presented at the World Environment & Water Resources Congress 2017, Sacramento, California, May 21-25, 2017.
6. Mallya, G., Hantush, M., Govindaraju, R.S., 2016. A Probabilistic Risk-Based Framework for Estimating Watershed Health. Presented at the World Environmental and Water Resources Congress 2016, West Palm Beach, Florida, May 22-26, 2016.
7. Mallya, G., Tripathi, S., Govindaraju R.S., 2016. Drought Index for Watersheds using Tree-structured Copulas. Presented at the World Environmental and Water Resources Congress 2016, West Palm Beach, Florida, May 22-26, 2016.
8. Mallya, G., Tripathi, S., Govindaraju R.S., 2015. Probabilistic drought classification using Gamma Mixture Model. Presented at the World Environmental and Water Resources Congress 2015, Austin, Texas, May 17-21, 2015.
9. Mallya, G., Tripathi, S., Govindaraju R.S., 2013. Quantifying the reliability of gridded precipitation datasets for studying extreme events over the Indian Monsoon Region. Presented at the World Environmental and Water Resources Congress 2013, Cincinnati, Ohio, May 19-23, 2013.
10. Mallya, G., Mishra, V., Tripathi, S., Niyogi, D., Govindaraju R.S., 2012. Comparison of Drought Characteristics over the Indian Monsoon Region using HMM-DI and SPI. Presented at the World Environmental and Water Resources Congress 2012, Albuquerque, New Mexico, May 20-24, 2012.
11. Mallya, G., Tripathi, S., Govindaraju, R.S., 2011. A machine learning approach for probabilistic drought classification, in: Proceedings of the 2011 Conference on Intelligent Data Understanding. Presented at the Conference on Intelligent Data Understanding, Mountain View, pp. 263-273.
12. Mallya, G., Tripathi, S., Govindaraju, R.S., 2011. Hidden Markov models for identifying drought triggers. Presented at the International Conference on Sustainable Water Resources Management and Climate Change Adaptation, NIT Durgapur, India.
13. Mallya, G., Tripathi, S., Govindaraju, R.S., 2011. Hidden Markov Model Based Probabilistic Assessment of Droughts. ASCE Conference Proceedings 414, 133.
14. Mallya, G., Tripathi, S., Govindaraju, R.S., 2010. Assessment of drought characteristics using graphical models., in: Frontiers of Interface Between Statistics and Sciences. Hyderabad, India, pp. 565-575.

○ Posters

1. Mallya, G., Gupta, A., Hantush, M., Govindaraju, R.S., 2019. A web-based Decision Support Tool for Watershed Health Analysis. Poster presented at the Indiana LTAP Stormwater Drainage Conference, West Lafayette, IN. Feb. 07, 2019.
2. Kumar¹, S., Mallya, G., Govindaraju, R.S., 2017. Forecasting water demand for Indianapolis. Poster/Quad-chart presented at the Purdue Undergraduate Research Experience Symposium 2017, West Lafayette, IN. July 10, 2017.
3. Talwaria¹, V., Mallya, G., Govindaraju R.S., 2016. Estimating Health of Ungauged Watersheds. Poster/Quad-chart presented at the Purdue Undergraduate Research Experience Symposium 2016, West Lafayette, IN. July 14, 2016.
4. Chaubey, I., Ramadas, M., Mallya, G., Ojha, R., Govindaraju, R.S., Niyogi, D., Song, C.X., Nenduri, K.V. 2012. Development of Drought Triggers for Agricultural Applications. Poster Presented at the 2012 Land Grant and Sea Grant National Water Conference, Portland, OR. May 20-24, 2012.
5. Mallya, G., Tripathi, S., Govindaraju, R.S. 2011. A machine learning approach for probabilistic drought classification. Poster presented at the Conference on Intelligent Data Understanding 2011, Mountain View, CA. October 19-21, 2011.
6. Riley¹, R., Huang, X., Lee, J., Mallya, G., Nedunuri, K.V., Zhao, L., Chaubey, I. 2011. Effects of droughts on water quality in streams. Poster presented at the 2011 Symposium on Data-Driven Approaches to Droughts, West Lafayette, IN. June 21-22, 2011.
7. Mallya, G., Tripathi, S., Kirshner, S., Govindaraju, R.S. 2011. Probabilistic assessment of drought characteristics using a hidden Markov model. Poster presented at the 2011 Symposium on Data-Driven Approaches to Droughts, West Lafayette, IN. June 21-22, 2011.

○ Magazine and News Articles

1. Mallya, G., Tripathi, S., Govindaraju, R.S., 2012. On classification of Indian Droughts, in *Directions* published at IIT Kanpur, India.

○ Manuscript under preparation (can be produced upon request)

1. Mallya, G., Hantush, M., Govindaraju, R.S., 2019. A Machine Learning Approach to Predict Sediment and Nutrient Watershed Health at Ungauged Basins. Manuscript under revision - Environmental Science & Technology.
2. Gupta, A., Mallya, G., Hantush, M., Govindaraju, R.S., 2019. Uncertainty quantification in Hydrologic and Water-Quality Modeling. Manuscript under preparation.
3. Mallya, G., Tripathi, S., Govindaraju, R.S., 2020. Identifying homogeneous drought regions using a Bayesian framework. Manuscript under preparation.

Research Tools

1. Watershed Risk-Assessment Decision Support Tool (<https://engineering.purdue.edu/WaterDST/>)
 - Enables risk-based assessments of watersheds and identifies *hotspots* of different water quality

- constituents.
 - o Allows users to view and download plots of reconstructed water quality loads and other statistical measures.
2. Multi-site Water Quality Reconstruction Tool (<https://engineering.purdue.edu/WaterDST/MultisiteTool/>)
 - o Reconstructs continuous time series of water quality loads at multiple sites.
 3. Risk-based TMDL and Watershed Health Analysis Tool (<https://engineering.purdue.edu/WaterDST/StandaloneTool/>)
 - o In addition to risk-based watershed health assessment, this tool performs TMDL assessment and provides estimates of compliance for different levels of permissible violations for user provided water quality data.

█ Awards

- 2018, 19 Summer Research Grant, Purdue University
- 2018, 19 Lyles TA Award, Purdue University
- 2015, 16, 17 Dorothy Faye Dunn Fellowship, Purdue University
- 2014 Graduate School Excellence in Teaching Award Nominee, Purdue University
- 2013 Committee for the Education of Teaching Assistants (CETA) Award, Purdue University
- 2011, 15, 17 Jacques Delleur travel award, Purdue University
- 2009 J. N. Tata Scholarship, Tata Trusts
- 2006 Gold medal recipient for first rank in Civil Engineering, NITK Surathkal

█ Computer skills

- Basic HEC-RAS, HEC-HMS, SWAT, ERDAS IMAGINE, LaTeX, D3, C/C++
- Intermediate StormCAD, SewerCAD, PIPE2010, R, Python, HTML, JavaScript, PHP
- Advanced MATLAB, ArcGIS

█ Activities and Professional Memberships

- o **Civil Engineering Graduate Student Advisory Council** – Purdue University (2012 - 2014)
 - Webmaster (2012-2014) and Treasurer (2013-2014)
 - Outreach Committee Chair (2013) - helped local senior residents with winterization, volunteered for Habitat for Humanity, and raised funds for committee activities.
- o **American Society of Civil Engineers** – Student member
- o **American Geophysical Union** – Student member
- o **Reviewer** – Journal of Hydrology, Journal of Hydrologic Engineering, International Journal of Climatology, Journal of Earth System Science, Science of the Total Environment

█ References

1. Dr. Rao S. Govindaraju
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4. Dr. Dennis A. Lyn
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For student testimonials, please check <https://gmallya.com/testimonials-ganesh-mallya/>
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