

Huidae Cho, Ph.D., GISP, PE (MD), CFM, M.ASCE

3820 Mundy Mill Road

Oakwood, GA 30566

HuidaeCho@gmail.com

EDUCATION

- **Doctor of Philosophy**, Civil Engineering August 2008
Texas A&M University, College Station, Texas
Area: Optimization and Hydrology
Dissertation: On the Predictive Uncertainty of a Distributed Hydrologic Model
- **Master of Science**, Civil Engineering February 2001
Kyungpook National University, Daegu, Korea
Area: GIS and Hydrology
Thesis: Development of a GIS Hydrologic Modeling System by Using the Programming Interface of GRASS GIS
- **Bachelor of Science**, Civil Engineering February 1999
Kyungpook National University, Daegu, Korea

RESEARCH INTERESTS AND EXPERTISE

- Application of geographic information systems to hydrology
- Hydroinformatics
- Heuristic optimization and uncertainty analysis in hydrologic/hydraulic modeling
- Surface water hydrology
- Impact of climate change on water resources

PROFESSIONAL EXPERIENCE

- **Assistant Professor of Geospatial Science and Computing** August 2018–Present
Institute for Environmental and Spatial Analysis, University of North Georgia, Oakwood, Georgia
- **Part-Time Assistant Professor** January 2015–May 2018
Department of Civil and Construction Engineering, Kennesaw State University, Marietta, Georgia
- **Senior Geospatial Engineer** September 2017–July 2018
MapAnything, Atlanta, Georgia
- **Water Resources Engineer** September 2008–September 2017
Dewberry, Fairfax, Virginia, Atlanta, Georgia
- **Open Source GIS Developer** June 2000–Present
GRASS GIS Development Team, Worldwide Team of Scientists and Developers

- **Research Assistant** January 2004–May 2008
Department of Civil Engineering, Texas A&M University, College Station, Texas
- **Lead Software Developer** December 2000–July 2003
Cemtlomedia, Daejeon, Korea
- **Lecturer** February 2000–October 2000
Computer Center, Kyungpook National University, Daegu, Korea
- **GIS Developer** June 1999–December 1999
General Information Center, Daegu, Korea

TEACHING

- **Assistant Professor of Geospatial Science and Computing** August 2018–Present
University of North Georgia, Oakwood, Georgia
 - ENST 2030 – Environmental Studies & Sustainability
 - GISC 2011/L – Geographic Information Science
 - GISC 4360K – Digital Image Processing
 - GISC 4500K – Application Development
- **Part-Time Assistant Professor** January 2015–May 2018
Kennesaw State University, Marietta, Georgia
 - CE 6303 – Water Resources Management (Co-lecturing, Graduate Level)
 - ENGR 3343 – Fluid Mechanics
 - ENGR 3345 – Fluid Mechanics Laboratory

RESEARCH AND PROJECTS

Evaluation of Uncertainty in Extreme Flow Estimation near a Gage with Historical Records

June 2017–Present

This research identifies various sources of uncertainty in extreme flow estimation and investigates how uncertainty in flow estimates should be evaluated when USGS regression equations are weighted with gage analysis using historical records from a near-by gauge.

Land Surface Modeling for Korea

July 2017–December 2017

I developed a land surface model for Korea. The Variable Infiltration Capacity (VIC) model and satellite data assimilation techniques were used for this research effort.

Development of a Web-Based Hydrologic Modeling System for Texas

June 2014–May 2015

<http://txmod.isnew.info>. I have been developing a web-based hydrologic modeling system for Texas using an open source software stack, USGS and NCDC web application programming interfaces (APIs), and a hydrologic model called the Topography Model (TOPMODEL).

Development of a Web-Based Regionalized Stochastic Point Rainfall Generator and Its Applicability in Runoff and Flood Modeling

December 2013–March 2016

<http://letitrain.info>. My colleague and I developed a web-based geospatial application for stochastic rainfall generation, whose algorithm is based on the Modified Bartlett-Lewis Rectangular Pulse (MBLRP) method. The web application allows the user to click on a United States map or MBLRP parameter maps, and generates hyetographs for a specified period. This application is very useful for hydrologic modeling in hypothetical weather conditions because synthetically generated rainfall time series simulate historical statistics reliably.

Efficient Uncertainty Analysis of TOPMODEL Using Particle Swarm Optimization

October 2013–March 2014

I applied the ISPSO-GLUE method, which integrates the Isolated-Speciation-based Particle Swarm Optimization (ISPSO) and the Generalized Likelihood Uncertainty Estimation (GLUE) framework, to the uncertainty analysis of TOPMODEL. With the same number of model runs, the ISPSO-GLUE approach was able to construct better performing uncertainty bounds when compared to the traditional GLUE approach. Quantitatively, the uncertainty bounds of ISPSO-GLUE enclosed about 5.4 times more observed streamflows than those of GLUE did. I showed that ISPSO-GLUE can be a promising alternative to GLUE when uncertainty analysis requires a lot of model runs.

Development and Application of a Storm Identification Algorithm That Conceptualizes Storms by Elliptical Shape

May 2013–October 2013

It is hydrologically very important to identify the shape, directionality, and speed of a storm with a high precipitation probability when we derive areal reduction factors and design hydraulic structures for extreme weather conditions. I developed and implemented a storm tracking algorithm that can identify on radar data a storm with the highest possible precipitation for a specific area of interest.

Impacts of Climate Change and Historical Land Cover Change on Water Resources

September 2011–August 2015

I offered consultations to a doctoral student on optimizing his Soil and Water Assessment Tool (SWAT) models for climate change research. I used ISPSO, the multi-modal heuristic optimization algorithm that I developed for my dissertation, for the optimization of his models. This research mainly concerns the impact of climate change and historical land cover change on water resources.

Effect of the Temporal Variability of Rainfall Statistics on Stochastically Generated Rainfall Time Series

July 2011–January 2013

My colleagues and I introduce a new synthetic rainfall generator and use ISPSO to find optimal parameter sets. The new rainfall generator outperforms the MBLRP method.

Regionalization of the Modified Bartlett-Lewis Rectangular Pulse Stochastic Rainfall Model

October 2009–January 2013

My colleagues and I regionalized the parameters of the MBLRP stochastic rainfall simulation model across the contiguous United States using ISPSO. The MBLRP model was calibrated such that discrepancies between observed and simulated rainfall statistics were minimized, and calibrated parameter values were spatially interpolated to create continuous parameter surfaces. We developed parameter maps covering the contiguous United States and the results indicate that the suggested maps reproduce well the statistics of the observed rainfall for different accumulation intervals. The estimated parameter values were also used to estimate storm and rain cell characteristics.

Application of Multi-Modal Optimization for Uncertainty Estimation of Computationally Expensive Hydrologic Models August 2008–November 2012

I employed ISPSO in the GLUE framework for fast estimation of the uncertainty bounds of a computationally expensive hydrologic model. The new uncertainty estimation method called ISPSO-GLUE allows building uncertainty bounds of SWAT qualitatively similar to those created by GLUE with at least 7 times less samples than GLUE requires.

Investigation on the Effect of Spatial Variability of Land Use, Soil Type, and Precipitation on Streamflows in Small Watersheds August 2008–June 2009

I proved the hypothesis using SWAT that, if a watershed is small enough such that it has a time of concentration shorter than the computational time step of a model, the model will not be able to see what is actually happening inside the watershed during one time step. The results support the research hypothesis, at least for the study watersheds, by showing that the location of specific land use and soil type areas within a watershed does not significantly affect the overall model performance.

Derivation of the Number of Minima of the Griewank Function September 2007–July 2008

A disagreement with NichePSO, a multi-modal optimization algorithm, on the number of local minima in the Griewank function, a heavily multi-modal benchmark function widely used for testing heuristic optimization algorithms, led me to use ISPSO to firstly count the number of minima of the Griewank function and formulate it in a recursive form. This research can serve as a sound basis for evaluating multi-modal optimization algorithms.

Development of a Heuristic Optimization Algorithm for Multi-Modal Problems

October 2007–February 2011

<https://idea.isnew.info/ispsso.html>. I developed and proposed Isolated-Speciation-based Particle Swarm Optimization (ISPSO), a novel heuristic optimization algorithm, to find multiple realistic model realizations for optimization problems and strategically take parameter samples from the search space to assess uncertainties associated with environmental models.

Control of Nonpoint Source Loads in the Hickory Creek Sub-basin of the Lake Lewisville Watershed as a Component of a Watershed-Based Water Quality Trading Program April 2005–May 2008

I performed environmental modeling for a best management practice (BMP) site analysis and the prediction of sediment, nitrogen, and phosphorous loads using SWAT and QUALTX. The two models were

coupled together to predict nutrient loads from nonpoint sources and were calibrated using the SCE-UA algorithm.

Incentives for Action: Incorporating Trading Options Into Watershed Improvement Plans for Lake Lewisville—Phase II January 2004–March 2005

I developed a software library that implements the SCE-UA algorithm, a heuristic global optimization algorithm. I have successfully applied SCE-UA to hydrologic and water quality modeling using SWAT and QUAL2E.

Integration of a Distributed Hydrologic Model within GRASS GIS June 2000–February 2001
Voluntary Service to the GRASS GIS Community

I developed GRASS GIS hydrologic analysis modules for a hydrologic model called TOPMODEL ([r.topmodel](#) and [r.topidx](#)). These modules improved the efficiency of distributed hydrologic modeling and motivated the development of the TOPMODEL R extension and SAGA GIS module, which directly use the code of the GRASS GIS modules.

Development of a Graphical User Interface (GUI) for the Unsteady/Uncertainty Water Quality Model February 2001

I developed a GUI system for a water quality model written in FORTRAN. This system visualizes the output of the model and provides user interactivity.

GRASS GIS Development Project June 2000–Present
Voluntary Service to the GRASS GIS Community

My role in the GRASS GIS team includes hydrologic modeling (TOPMODEL modules), DXF modules, support for modern fonts, bug fixing, etc. For more than 17 years, I have contributed a lot of code to the GRASS GIS community. Some highlights include:

- Developed a georectification module ([i.gcp](#)).
- Developed hydrologic modules ([r.lfp](#), [v.lfp](#), [r.wateroutlet.lessmem](#)).
- Developed general modules that manage data base element files using a search pattern ([g.list](#), [g.remove](#)).
- Rewrote and improved the DXF import module to support 3D geometry importing ([v.in.dxf](#)).
- Developed a display module for vector fonts and enabled the use of non-Latin characters ([d.text.freetype](#), later merged to [d.text](#)).
- Developed the inter-process communication (IPC) messaging X-Window display driver (XDRIVER/IPC) based on an outdated code base to better support more systems.
- Maintained GRASS binary distributions for MS-Windows (MS-Windows native version and Cygwin version).
- Contributed to porting the engine from UNIX platforms to MS-Windows Cygwin environments.
- Managed porting to BSD UNIX platforms.

Consulting Projects

September 2008–September 2017

- 2-Dimensional Hydrologic & Hydraulic Modeling for Northwest Florida Water Management District
- Dam Break Analysis for Bartow and Cobb Counties, Georgia
- Stormwater System Assessment for Gwinnett County, Georgia
- Instream Flow Decision Support System for Colorado Water Conservation Board Department of Natural Resources
- Waterway Debris Removal System for New Jersey Department of Environmental Protection
- Virtual Flooding in Augmented Reality
- North Carolina Sea Level Rise Risk Management Study
- Hydrologic & Hydraulic Modeling and Review for FEMA Flood Insurance Studies
- FEMA GeoDam-BREACH Toolset for Simplified Dam Break Analysis
- MapViewer Desktop for Visualizing FEMA Digital Flood Insurance Rate Map Data
- ArcGIS Module for Managing Digital Flood Insurance Rate Map Panels
- Geospatial Web Applications for Disseminating Flood Modeling Information
- Development of In-House Software for Hydrologic & Hydraulic Modeling and Flood Risk Mapping

PUBLICATIONS

Journal Articles

- Cho, H., Park, J., Kim, D., 2019. Evaluation of Four GLUE Likelihood Measures and Behavior of Large Parameter Samples in ISPSO-GLUE for TOPMODEL. *Water* 11 (3), 447. doi:10.3390/w11030447.
- Cho, H., Yee, T. M., Heo J., 2018. Automated Floodway Determination using Particle Swarm Optimization. *Water* 10 (10), 1420. doi:10.3390/w10101420.
- Lee, J., Cho, H., Choi, M., Kim, D., 2017. Development of a Land Surface Model for the Soyang River Basin. *Journal of the Korean Water Resources Association* 50 (12), 837–847. doi:10.3741/JKWRA.2017.50.12.837.
- Cho, H., Bones, E., 2016. Quantification of Uncertainties in the 100-year Flow at an Ungaged Site Near a Gaged Station and Its Application in Georgia. *Journal of Hydrology* 539, 640–647. doi:10.1016/j.jhydrol.2016.05.070.
- Kim, D., Cho, H., Onof, C., Choi, M., 2016. Let-It-Rain: A Web Application for Stochastic Point Rainfall Generation at Ungaged Basins and Its Applicability in Runoff and Flood Modeling. *Stochastic Environmental Research and Risk Assessment*. doi:10.1007/s00477-016-1234-6.
- Heo, J., Yu, J., Giardino, J., Cho, H., 2015. Water Resources Response to Climate and Land-Cover Changes in a Semi-Arid Watershed, New Mexico, USA. *Terrestrial, Atmospheric and Oceanic Sciences* 26 (4), 463–474. doi:10.3319/TAO.2015.03.24.01(Hy).

- Heo, J., Yu, J., Giardino, J., Cho, H., 2014. Impacts of Climate and Land-Cover Changes on Water Resources in a Humid Subtropical Watershed: A Case Study from East Texas, USA. *Water and Environmental Journal* 29 (1), 51–60. doi:10.1111/wej.12096.
- Cho, H., Kim, D., Lee, K., 2014. Efficient Uncertainty Analysis of TOPMODEL Using Particle Swarm Optimization. *Journal of the Korean Water Resources Association* 47 (3), 285–295. doi:10.3741/JKWRA.2014.47.3.285.
- Cho, H., Olivera, F., 2014. Application of Multimodal Optimization for Uncertainty Estimation of Computationally Expensive Hydrologic Models. *Journal of Water Resources Planning and Management* 140 (3), 313–321. doi:10.1061/(ASCE)WR.1943-5452.0000330.
- Cho, H., Lee, D., Lee, K., Lee, J., Kim, D., 2013. Development and Application of a Storm Identification Algorithm that Conceptualizes Storms by Elliptical Shape. *Journal of the Korean Society of Hazard Mitigation* 13 (5), 325–335. doi:10.9798/KOSHAM.2013.13.5.325.
- Kim, D., Olivera, F., Cho, H., Lee, S., 2013. Effect of the Inter-Annual Variability of Rainfall Statistics on Stochastically Generated Rainfall Time Series: Part 2. Impact on Watershed Response Variables. *Stochastic Environmental Research and Risk Assessment*, doi:10.1007/s00477-013-0697-y.
- Kim, D., Olivera, F., Cho, H., 2013. Effect of the Inter-Annual Variability of Rainfall Statistics on Stochastically Generated Rainfall Time Series: Part 1. Impact on Peak and Extreme Rainfall Values. *Stochastic Environmental Research and Risk Assessment*, doi:10.1007/s00477-013-0696-z.
- Kim, D., Olivera, F., Cho, H., Socolofsky, S., 2013. Regionalization of the Modified Bartlett-Lewis Rectangular Pulse Stochastic Rainfall Model. *Terrestrial, Atmospheric and Oceanic Sciences* 24 (3), 421–436. doi:10.3319/TAO.2012.11.12.01(Hy).
- Cho, H., Kim, D., Olivera, F., Guikema, S. D., 2011. Enhanced Speciation in Particle Swarm Optimization for Multi-Modal Problems. *European Journal of Operational Research* 213 (1), 15–23. doi:10.1016/j.ejor.2011.02.026.
- Cho, H., Olivera, F., 2009. Effect of the Spatial Variability of Land Use, Soil Type, and Precipitation on Streamflows in Small Watersheds. *Journal of the American Water Resources Association* 45 (3), 673–686. doi:10.1111/j.1752-1688.2009.00315.x.
- Cho, H., Olivera, F., Guikema, S. D., 2008. A Derivation of the Number of Minima of the Griewank Function. *Applied Mathematics and Computation* 204 (2), 694–701. doi:10.1016/j.amc.2008.07.009.
- Olivera, F., Valenzuela, M., Srinivasan, R., Choi, J., Cho, H., Koka, S., Agrawal, A., 2006. ArcGIS-SWAT: A Geodata Model and GIS Interface for SWAT. *Journal of the American Water Resources Association* 42 (2), 295–309. doi:10.1111/j.1752-1688.2006.tb03839.x.

Conference Papers and Presentations

- Cho, H., Kim, D., Onof, C., Choi, M., October 2018. Let-It-Rain: A Web-based Stochastic Rainfall Generator. 2018 Georgia Geospatial Conference. Georgia Urban and Regional Information Systems

Association. Classic Center, Athens, GA.

- Flores, M., Cho, H., May 2018. Bridging the Gap between Esri and CRM. 2018 Esri Southeast User Conference. Esri. Charlotte Convention Center, Charlotte, NC.
- Yee, T. M., Cho, H., May 2017. Towards an Automated Floodway Optimizer for HEC-RAS. 2017 EWRI World Environmental & Water Resources Congress. Sacramento, CA.
- Lee, J., Cho, H., Kim, D., April 2017. Assessment of the Applicability of the Satellite-In-Situ Composite Soil Moisture Data Assimilation using Ensemble Kalman Filter. European Geosciences Union General Assembly 2017. Vienna, Austria.
- Cho, H., April 2017. Web-based Hydrologic Modeling System for Texas. Proceedings of 2017 Georgia Water Resources Conference. University of Georgia. Athens, GA.
- Yee, T. M., Cho, H., April 2017. Floodway Optimization Algorithm for Streams in Georgia. Proceedings of 2017 Georgia Water Resources Conference. University of Georgia. Athens, GA.
- Lee, J., Cho, H., Kim, D., August 2016. Applicability of AMSR2 Soil Moisture Data in a Real-Time Land Surface Model. HIC 2016, The 12th International Conference on Hydroinformatics—Smart Water for the Future. Society of Smart Water Grid. Songdo ConvensiA, Incheon, Korea.
- Kim, D., Cho, H., Han, J., May 2014. Development and Validation of a Web-based Poisson Cluster Synthetic Rainfall Generator. Korean Water Resources Association Conference 2014. Korean Water Resources Association. Busan, Korea.
- Cho, H., Kim, D., March 2014. Spatiotemporal Storm Tracking for Hydrologic Modeling Using Particle Swarm Optimization. Southeastern Regional Conference 2014—Future Preparedness: Smart Technologies and Science. Korean-American Scientists and Engineers Association. Atlanta, GA.
- Cho, H., Choi, J., Demby, J., Crampton, S., Selvanathan, S., March 2013. Development of FEMA's GeoDam-BREACH Toolset for Simplified Dam Break Analysis. Virginia Water Conference 2013. Virginia Lakes and Watersheds Association. Richmond, VA.
- Sharma, D., Choi, J., Sadhu, J., Selvanathan, S., Cho, H., Logsdon, Jr., K., October 2010. Improved Visualization of Contours/Bands as Symbology Using ESRI Terrain for Flood Mapping and Engineering Analysis. The 6th Annual MAFSM Conference—New Maps, New Regs—Reducing Flood and Stormwater Impacts in Maryland. Maryland Association of Floodplain and Stormwater Managers. Linthicum, MD.
- Sadhu, J., Choi, J., Sharma, D., Selvanathan, S., Cho, H., Logsdon, Jr., K., October 2010. Overcoming Depth Grid Creation Challenges through the Use of Depth TIN/Terrain. The 6th Annual MAFSM Conference—New Maps, New Regs- Reducing Flood and Stormwater Impacts in Maryland. Maryland Association of Floodplain and Stormwater Managers. Linthicum, MD.
- Choi, J., Selvanathan, S., Sadhu, J., Sharma, D., Cho, H., October 2010. Automated Peakflow Computations Using NSS and ArcGIS. The 6th NJAFM Annual Conference—Proactive Floodplain Management: Reducing Vulnerability and Leveraging Resources. New Jersey Association for Floodplain Management. Somerset, NJ.

- Katherine, H., Logsdon, Jr., K., Cho, H., May 2010. Digital Flood Insurance Rate Map Panel Management Module. ASFPM 34th Annual National Conference—Building Blocks of Floodplain Management. Association of State Floodplain Managers. Oklahoma City, OK.
- Logsdon, Jr., K., Choi, J., Cho, H., May 2010. Layered Flood Theme and an Integrated QC Module. ASFPM 34th Annual National Conference—Building Blocks of Floodplain Management. Association of State Floodplain Managers. Oklahoma City, OK.
- Cho, H., Bedane, T., Sreetharan, M., Huang, J., October 2009. Floodplain Development for Flood Insurance Studies Using GeoTerrain. The 5th NJAFM Annual Conference: Effective Floodplain Management—Solutions Using Limited Resources. New Jersey Association for Floodplain Management. Somerset, NJ.
- Olivera, F., Cho, H., July 2007. Importance of Spatial Distribution in Small Watersheds. The 4th International Soil and Water Assessment Tool (SWAT) Conference. UNESCO-IHE. Delft, The Netherlands.
- Olivera, F., Cho, H., July 2005. Two-Step Calibration Method for SWAT. The 3rd International Soil and Water Assessment Tool (SWAT) Conference. Swiss Federal Institute for Environmental Science and Technology (Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz—EAWAG). Zürich, Switzerland.
- Olivera, F., Cho, H., April 2005. The Two-Step Calibration Method of Distributed Models. VII IAHS Scientific Assembly. International Association of Hydrologic Sciences (IAHS). Foz do Iguaçu, Brazil.
- Kim, J., Han, K., Cho, H., Choi, H., November 2001. GIS-Based Hydrological Modeling by Using GRASS. Proceedings of Korean Society of Civil Engineers, 1–4.

Other Publications

- Cho, H., In Press. Review of “GIS for Surface Water: Using the National Hydrography Dataset” by Jeff Simley. Photogrammetric Engineering & Remote Sensing.
- Han, K., Kim, S., Son, I., Baek, C., Choi, K., Cho, H., February 1999. Riverine & Lacustrine Water Quality Prediction Models (QUAL2E, WASP, etc.). 7th Water Resources Engineering Workshop Manual. The Korea Water Resources Association.

INVITED TALKS

- Hydrologic Modeling Using Open Source GIS. November 13, 2018. GIS Day, Geospatial Alliance Club, University of North Georgia, Oakwood, GA.
- Web-based Hydrologic Modeling System for Texas. November 24, 2017. Hongik University, Seoul, Korea.
- Flood Insurance Study. November 24, 2017. Hongik University, Seoul, Korea.
- Development of an Automated Toolset for Simplified Dam Break Analysis. November 24, 2017. Hongik University, Seoul, Korea.

- Floodway Optimization Algorithm for Streams in Georgia. November 23, 2017. Kyungpook National University, Daegu, Korea.
- Automation of Floodway Models for HEC-RAS. Co-presentation with Yee, T. M., November 11, 2016. PDH Day, Georgia Society of Professional Engineers. Georgia Tech Student Center, Atlanta, GA.
- Let-It-Rain: A Web-based Stochastic Rainfall Generator. April 20, 2016. Dewberry, Atlanta, GA.
- Effect of Spatial Variability on a Distributed Hydrologic Model. May 6, 2015. Kyungpook National University, Daegu, Korea.
- Impacts of Climate Change and Land-Cover Changes on Water Resources—Methodology Review. May 6, 2015. Korea Institute of Civil Engineering and Building Technology, Goyang, Korea.
- Improved Search for Local Optima in Particle Swarm Optimization. May 6, 2015. Hongik University, Seoul, Korea.
- Hydrologic Modeling Using Open Source Software. April 30, 2015. Korea Water Resources Corporation, Daejeon, Korea.

PATENTS

- Kim, D., Choi, E., Cho, H., 2018. The System for Generating Stochastic Rainfall of the Poisson Cluster Based on Optimized Parameter Maps, and the Method for the Same. Registration No. 10-1818568. The Korean Intellectual Property Office.

PROFESSIONAL ACTIVITIES

Invited reviewer for

- Sustainability published by MDPI,
- Water published by MDPI,
- Smart Water published by Springer,
- the Journal of Hydroinformatics published by International Water Association Publications,
- Resources, Conservation & Recycling published by Elsevier,
- Computers and Electronics in Agriculture published by Elsevier,
- the 2017 International Conference on Water Resource and Environment,
- the Journal of Hydrologic Engineering published by the American Society of Civil Engineers,
- Applied Mathematics and Computation published by Elsevier,
- PLOS ONE published by the Public Library of Science,
- the Journal of Water Resources Planning and Management published by the American Society of Civil Engineers,
- the Journal of the Operational Research Society published by the Operational Research Society,
- the European Journal of Operational Research published by Elsevier, and

- the Journal of the American Water Resources Association published by the American Water Resources Association,

PROFESSIONAL AFFILIATIONS

- Georgia Urban and Regional Information Systems Association (Georgia URISA).
- American Society of Civil Engineers (ASCE).
- American Geophysical Union (AGU).
- American Water Resources Association (AWRA).
- Association of State Floodplain Managers, Inc. (ASFPM).
- Open Source Geospatial Foundation (OSGeo).
- GRASS GIS Development Team.

PROFESSIONAL LICENSES

- Certified Geographic Information Systems Professional, GIS Certification Institute, April 2011.
- Professional Engineer, State of Maryland, Department of Labor, Licensing and Regulation, June 2013.
- Certified Floodplain Manager, Association of State Floodplain Managers, Inc., November 2009.

GRANTS AND FELLOWSHIPS

- Department Head Fellowship, Zachry Department of Civil Engineering at Texas A&M University, August 2007.
- National Grant for Graduate Students, Korea Science and Engineering Foundation Grant M06-2003-000-10064-0, Korean Ministry of Science & Technology, July 2003.