

Qian Zhang, Ph.D.

Watershed Effectiveness Data Analyst / Assistant Research Scientist
University of Maryland Center for Environmental Science
USEPA Chesapeake Bay Program
410 Severn Avenue, Suite 112, Annapolis, MD 21403
Office: 410-267-5794; Cell: 443-509-2270
Email: qzhang@chesapeakebay.net; qzhang@umces.edu
Website: <http://www.umces.edu/qian-zhang>;
Website: <https://sites.google.com/site/qianzhangatjhu/home>

Research Interests

- Statistical analysis of water quality monitoring data sets to inform watershed management
- Improvement of statistical methods for quantification of riverine fluxes, trends, and uncertainties
- Linkage between riverine fluxes and trends to watershed changes (source inputs, land use, climate)
- Linkage between riverine fluxes and trends to estuarine processes (oxygen, chlorophyll-a, water clarity)

Education

- Ph.D.** Johns Hopkins University, **Environmental Engineering**, 2011-2016.
Advisor: Professor William P. Ball (bball@jhu.edu)
Thesis: [Quantifying Nutrient and Sediment Export from the Chesapeake Bay Watershed: Retrospective Analyses and Method Improvements](#)
- M.S.E.** Johns Hopkins University, **Applied Mathematics and Statistics**, 2013-2014.
- M.S.E.** Johns Hopkins University, **Environmental Engineering**, 2010-2011.
- B.Eng.** Nanyang Technological University, Singapore, **Environmental Engineering** (1st Class Honors), 2005-2009.

Appointments

- Assistant Research Scientist (Watershed Effectiveness Data Analyst), University of Maryland Center for Environmental Science / USEPA Chesapeake Bay Program, Annapolis, MD, 2016-present.
- Research Assistant, Department of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, MD, 2010-2016.
- Teaching Assistant, Department of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, MD, 2011-2012.
- Engineer, LBW Consultants LLP, Singapore, 2009-2010.

Skills & Expertise

- **Programming:** R, Matlab, Python
- **Computer:** Microsoft Office, ArcGIS, AutoCAD, HEC-RAS, Adobe Illustrator
- **Environment:** Chesapeake Bay, Hydrology, Watershed, Sediment, Nutrients, TMDL, Physical/Chemical Processes, Biological Processes, Contaminant Transport
- **Analytics:** Statistics, Monte Carlo, Data Mining, Machine Learning, Time Series, Modeling

Honors & Awards

- **Recipient**, Innovyze Excellence in Computational Hydraulics/Hydrology Award by American Academy of Environmental Engineers and Scientists (AAEES) [jointly selected with the Association of Environmental Engineering and Science Professors (AEESP)], 2017
- **Recipient**, Coastal & Estuarine Research Federation (CERF) Student/Early Career Travel Grant, 2017
- **Recipient**, Johns Hopkins Graduate Representatives Organization (GRO) Travel Grant, 2016
- **Research Fellow**, Maryland Water Resources Research Center (MWRRC), 2015
- **Recipient**, Geological Society of America (GSA) Student Travel Grant, 2015
- **Research Fellow**, Maryland Sea Grant Graduate (MDSG), 2013 - 2014
- **Graduate Student Scholar**, Community Surface Dynamics Modeling System (CSDMS), 2013
- **3rd Place Winner**, Chesapeake Water Environment Association (CWEA) Student Paper Competition, 2012
- **Awardee**, Dean's List Award, Nanyang Technological University (NTU), Singapore, 2008 - 2009
- **Awardee**, Dean's List Award, Nanyang Technological University (NTU), Singapore, 2007 - 2008
- **Winner**, Singapore National Concrete Canoe Competition (SNCCC), 2008
- **Undergraduate Fellow**, Ministry of Education (MOE), Singapore, 2005 - 2009

Journal Publications

- Zhang, Q.** R.R. Murphy, R. Tian, M.K. Forsyth, E.M. Trentacoste, J. Keisman, and P.J. Tango. 2018. "Chesapeake Bay's water quality condition has been recovering: Insights from a multimetric indicator assessment of thirty years of tidal monitoring data", *Science of the Total Environment*, 637-638: 1617-1625, [doi: 10.1016/j.scitotenv.2018.05.025](https://doi.org/10.1016/j.scitotenv.2018.05.025).
- Zhang, Q.**, C.J. Harman, and J.W. Kirchner. 2018. "Evaluation of statistical methods for quantifying fractal scaling in water quality time series with irregular sampling", *Hydrology and Earth System Sciences*, 22(2): 1175-1192, [doi: 10.5194/hess-22-1175-2018](https://doi.org/10.5194/hess-22-1175-2018).
- Zhang, Q.** and J.D. Blomquist. 2018. "Watershed export of fine sediment, organic carbon, and chlorophyll-a to Chesapeake Bay: Spatial and temporal patterns in 1984–2016", *Science of the Total Environment*, 619–620: 1066–1078, [doi: 10.1016/j.scitotenv.2017.10.279](https://doi.org/10.1016/j.scitotenv.2017.10.279).
- Zhang, Q.** 2018. "Synthesis of nutrient and sediment export patterns in the Chesapeake Bay watershed: Complex and non-stationary concentration-discharge relationships", *Science of the Total Environment*, 618: 1268-1283, [doi: 10.1016/j.scitotenv.2017.09.221](https://doi.org/10.1016/j.scitotenv.2017.09.221).
- Zhang, Q.** and W.P. Ball. 2017. "Improving Riverine Constituent Concentration and Flux Estimation by Accounting for Antecedent Discharge Conditions", *Journal of Hydrology*, 547: 387–402, [doi: 10.1016/j.jhydrol.2016.12.052](https://doi.org/10.1016/j.jhydrol.2016.12.052).
- Zhang, Q.**, C.J. Harman, and W.P. Ball. 2016. "An Improved Method for Interpretation of Riverine Concentration-Discharge Relationships Indicates Long-Term Shifts in Reservoir Sediment Trapping", *Geophysical Research Letters*, 43: 10215–10224, [doi: 10.1002/2016GL069945](https://doi.org/10.1002/2016GL069945).
- Zhang, Q.**, R.M. Hirsch, and W.P. Ball. 2016. "Long-Term Changes in Sediment and Nutrient Delivery from Conowingo Dam to Chesapeake Bay: Effects of Reservoir Filling", *Environmental Science & Technology*, 50(4): 1877-1886, [doi: 10.1021/acs.est.5b04073](https://doi.org/10.1021/acs.est.5b04073).
- Zhang, Q.**, W.P. Ball., and D.L. Moyer. 2016. "Decadal-scale Export of Nitrogen, Phosphorus, and Sediment from the Susquehanna River Basin, USA: Analysis and Synthesis of Temporal and Spatial Patterns", *Science of the Total Environment*, 563-564: 1016-1029, [doi: 10.1016/j.scitotenv.2016.03.104](https://doi.org/10.1016/j.scitotenv.2016.03.104).
- Zhang, Q.**, D.C. Brady, W.R. Boynton, and W.P. Ball. 2015. "Long-term Trends of Nutrients and Sediment from the Non-tidal Chesapeake Watershed: An Assessment of Progress by River and Season", *Journal of the American Water Resources Association*, 51(6): 1534-1555, [doi: 10.1111/1752-1688.12327](https://doi.org/10.1111/1752-1688.12327).

Zhang, Q., D.C. Brady, and W.P. Ball, 2013. “Long-term Seasonal Trends of Nitrogen, Phosphorus, and Suspended Sediment Load from the Non-tidal Susquehanna River Basin to Chesapeake Bay”, *Science of the Total Environment*, 452-453: 208-221, [doi: 10.1016/j.scitotenv.2013.02.012](https://doi.org/10.1016/j.scitotenv.2013.02.012).

Journal Manuscripts under Review

Zhang, Q., M. Forsyth, R. Murphy, R. Tian, E. Trentacoste, J. Keisman, and P. Tango. “Dissolved oxygen criterion attainment in Chesapeake Bay and its tidal tributaries in 1985-2016: A new framework for assessing temporal and spatial non-attainment patterns”.

Testa, J. M., V. Lyubchich, and **Q. Zhang**. “Patterns and trends in Secchi disk depth over three decades in a large coastal plain estuary”.

Zhang, Q., W.P. Ball, and K. Staver. “What Can We Learn from Limited Data? Statistical Inferences and Uncertainties of Riverine Fluxes and Trends with Limited Sampling of Extreme-Flow Events”.

Data Publications

Zhang, Q., C.J. Harman, and W.P. Ball. 2016. “Data associated with An Improved Method for Interpretation of Riverine Concentration-Discharge Relationships Indicates Long-Term Shifts in Reservoir Sediment Trapping”, *Johns Hopkins University Data Archive*, dx.doi.org/10.7281/T18G8HM0.

Zhang, Q. and W.P. Ball. 2016. “Data associated with Decadal-scale export of nitrogen, phosphorus, and sediment from the Susquehanna River basin, USA: Analysis and synthesis of temporal and spatial patterns”, *Johns Hopkins University Data Archive*, dx.doi.org/10.7281/T1QN64NW.

Zhang, Q. and W.P. Ball. 2014. “Data associated with Long-term seasonal trends of nutrients and sediment from the nontidal Chesapeake Bay Watershed”, *Johns Hopkins University Data Archive*, dx.doi.org/10.7281/T1VD6WC7.

Zhang, Q. and W.P. Ball. 2014. “Data associated with Long-term seasonal trends of nitrogen, phosphorus, and suspended sediment load from the non-tidal Susquehanna River Basin to Chesapeake Bay”, *Johns Hopkins University Data Archive*, dx.doi.org/10.7281/T1KW5CX5.

Conference Sessions

Co-convener, session “Aquatic Ecosystem Responses to Human Disturbances and Management: A Comparative Discussion of Inland and Coastal Ecosystems and Their Contributing Watersheds” in *American Geophysical Union (AGU) Fall Meeting*, Washington, D.C., December 10-14, 2018.

Co-convener, session “Modeling and Assessment of Complex Watershed-River-Estuary Systems: Chesapeake Bay as a Case Study of Ecosystem Restoration and Management” in *American Water Resources Association (AWRA) Annual Conference*, Baltimore, MD, November 4-8, 2018.

Co-convener, session “Chesapeake Bay Water Quality Standards Criteria Assessment for Dissolved Oxygen, Water Clarity, and Chlorophyll-a: Method Development and Implementation for Ecosystem Management” in *American Water Resources Association (AWRA) Annual Conference*, Baltimore, MD, November 4-8, 2018.

Co-convener, session “Explaining conditions and trends: Integrated monitoring and modeling approaches to describe water-quality change in the watershed and estuary” in *Chesapeake Research and Modeling Symposium*, Annapolis, MD, June 12-14, 2018.

Conference Presentations

Zhang, Q. 2018. “Synthesis of decadal-scale patterns of nutrient and sediment delivery from Susquehanna River to Chesapeake Bay: What have we learned from long-term monitoring records?” **invited** oral presentation at *Chesapeake Biological Laboratory Distinguished Scholar Seminar Series*, Solomons, MD, March 7, 2018.

- Zhang, Q.**, R. Tian, and P. Tango. 2017. “Status and Trends of the Chesapeake Bay Water Quality Standards Criteria Attainment”, oral presentation at *Maryland Water Monitoring Council Annual Conference*, Linthicum Heights, MD, December 8, 2017.
- Zhang, Q.** and J.D. Blomquist. 2017. “Quantification of Fine Sediment, Organic Carbon, and Chlorophyll-a Export from Major Tributaries to Chesapeake Bay”, oral presentation at the *Coastal & Estuarine Research Federation (CERF) Biennial Conference*, Providence, RI, November 5-9, 2017.
- Ball, W.P. and **Q. Zhang**. 2017. “Net Deposition behind Conowingo Dam under Different Flow Conditions: Trends and Uncertainties”, poster presentation at the *Coastal & Estuarine Research Federation (CERF) Biennial Conference*, Providence, RI, November 5-9, 2017.
- Zhang, Q.** and W.P. Ball. 2017. “Synthesis of Long-term Patterns of Nutrient and Sediment Export from the Chesapeake Bay Watershed”, **invited** oral presentation at the *International Association for Great Lakes Research (IAGLR) Annual Conference*, Detroit, MI, May 18, 2017.
- Zhang, Q.** 2017. “Evaluation of Results from the HDR Conowingo Sediment Transport Model”, oral presentation at *Chesapeake Bay Program Modeling Quarterly Review Meeting*, Annapolis, MD, February 14, 2017.
- Zhang, Q.** and J.D. Blomquist. 2017. “Long-term Riverine Inputs from Major Tributaries to Chesapeake Bay Relevant to Water Clarity”, oral presentation at *Chesapeake Bay Program's Scientific and Technical Advisory Committee (STAC) Workshop: Understanding and Explaining 30+ Years of Water Clarity Trends in the Bay's Tidal Waters*, Solomons, MD, February 6-7, 2017.
- Zhang, Q.**, C.J. Harman, and W.P. Ball. 2016. “An Improved Method for Interpretation of Concentration-Discharge Relationships in Riverine Water-Quality Data”, poster presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12-16, 2016.
- W.P. Ball and **Q. Zhang**. 2016. “Improving Riverine Constituent Concentration and Flux Estimation by Accounting for Antecedent Discharge Conditions”, oral presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 12-16, 2016.
- Zhang, Q.** 2016. “Decadal-Scale Changes in Sediment and Nutrient Delivery from Conowingo Reservoir to Chesapeake Bay: Statistical Evaluations of Reservoir Trapping Using Long-Term Monitoring Data”, **invited** oral presentation at *Chesapeake Bay Program Scientific, Technical Assessment and Reporting (STAR) Team Meeting*, Annapolis, MD, October 27, 2016.
- Zhang, Q.**, R.M. Hirsch, and W.P. Ball. 2016. “Temporal Changes in Net Deposition of Sediment and Nutrients behind Conowingo Dam under Different Flow Conditions: Statistical Evaluations of Monitoring Data between 1987 and 2013”, oral presentation at *Chesapeake Modeling Symposium*, Williamsburg, VA, June 1-2, 2016.
- Zhang, Q.**, D.C. Brady, W.R. Boynton, and W.P. Ball. 2016. “Nutrient and Sediment Trends from the Nontidal Chesapeake Bay Watershed: Synthesis of Progress by Season for the Nine Major Tributaries”, oral presentation at *Chesapeake Modeling Symposium*, Williamsburg, VA, June 1-2, 2016.
- Zhang, Q.**, R.M. Hirsch, and W.P. Ball. 2016. “Effects of Reservoir Filling on Sediment and Nutrient Delivery from Susquehanna River to Chesapeake Bay: Input-Output Analyses based on Long-Term Monitoring”, **invited** oral presentation at *U.S. Geological Survey MD-DE-DC Water Science Center Seminars*, Baltimore, MD, April 12, 2016.
- Zhang, Q.**, R.M. Hirsch, and W.P. Ball. 2016. “Effects of Reservoir Filling on Sediment and Nutrient Removal in the Lower Susquehanna River Reservoir System: An Input-Output Analysis based on Long-Term Monitoring”, **invited** oral presentation at *Chesapeake Bay Program's Scientific and Technical Advisory Committee (STAC) Workshop: Conowingo Infill Influence on Chesapeake Water Quality*, Annapolis, MD, January 13-14, 2016.
- Zhang, Q.** and W.P. Ball. 2015. “Non-stationary Concentration-Discharge Relationships for Nitrogen, Phosphorus, and Sediment for Nine Major Tributaries of the Chesapeake Bay”, oral presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18, 2015.
- W.P. Ball, **Q. Zhang**, and R.M. Hirsch. 2015. “Effects of Reservoir Filling on Sediment and Nutrient Removal in the Lower Susquehanna River Reservoir: An Input-Output Analysis Based on Long-Term Monitoring”, oral presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18, 2015.

- Zhang, Q.** and W.P. Ball. 2015. “Concentration-Discharge Relationships for Nutrients and Sediment in Major Tributaries to Chesapeake Bay: Typical Patterns and Non-Stationarity”, poster presentation at *Maryland Water Monitoring Council Annual Conference*, Linthicum Heights, MD, November 13, 2015.
- Zhang, Q.**, W.P. Ball., and D.L. Moyer. 2015. “Long-Term Export of Nitrogen, Phosphorus, and Sediment in the Susquehanna River Basin: Analysis of Decadal-Scale Trends and Sub-Basin Mass Balances”, oral presentation at *Geological Society of America Annual Meeting*, Baltimore, MD, November 1-4, 2015.
- Ball, W.P., **Q. Zhang**, D.C. Brady, and W.R. Boynton. 2015. “Long-term Trends of Nutrients and Sediment from the Non-tidal Chesapeake Watershed: An Assessment of Progress by River and Season”, oral presentation at *Association of Environmental Engineering and Science Professors Annual Conference*, New Haven, CT, June 13-16, 2015.
- Zhang, Q.**, C.J. Harman, and W.P. Ball. 2014. “Evaluation of Methods for Estimating Long-Range Dependence in Water Quality Time Series with Missing Data and Irregular Sampling”, poster presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 15-19, 2014.
- Ball, W.P., **Q. Zhang**, D.C. Brady, and W.R. Boynton. 2014. “Long-Term Loads of Nutrients and Sediment from Non-Tidal Regions of the Chesapeake Bay Watershed: An Assessment of Seasonal Trends and Progress”, poster presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 15-19, 2014.
- Wei, H., D. Ha, **Q. Zhang**, and W.P. Ball. 2014. “Effectiveness of Nitrogen Assimilation in the Non-Tidal Chesapeake Bay Watershed: Evaluations Based on Thirty Years of Data”, poster presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA, December 15-19, 2014.
- Ha, D., H. Wei, **Q. Zhang**, and W.P. Ball. 2014. Retrospective Analysis of Sediment-associated Phosphorus Concentration in the Non-Tidal Chesapeake Bay Watershed, poster presentation at *Maryland Water Monitoring Council Annual Conference*, Linthicum Heights, MD, November 21, 2014.
- Ha, D., H. Wei, **Q. Zhang**, and W.P. Ball. 2014. Nitrogen Source Input from the Non-Tidal Chesapeake Bay Watershed and Output in the Major Rivers: Evaluation of Changes Based on Long-term Data, poster presentation at *Maryland Water Monitoring Council Annual Conference*, Linthicum Heights, MD, November 21, 2014.
- Wei, H., D. Ha, **Q. Zhang**, and W.P. Ball. 2014. “Retrospective Analysis of Phosphorus Source Input and Riverine Output in the Chesapeake Bay Watershed”, poster presentation at *Maryland Water Monitoring Council Annual Conference*, Linthicum Heights, MD, November 21, 2014.
- Zhang, Q.** and W.P. Ball. 2014. “Decadal-scale Trends of Nutrients and Sediment from the Non-tidal Chesapeake Bay Watershed: Are We Making of Progress in Loading Reduction”, poster presentation at *Gordon Research Conference - Environmental Sciences: Water*, Holderness, NH, June 22-27, 2014.
- Zhang, Q.** and W.P. Ball. 2014. “Nutrient and Sediment Delivery from the Susquehanna River to Chesapeake Bay: Long-term Changes in Loading Trend and Reservoir Sedimentation”, oral presentation at *Chesapeake Modeling Symposium*, Annapolis, MD, May 28-29, 2014.
- Zhang, Q.** and W.P. Ball. 2014. “Long-term trends and mass-balance of nutrient and sediment loadings in the Lower Susquehanna River Watershed”, invited oral presentation at *Chesapeake Bay Program Modeling Quarterly Review Meeting*, Annapolis, MD, January 7, 2014.
- Zhang, Q.** and W.P. Ball. 2013. “Long-term Seasonal Trends of Nutrients and Sediment from the Non-tidal Chesapeake Bay Watershed: An Assessment of Progress in Loading Reduction”, oral presentation at *American Water Resources Association Annual Conference*, Portland, OR, November 4-7, 2013.
- Zhang, Q.** and W.P. Ball. 2013. “Nutrient and Sediment Loads Delivered through the Conowingo Reservoir”, invited oral presentation at *Maryland Department of Natural Resources Conowingo Dam Sediment Load Meeting*, Annapolis, MD, August 19, 2013.
- Zhang, Q.**, D.C. Brady, and W.P. Ball. 2013. “Application of a USGS Statistical Tool (WRTDS) toward Assessing Watershed Management and Reservoir Function in the Susquehanna River Basin”, poster presentation at *Association of Environmental Engineering and Science Professors 50th Anniversary Conference*, Golden, CO, July 14-16, 2013.

Zhang, Q., D.C. Brady, and W.P. Ball. 2013. “Long-term Seasonal Trends of Nitrogen, Phosphorus, and Suspended Sediment Load from the Non-tidal Susquehanna River Basin to Chesapeake Bay”, poster presentation at *Community Surface Dynamics Modeling System Annual Meeting*, Boulder, CO, March 23-25, 2013.

Zhang, Q. and W.P. Ball. 2012. “Long-term Seasonal Nutrient Trends for the Non-tidal Portions of the Major Tributaries to Chesapeake Bay”, poster presentation at *Chesapeake Modeling Symposium*, Annapolis, MD, May 21-22, 2012.

Professional Services

Reviewer, Geophysical Research Letters.

Reviewer, Water Resources Research.

Reviewer, Hydrology and Earth System Sciences.

Reviewer, Science of the Total Environment.

Reviewer, Journal of Hydrology.

Reviewer, Biogeosciences.

Reviewer, Estuarine, Coastal and Shelf Science.

Reviewer, Hydrological Sciences Journal.

Reviewer, Agricultural and Forest Meteorology.

Reviewer, Journal of the American Water Resources Association.

Reviewer, Statistics and Computing.

Reviewer, Journal of Hydro-environment Research.

Reviewer, Environmental Science and Pollution Research.

Reviewer, Air, Soil and Water Research.

Reviewer, U.S. Geological Survey Scientific Investigations Report.

Reviewer, International Conference on Water Resource and Environment.

Synergistic Activities

Member, Coastal & Estuarine Research Federation (CERF), 2017-present.

Member, International Association for Great Lakes Research (IAGLR), 2017-present.

Member, Geological Society of America (GSA), 2015-present.

Member, American Geophysical Union (AGU), 2014-present.

Member, American Water Resources Association (AWRA), 2013-present.

Member, Association of Environmental Engineering and Science Professors (AEESP), 2013-present.

Member, American Water Works Association (AWWA), 2012-present.

Member, Community Surface Dynamics Modeling System (CSDMS), 2012-present.

Media Reports

The Washington Post, *A dam could derail the Chesapeake Bay cleanup*. [{Link}](#)

Bloomberg BNA, *First Move: Industry Eyes Permitting Program Changes • Safety Board Recommendations • Chesapeake Bay Cleanup*. [{Link}](#)

The Chesapeake Quarterly, *A Bay in a box: How scientific findings could help a computer model keep the Chesapeake Bay on its pollution diet*. [{Link}](#)

Maryland Sea Grant, *Modeling studies provide new insights on dam’s influence on water quality in Chesapeake Bay*. [{Link}](#)

Maryland Sea Grant Blog, *Conowingo Dam traps less sediment, a challenge to bay restoration*. [{Link}](#)
UMCES News, *Qian Zhang wins national award for research on Chesapeake Bay*. [{Link}](#)
JHU Engineering News, *Qian Zhang received an award from the AAEEES*. [{Link}](#)
AAEES Newsletter, *2017 Innovyze Excellence in Computational Hydraulics/Hydrology Award*. [{Link}](#)
TenLinks News, *Research scientist wins AAEEES 2017 Innovyze Excellence Award*. [{Link}](#)