

Habibollah Fakhraei

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EXPERIENCE SUMMARY

Biogeochemistry

Application of a comprehensive biogeochemical model to the northeastern U.S. and southern Appalachian

Aquatic Chemistry

Characterizing aluminum binding and acid/base behavior of organic acids in northeastern U.S.

Optimization

Developing an optimization model to fit equilibrium constant of chemical equilibrium models

Geostatistic

Developing spatial patterns for atmospheric deposition using multiple regression models, Kriging techniques and GIS

AREAS OF INTEREST

Biogeochemistry, aquatic chemistry, surface complexation, TMDLs of acidity, numerical optimization, sensitivity/uncertainty analysis, geostatistical analysis, data mining, GIS.

EDUCATION

PhD candidate - Environmental Engineering

Syracuse University, Syracuse, NY, USA

Thesis Title: Developing TMDL of acidity for impaired surface waters in Adirondack and Great Smoky Mountains National Park (GRSM), using PnET-BGC Model

2009 *Master of science - Environmental Engineering*

Shiraz University, Shiraz, Iran

Thesis Title: Self-assimilating capacity of the Kor and Sivand Rivers and TMDL of BOD for pollution sources

2003 *Bachelor of Science - Civil Engineering*

Shahid Bahonar University of Kerman, Kerman, Iran

RESEARCH & WORK EXPERIENCE

- Aug. 2013 - *Center for Environmental Systems Engineering at Syracuse University*
Present Perform research in: Modeling recovery of sensitive aquatic resources at Great Smoky Mountains National Park from the effects of acidic deposition, sensitivity and uncertainty analysis.
- Aug. 2013 - *Center for Environmental Systems Engineering at Syracuse University*
Present Perform research in: Post-processing CMAQ model and GIS and data analysis to evaluate effect of U.S. power plant carbon standards and clean air on health and ecosystem co-benefits.
- May 2013 - *Center for Environmental Systems Engineering at Syracuse University*
Aug. 2013 Perform research in: Characterizing proton and aluminum binding behavior of natural organic acids in northeastern U.S
- Jan 2012 - *Center for Environmental Systems Engineering at Syracuse University*
Jan 2013 Perform research in: Developing Total Maximum Daily Load (TMDL) for acid impaired lakes in the Adirondack Park
- May 2011 - *Department of Civil and Environmental Engineering at Syracuse University*
Aug. 2011 Perform research in: i) Field sampling and laboratory analysis of SO_4^{2-} adsorption capacity of soil in Catskill region, NY. ii) Laboratory analysis of pH dependency of precipitation rate of CaCO_3 to reduce Catskill Aqueduct leakage.
- Feb. 2009 - *Department of Civil and Environmental Engineering at Shiraz University*
Aug. 2010 Perform research in: Field scale pilot study of leachate treatment for Shiraz City landfill.

TEACHING EXPERIENCE

Teaching Assistant at Civil and Environmental Engineering Department,
Syracuse University:

- Spring 2013 *Civil and Environmental Engineering Design*
Fall 2011 *Environmental Chemistry and Analysis*
Fall 2011 *Treatment Processes in Environmental Engineering*
Spring 2011 *Water Resources Engineering*
Fall 2010 *Introduction to Engineering and Computer Science*
Fall 2010 *Treatment Processes in Environmental Engineering*

PUBLICATIONS

Journal Articles

Fakhraei, H., Driscoll, C.T., Selvendiran P., DePinto J.V., Bloomfield J., Quinn S., Rowell C., (2014) “*Development of a total maximum daily load (TMDL) for acid-impaired lakes in the Adirondack region of New York*” Atmospheric Environment 95:277-287.

Fakhraei, H., Driscoll, C.T. (2015) “*Proton and aluminum binding properties of organic acids in surface waters of the Northeastern, USA.*” Environmental Science & Technology, DOI:10.1021/es504024u .

Driscoll, C.T, Buonocore, J., Levy, J.I., Lambert, K.F., Burtraw, D., Reid, S.B., **Fakhraei, H.**, Schwartz, J. (2015) “*U.S. Power Plant Carbon Standards and Clean Air and Health Co-benefits*”, Nature Climate Change, 5, 535–540, doi:10.1038/nclimate2598.

Driscoll, C.T., **Fakhraei, H.**, Johnson, C.E., Driscoll K.M. (2014) “*Response of Adirondack ecosystems to decreases in acid deposition: a roadmap to recovery?*”, In Preparation.

Technical Reports

Technical Analysis “*Total Maximum Daily Load (TMDL) for Acid Impaired Lakes in the Adirondack Park*” Prepared by Syracuse University (Driscoll, C.T., **Fakhraei, H.**) and LimnoTech (Selvendiran P., DePinto J.V.) Under Contract to Battelle, Duxbury MA, prepared for NYSDEC, USEPA Region 2, September 2013.

Driscoll, C.T, Buonocore, J., Reid, S., **Fakhraei, H.**, Lambert, K.F. (2014) “*Co-benefits of Carbon Standards Part 1: Air Pollution Changes under Different 111d Options for Existing Power Plants*”, Syracuse University, Syracuse, NY and Harvard University, Cambridge, MA. A report of the Science Policy Exchange. 34 pp.

TECHNICAL PRESENTATIONS

Fakhraei, H., Karimi-Jashni A., (2009) “*Use of the water quality index as a simple pollution indicator for Kor and Sivand Rivers*”, 8th International Congress on Civil Engineering Shiraz University, Shiraz, Iran, May 11-13,2009.

Fakhraei, H., Karimi-Jashni A., (2009) “*Study of pollutants and participation of pollution sources at Kor River*”, 3rd National Conference on World Environment Day, Tehran University, Tehran, Iran, June,2009.

Fakhraei, H., Karimi-Jashni A., (2010) “*A water quality model of Kor River using QUAL2K*”, ASCE/EWRI, 3rd International Perspective on Current & Future State of Water resources & the Environment, Chennai, India, Jan 5-7,2010.

Fakhraei, H., Karimi-Jashni A., (2010) “*Assessment of weirs in dissolve oxygen (DO) level in Kor River*”, 5th National Congress on Civil Engineering, Ferdowsi University of Mashhad, Mashhad, Iran, May 4-6, 2010.

Fakhraei, H., Karimi-Jashni A., (2010) “*Study of pollutants and participation of pollution sources in Sivand River*”, 5th National Congress on Civil Engineering, Ferdowsi University of Mashhad, Mashhad, Iran, May 4- 6, 2010.

Fakhraei, H., Karimi-Jashni A., (2011) “*Using water quality index as a simple pollution indicator for Kor and Sivand Rivers*” Nunan Lecture and Research Day, poster presentation, L.C. Smith College of Engineering, Syracuse University, Syracuse, NY, April 8, 2011.

Fakhraei, H., Karimi-Jashni A., (2012) “*Using Qual2k Model for developing TMDL of BOD for Kor and Sivand Rivers*” presentation given at the Civil and Environmental Engineering Department Seminar Series at Syracuse University, Syracuse, NY, February 3, 2012.

Fakhraei, H., Driscoll, C.T. (2012) “*Modeling the response of surface waters in the Adirondacks region to acid deposition*” presentation given at the Civil and Environmental Engineering Department Seminar Series at Syracuse University, Syracuse, NY, October 22, 2012.

Fakhraei, H., Driscoll, C.T. (2012) “*Applying PnET-BGC Model for estimating acidity's TMDL of Brook Trout Lake at Adirondacks, NY.*” poster presentation given at the 9th Adirondack Annual Research Forum, Old Forge, NY, March 7-8, 2012.

Fakhraei, H., Driscoll, C.T. (2012) “*Simulating the response of eight forested lake-watersheds in the Adirondacks region of New York to acid deposition.*” National Atmospheric Deposition Program (NADP) Annual Meeting and Scientific Symposium, Oral Presentation, Portland, ME, October 2-5, 2012.

Fakhraei, H., Driscoll, C.T. (2013) “*Characterization of an organic acid analog model in Adirondack, New York, surface waters*” American Geophysical Union (AGU), 2013 Fall Meeting, poster presentation, San Francisco, CA, December 9-13, 2013.

Fakhraei, H., Driscoll, C.T., Selvendiran P., DePinto J.V., Bloomfield J., Quinn S., (2013) “*How much must acid deposition decrease to restore acid-impaired lakes in the Adirondacks?*” Adirondack Research Consortium (ARC), 20th Annual Conference on the Adirondacks, oral presentation, Lake Placid, NY, May 15-16, 2013.

Fakhraei, H., Driscoll, C.T., Selvendiran P., DePinto J.V., Bloomfield J., Quinn S., (2013) “*Total Maximum Daily Load of acidity for impaired lakes in the Adirondack region of New York*” Northeastern Ecosystem Research Cooperative (NERC), 2013 Conference, poster presentation, Saratoga Springs, NY, March 19-20, 2013.

Fakhraei, H., (2013) Participated in “PnET modeling workshop” and given a short talk on “*Sensitivity analysis of PnET-BGC Model*”, University of New Hampshire, Durham, NH, May 20-22, 2013.

Fakhraei, H., Driscoll, C.T., Selvendiran P., DePinto J.V., Bloomfield J., Quinn S., (2013) “*Determining Total Maximum Daily Loads of Acidity for Adirondack New York Lakes, U.S.*” Nunan Lecture and Research Day, Poster Presentation, L.C. Smith College of Engineering, Syracuse University, Syracuse, NY, March 7, 2013.

Fakhraei, H., Driscoll, C.T., Moore, S., Kulp, M., Schwartz, J.S. (2014) “*Critical Loads for nitrogen and sulfur atmospheric deposition in the Great Smoky Mountains National Park, USA*”, International Union of Forest Research Organization (IUFRO) XXIV World Congress, Oral Presentation, Salt Lake City, UT, October 5-11, 2014.

Fakhraei, H., Driscoll, C.T. (2014) “*An organic acid analog model to characterize dissolved organic matter at Hubbard Brook, NH*”, 51st Annual Hubbard Brook Cooperators' Meeting, Oral Presentation, Hubbard Brook, NH, July 9, 2014.

Fakhraei, H., Driscoll, C.T. (2014) “*Quantifying acid-base properties of organic acids in Adirondacks lakes*” 15th annual Onondaga Lake Scientific Forum (OLSF), Poster Presentation, Syracuse, NY, March 28, 2014.

Fakhraei, H., Driscoll, C.T., Johnson, C.E. (2014) “*Relations between soil chemical properties and their spatial patterns in acid forest soils of eastern USA*” Nunan Lecture and Research Day, Poster Presentation, L.C. Smith College of Engineering, Syracuse University, Syracuse, NY, April 3, 2014.

Fakhraei, H., Driscoll, C.T., Kulp M., Renfro J., Schwartz J.S. (2014) “*How acid-base chemistry of streams in Smoky Mountains is responding to control on acid deposition*” presentation given at the Civil and Environmental Engineering Department Seminar Series at Syracuse University, Syracuse, NY, September 30, 2014.

Driscoll, C.T., Johnson, C.E., **Fakhraei, H.**, Campbell J., Battles J., Blum J., Fahey T., Likens G. (2015) “*Effects of changing atmospheric deposition on the structure and function of the Northern Forest: long-term measurements, experiments and future model projections from the Hubbard Brook Experimental Forest, New Hampshire, USA*”, Ecological Society of America (ESA) Annual Meeting, Baltimore, MD, August 9-14, 2015.

Driscoll, C.T, Buonocore, J., Levy, J.I., Lambert, K.F., Burtraw, D., Reid, S.B., **Fakhraei, H.**, Schwartz, J. (2015) “*Effects of changing atmospheric deposition on the structure and function of the Northern Forest: long-term measurements, experiments and future model projections from the Hubbard Brook Experimental Forest, New Hampshire, USA*”, Ecological Society of America (ESA) Annual Meeting, Baltimore, MD, August 9-14, 2015.

Driscoll, C.T, Buonocore, J., Levy, J.I., Lambert, K.F., Burtraw, D., Reid, S.B., **Fakhraei, H.**, Schwartz, J. (2015) “*U.S. Power Plant Carbon Standards and the Potential for Clean Air, Human Health and Ecosystem Co-benefits*”, Ecological Society of America (ESA) Annual Meeting, Baltimore, MD, August 9-14, 2015.