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EXPERIENCE:

Senior Scientist, Badger Technical Services, Environmental Laboratory, Engineer Research and Development Center (ERDC**)**, Vicksburg, Mississippi (2002 - Present)

- Perform applied research to support the development and enhancement of the watershed and water quality models sponsored by the USACE. Incorporate basic research from the published scientific literatures and numerical techniques to create tools and methodologies to solve water resources problems. Research activities include:
  - Development of aquatic nutrient simulation modules (NSM-I, -II, -III) in HEC-RAS for simulating eutrophication.
  - Development of distributed contaminant transport, transformation and fate (CTT&F) submodel for simulating the watershed behavior of distributed sources.
  - Development of raster based landscape model for simulating hydrology and the effects and risks of the spill or release of toxic chemicals and materials.
  - Development and validation of linked HSPF - HEC-RAS, SWAT – HEC-RAS modeling technologies.
  - Development and integration of new water quality kinetics and DiToro's sediment diagenesis module for CE-QUAL-W2 (W2V3.9).
  - Support of the development of multimedia transport/fate/risk assessment models in TREECS.
- Apply watershed and water quality models for TMDL, integrated watershed, water quality, ecosystem restoration, and environmental sustainability projects. These activities include:
  - Application of SWAT model to the entire Upper Mississippi River Basin (UMRB) and Missouri River Basin (MORB) for evaluating environmental impacts of large-scale biofuel energy production and sustainable development in biofuel feedstock production sponsored by the DOE.
  - Application of HEC-HMS to the Russian River watershed.
  - Application of MIKE-SHE to the Santa Margarita River watershed.
  - Application of HEC-RAS-NSM to the Lower Minnesota River.
  - Application of CE-QUAL-W2 (W2V3.9) to the Lower Minnesota River.
  - Application of CH3D/CE-QUA-ICM eutrophication model to the Potomac River.
  - Development and application of CE-QUA-ICM bioenergetics model to entire Chesapeake Bay.
  - Application of EFDC/CE-QUA-ICM model to the Lower St. Johns River.
  - Application of linked HSPF and HEC-RAS to the Foot Hood installation.

- Provide technical review and support. These activities include:
  - City of Richmond's SWMM model involving the delineation of flood plains and the evaluation of potential flood hazards for the FEMA.
  - Sacramento-San Joaquin River Delta 3D EFDC water quality model for the Sacramento District.
  - Minnehaha Creek Watershed SWMM modeling for the St. Paul District and Minnehaha Creek Watershed District.

Principal Environmental Systems Modeler, Concurrent Technologies Corporation, Bremerton, Washington (2001 - 2002)

- Technical lead for application and development of HSPF and SWMM models and GIS-based approach in support of the U.S. Navy ENVVEST's TMDL project

Project Scientist & CSMoS Interim Supervisor, EPA Center for Subsurface Modeling Support (CSMoS), Robert S. Kerr Environmental Research Center, Ada, Oklahoma (1999 - 2001)

- Provided research and technical support conducted by EPA. These activities include:
  - Development of physically based nonpoint sources (nutrients and pesticides) transport and fate models with uncertainty analysis and GIS for the regional groundwater vulnerability assessment.
  - Watershed and groundwater interaction modeling study.
  - Development of stressor-input/eco-effects database in support of ecosystem risk assessment.
  - On-line and phone technical support to the user community for EPA subsurface and groundwater models available from the EPA web site.
  - Enhancement and development of EPA subsurface modeling softwares.
  - Technical review for the EPA Regions and State agencies on the evaluation of groundwater and contaminant transport models for Superfund and RCRA sites.

Research Assistant, Clemson University, Clemson, South Carolina (1995 - 1998)

- Developed GIS interfaces for watershed models to automate model inputs and outputs.
- Applied watershed models to identify critical non-point source areas in the watershed, estimate the impact of various best management practices (BMPs) on sediment and nutrient loads, and to support the TMDL implementation efforts.

INTERESTS AND SKILLS:

- Watershed hydrology and water quality modeling
- 1D, 2D and 3D surface water hydrodrodynamic and water quality modeling
- Subsurface and groundwater flow and contaminant modeling
- Environmental modeling linkage and ecosystem assessment
- GIS application and computer programming using Fortran, C, and VB/VBA
- SWAT, HEC-HMS, SWMM (SWMM5, XP-SWMM), HSPF/BASINS, MODFLOW, MT3DMS, PHT3D
- HEC-RAS - NSM, CE-QUAL-W2 (W2V3.9), CE-QUAL-ICM, SWAT - HEC-RAS, HSPF - HEC-RAS

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS:

- Professional Civil Engineer in Washington (P.E. #39431)
- Professional Hydrologist in American Institute of Hydrology (P.H. #05-H-1651)
- American Society of Agricultural and Biological Engineers (ASABE) (1998-)
- American Geophysical Union (AGU) (1999-)

- American Society of Civil Engineers (ASCE) (2000-)
- International Association of Hydrologic Science (IAHS) (2001-)
- American Water Resources Association (AWRA) (2002-)
- International Water Association (IWA) (2012-)

RECENT PUBLICATIONS:

- Zhang, Z., Johnson, B.E. 2014. Aquatic Nutrient Simulation Modules (NSM) Developed for Hydrologic and Hydraulic Models. *ERDC/EL TR-14-X,* U.S. Army Engineer Research and Development Center, Vicksburg, MS. (in press)
- Zhang, Z., Johnson, B.E. 2014. Application and Evaluation of HEC-RAS – NSM-I Model to the Lower Minnesota River. *ERDC TN-EMRRP-14-X,* U.S. Army Engineer Research and Development Center, Vicksburg, MS. (in press)
- Wu M., Zhang, Z., Chiu Y. 2014. "Life-cycle water quantity and water quality implications of biofuels." *Current Sustainable/Renewable Energy Reports* (in press).
- Zhang, Z., 2014. "Nonpoint source and water quality modeling." In *Handbook of Engineering Hydrology: Environmental Hydrology and Water Management.* Saeid Eslamian, ed., CRC Press, ISBN 9781466552494, Chapter 13, pp 261-298.
- Zhang, Z., Sun, B., Johnson, B.E. 2013. "Integration of a benthic sediment diagenesis module into a two-dimensional hydrodynamic and water quality model – CE-QUAL-W2." *Ecological Modelling* (in review).
- Sun, B., Zhang, Z., Johnson, B.E. 2013. "A modified CE-QUAL-W2 model for simulation of aquatic carbon, nitrogen and phosphorus cycles." *Environmental Modeling & Assessment* (in review).
- Zhang, Z., Johnson, B.E. 2013. Nutrient Simulation Modules (NSM) within the Gridded Surface Subsurface Hydrologic Analysis (GSSHA). *ERDC/EL TR-13-X,* U.S. Army Engineer Research and Development Center, Vicksburg, MS.
- Zhang, Z., Wu M. 2013. Analysis of Riverine Sediment and Nutrient Exports in Missouri River Basin by Application of SWAT Model. *ANL/ESD-13/12*, Argonne National Laboratory, Argonne, IL.
- Zhang, Z. and Wu, M. 2013. "Evaluating the transport and fate of nutrients in large scale river basins using an integrated modeling system." In *Landscape Ecology for Sustainable Environment and Culture*. Fu, B. and Jones, K.B. (eds.), Springer, ISBN 978-94-007-6529-0, Chapter 10, pp 187-204.
- Johnson, B.E., Zhang, Z. and Downer, C.W. 2013. "Watershed scale physically based water flow, sediment and nutrient dynamic modeling system. In *Ecology for Sustainable Environment and Culture*. B. Fu and K.B. Jones (eds.), Springer, ISBN 978-94-007-6529-0, Chapter 8, pp 145-171.
- Zhang, Z. and Johnson, B.E. 2011. "The contaminant transport, transformation, and fate sub-model for predicting the site-specific behavior of distributed sources (munitions constituents) on U.S. Army training and testing ranges." In *Environmental Chemistry of Explosives and Propellant Compounds in Soils and Marine Systems: Distributed Source Characterization and Remedial Technologies*. Chappell, M.A., Price, C.L. and George, R.D. (eds.), American Chemical Society, Vol. 1069, ISBN13: 9780841226326, Chapter 14, pp 241-272.