P.S.C. Rao Biographical Sketch:

Dr. Suresh Rao is the Lee A. Reith Chair & Distinguished Professor of Environmental Engineering in the School of Civil Engineering at Purdue University, with a joint appointment as a Distinguished Professor in the Agronomy Department. He also holds an appointment in the College of Engineering Division of Environmental & Ecological Engineering. He served as the Associate Dean of Engineering of Graduate & Interdisciplinary Programs at Purdue University. Prior to joining Purdue University in July 1999, Dr. Rao served for 25 years on the faculty at the University of Florida.

Dr. Rao's professional interests include interdisciplinary research and graduate education in environmental/ecological sciences and engineering. Dr. Rao's diverse range of research interests have spanned from lab-scale, process-level studies on environmental fate and transport of various contaminant classes to aquifer-scale and watershed-scale studies on water quality impacts of agricultural and industrial land uses. Dr. Rao has been involved in development and use of models for research purposes and for decision making, with applications in soil quality assessments, groundwater vulnerability, contaminated site remediation, and watershed management. His most recent research and educational interests have focused on the areas of water-food-bioenergy sustainability issues, with specific projects on (1) landscape transitions under human impacts, and multi-scale modeling/analysis of catchments; (2) resilience analysis of coupled, complex (natural and engineered) systems.

Dr. Rao has taught disciplinary and inter-disciplinary courses, including "Vadose Hydrology" & "Contaminant Subsurface Hydrology", as a part of the inter-disciplinary graduate program in Hydrologic Sciences at the University of Florida; and "Contaminant Transport Processes" and "Remediation Science & Engineering" at Purdue University. Currently, he teaches graduate courses with a focus on sustainability and resilience: "Global Water Resources Sustainability", "Ecological Resilience & Sustainability", "Transport Processes in Nature", "Complex Coupled Systems", and "Resilience Engineering", as a part of the campus-wide interdisciplinary graduate program in Ecological Science and Engineering, and engineering-wide undergraduate program in Environmental & Ecological Engineering.

Dr. Rao's research has been documented in about 300 refereed publications, book chapters, technical reports, and conference proceedings. He has been named as one of the 100-most-cited authors in Environmental Science and Engineering, by the *ISI Highly Cited Researchers*. Dr. Rao was one of the four founding Editors-in-Chief for the *Journal of Contaminant Hydrology* (Elsevier), and has also served as an Associate Editor for *Water Resources Research* (American Geophysical Union), *Environmental Chemistry & Toxicology* (SETAC), and *Journal of Environmental Quality* (American Society of Agronomy). Dr. Rao was elected as Fellow of the American Geophysical Union, the Soil Science Society of America, and the American Society of Agronomy. He received the Soil Science Research Award presented by SSSA, the Environmental Research Award presented by ASA.

Dr. Rao has travelled extensively in Asia, Europe, Africa, Australia, and South America, to present invited talks at international conferences and workshops. He has travelled for two weeks in Malawi under a USAID project (University of Florida), and next year he will work in Eldoret,

Kenya as a part of a Global Design Team (Purdue University). He been a frequent visitor to Australia, and has conducted collaborative research through CRC CARE & University of South Australia (Adelaide), and CSIRO (Perth), including a sabbatical leave in Perth, Western Australia. He also maintains active research collaboration with colleagues in Switzerland, Italy, and Sweden.

Education
B. Sc., APA Univ., India, 1967; M.S., Colorado State University, 1969; Ph.D., University of Hawaii, 1974

Professional Experience
Purdue University:

- Lee A. Reith Chair & Distinguished Professor, School of Civil Engineering & Department of Agronomy (July 1999 – present); Division of Environmental and Ecological Engineering (July 2009-present)
- Associate Dean of Engineering, Graduate Education & Professional Education (March 2002-December 2005)
- Emeritus Graduate Research Professor, University of Florida, Gainesville, FL (July 1999 – present)

University of Florida:

- Director, Center for Natural Resources (June 96- May 99);
- Graduate Research Professor, Soil & Water Sci. (June 93-May 99);
- University of Florida Research Foundation Professor (1998-May 1999);
- Professor, Soil & Water Sci., (1985-93); Affiliate Prof., Env. Eng. Sci., (1985-99); Affil. Prof., Food Sci./Human Nutrition, (1985-99); Assoc. Professor, Soil Sci., (1982-85); Asst. Professor, Soil Sci., (1979-82); Asst. Res. Sci., Soil Sci., (1977-79); Post-Doc Res. Assoc., Soil Sci., (1975-77).

University of Hawaii-Manoa:

- Grad. Res. Asst. (1970-74); Visiting Prof. (1985-86; sabbatical).

Awards
-- Soil Science Research Award, Soil Science Society of America (1998)
-- Appointed University of Florida Research Foundation Professor (1998)
-- Sir Frederick McMaster Fellow, Council of Industrial and Research Organizations, Australia (1996)
-- Appointed Graduate Research Professor at the University of Florida (1993)
-- Distinguished Faculty Service Award, Institute of Food & Agricultural Sciences, University of Florida (1992)
-- Environmental Quality Research Award, American Society of Agronomy (1991)
-- Scientific & Technology Achievement Award, U.S. EPA (1990)
-- Research Achievement Award, University of Florida (1990)
-- Fellow, Soil Science Society of America (1989)
-- Fellow, American Society of Agronomy (1989)
-- Fellow, American Geophysical Union (2007)

-- Distinguished Alumni Research Award, College of Tropical Agriculture & Human Resources, University of Hawaii (May 2009)

Citations

- ISI 200 Most-Highly Cited Researchers in Environmental Science & Engineering
- Who's Who in Technology Today (USA); Who's Who in South and Southeast (USA)
- American Men and Women in Science; Men of Achievement (Cambridge, U.K.)

Editorial Boards

- Editor-in-Chief, *Journal of Contaminant Hydrology*, Published by Elsevier Sci. Publishers (1985-1992). (One of four founding editors-in-chief)
- Associate Editor, *Water Resources Research*, Published by the American Geophysical Union (1990-1993).
- Member, Editorial Board, *Environmental Toxicology & Chemistry*, published by Pergamon Press (1990-1992).
- Associate Editor, *Journal of Environmental Quality*, published by the American Society of Agronomy (1980-1983).

Service on National Committees & Boards

- Member, Water Science and Technology Board, US National Research Council (1988-1991).
- Member, Committee on Groundwater Modeling Assessment, Water Science and Technology Board, US National Research Council (1987-1989).
- Member, Committee on Regional Assessment of Ground Water Vulnerability to Contamination, Water Science & Technology Board, US National Research Council (1990-1993).
- Chairman, Committee on Commercialization of Alternate Remediation Technologies, Water Science & Technology Board, US National Research Council (1994-1997).
- Chair-Elect (1992) and Chairman (1993), Division A-5 (Environmental Quality), American Society of Agronomy.
- Member, American Geophysical Union's Committee on Water in the Unsaturated Zone (1978-1988).
- Member, Research & Technology Advisory Committee, Cooperative Research Center for
- Contamination Assessment & Remediation of the Environment (CRC CARE), Adelaide,
- South Australia (2005-current)
- Member, Committee on Independent Scientific Review of Everglades Restorations Programs, Water Science and Technology Board, National Research Council (2004-2006)
- Member, Committee on Long Term Institutional Management of DOE Legacy Sites, Board on Radioactive Waste Management, National Research Council (2001-2003)
- · Co-Chair, US EPA International Expert Panel on DNAPL Source Zone Remediation (2001-2003)
- Co-Chair of the First Theis Conference on "*In-Situ* Flushing Technologies for DNAPL Contaminated Sites," Sponsored by National Water Well Association

- Chair-Elect (1992) and Chairman (1993), Division A-5 (Environmental Quality), American Society of Agronomy
- Member, American Geophysical Union's Committee on Water in the Unsaturated Zone (1978-1988)
- Member, American Geophysical Union's Committee on Groundwater (1992-1994)
- Liaison Representative between the Soil Science Society of America and the American Geophysical Union (1979-1983)

Selected Publications (2005-2010):

PUBLISHED IN 2010

Basu, N.B., Destouni, G. et al. Nutrient loads exported from managed catchments reveal emergent biogeochemical stationarity. **GEOPHYSICAL RESEARCH LETTERS** Volume: **37**

Botter, G., Basu NB, Zanardo S, et al. Stochastic modeling of nutrient losses in streams: Interactions of climatic, hydrologic, and biogeochemical controls. **WATER RESOURCES RESEARCH** Volume: **46** Article Number: **W08509**

Wagener, T., Sivapalan M, Troch PA, et al. The future of hydrology: An evolving science for a changing world, **WATER RESOURCES RESEARCH** Volume: **46** Article Number: **W05301**

Basu, N.B., Rao PSC, Winzeler HE, et al. Parsimonious modeling of hydrologic responses in engineered watersheds: Structural heterogeneity versus functional homogeneity. **WATER RESOURCES RESEARCH** Volume: **46** Article Number: **W04501**

Mu, DY, Seager T, Rao PSC, Park, J, and Zhao, F. Comparative Life Cycle Assessment of Lignocellulosic Ethanol Production: Biochemical Versus Thermochemical Conversion, **ENVIRONMENTAL MANAGEMENT** Volume: **46** Issue: **4** Special Issue: **Sp. Iss. SI** Pages: **565-578**

Mu, DY, Seager T, Rao PSC, and Zhao, F A Resilience Perspective of Biofuels Production, **INTEGRATED ENVIRONMENTAL ASSESSMENT & MANAGEMENT** (In Press)

MANUSCRIPTS PUBLISHED IN 2011

Thompson, S E, N B Basu, J. Lascurian, A. Abeneau, and P S C Rao. Relative dominance of hydrologic vs biogeochemical factors on solute export across human impact gradients, **WATER RESOURCES RESEARCH** (in press).

Basu NB, P S C Rao, S E Thompson, N Loukinova, S Donner, S. Ye, and M Sivapalan. Spatiotemporal averaging of in-stream solute removal dynamics: Dominant controls yield emergent patterns. **WATER RESOURCES RESEARCH** (in press)

Guan, K., S.E. Thompson, C.J. Harman, N.B. Basu, P.S.C. Rao, M. Sivapalan, A.I. Packman, and P.K. Kalita. Spatiotemporal scaling of hydrological and agrochemical export dynamics in tile-drained Midwestern watershed. **WATER RESOURCES RESEARCH** (in press).

Zanardo, S., C.J. Harman, P.A. Troch, P.S.C. Rao, and M. Sivapalan. Climatic and landscape controls on inter-annual variability of catchment water balance: A stochastic approach. **WATER RESOURCES RESEARCH** (in press).

MANUSCRIPTS IN REVIEW IN 2011

Park, J., T.P. Seager, and P.S.C. Rao. Lessons in Risk- vs. Resilience-Based Design and Management, **Integrated Environmental Assessment and Management** (in review)

Basu, NB, S.E. Thompson, and PSC Rao. Hydrologic and biogeochemical functioning of intensively managed catchments, **WATER RESOURCES RESEARCH** (in review)

Harman C, P S C Rao, N B Basu, G S McGrath, and M Sivapalan. Climate, soil and vegetation controls on the temporal variability of vadose zone transport. **WATER RESOURCES RESEARCH** (in review)

Zanardo, S, N B Basu, G Botter, E Bertuzzo, A Rinaldo, and P S C Rao. Dominant controls on pesticide transport from tile to catchment scale: Lessons from a Minimalist model. **WATER RESOURCES RESEARCH** (in review)

Ye, S, TP Covino, M Sivapalan, NB Basu, PSC Rao, H Li, and SW Wang. Dissolved nutrient removal dynamics in river networks: A modeling investigation of transient flow and scale effects. **WATER RESOURCES RESEARCH** (in review)

OTHER SELECTED PAPERS (2005-2009):
(Complete list available on request)

Kim, H, Annable, MD, Rao, PSC, and Cho, J, 2009. Laboratory evaluation of surfactant-enhanced airsparging for perchloroethene source mass depletion from sand. Journal of Environmental Science and Health, Part A, 44(4): 406-413.

Brooks, MC, Wood, AL, Annable, MD, Hatfield, K, Cho, J, Holbert, C, Rao, PSC, Enfield, C, Lynch, K, and Smith, R. 2008. Changes in contaminant mass discharge from DNAPL source mass depletion: Evaluation at two field sites. *Journal of Contaminant Hydrology*, *102(1-2): 140-153.*

Basu, NB, Rao, PSC, Poyer, IC, Nandy, S, Mallavarupu, M, Naidu, R, Davis, GB, and Patterson, B. 2009. Integration of traditional and innovative characterization techniques for flux-based assessment of dense non-aqueous phase liquid (DNAPL) sites. *Journal of Contaminant Hydrology, 105(3-4):161-172.*

Basu, NB, Rao PSC, Falta RW, Annable, MD, Jawitz, JW, and Hatfield, K. 2008. Temporal evolution of DNAPL source and contaminant flux distribution: Impacts of source mass depletion. JOURNAL OF CONTAMINANT HYDROLOGY, 95(3-4): 93-109.

Lee J, Rao PSC, Poyer IC, Toole RM, Annable MD, Hatfield K. 2007. Oxyanion flux characterization using passive flux meters: Development and field testing of surfactant-modified granular activated carbon, JOURNAL OF CONTAMINANT HYDROLOGY 92 (3-4): 208-229.

Kim H, Choi, KM, Rao PSC. 2007. Measurement of gas-accessible NAPL saturation in soil using gaseous tracers. ENVIRONMENTAL SCIENCE & TECHNOLOGY 41 (1): 235-241.

Klammler H, Hatfield K, Annable MD, Agyei E, Parker BL, Cherry JA, and Rao PSC. 2007. General analytical treatment of the flow field relevant to the interpretation of passive fluxmeter measurements WATER RESOURCES RESEARCH 43 (4): Art. No. W04407.

Newman M, Hatfield K, Hayworth J, et al., 2005. A hybrid method for inverse characterization of subsurface contaminant flux JOURNAL OF CONTAMINANT HYDROLOGY 81 (1-4): 34-62 DEC 2005

Enfield CG, Wood AL, Espinoza FP, et al., 2005. Design of aquifer remediation systems: (1) Describing hydraulic structure and NAPL architecture using tracers JOURNAL OF CONTAMINANT HYDROLOGY 81 (1-4): 125-147 DEC 2005

Wood AL, Enfield CG, Espinoza FP, et al., 2005. Design of aquifer remediation systems: (2) Estimating site-specific performance and benefits of partial source removal JOURNAL OF CONTAMINANT HYDROLOGY 81 (1-4): 148-166 DEC 2005

Falta RW, Rao PSC, Basu N, 2005. Assessing the impacts of partial mass depletion in DNAPL sourcezones - I. Analytical modeling of source strength functions and plume response JOURNAL OF CONTAMINANT HYDROLOGY 78 (4): 259-280 AUG 2005

Falta RW, Basu N, Rao PSC Assessing impacts of partial mass depletion in DNAPL source zones: II. Coupling source strength functions to plume evolution JOURNAL OF CONTAMINANT HYDROLOGY 79 (1-2): 45-66 SEP 2005

Jawitz JW, Fure AD, Demmy GG, et al., 2005. Groundwater contaminant flux reduction resulting from non-aqueous phase liquid mass reduction, WATER RESOURCES RESEARCH 41 (10): Art. No.W10408