

TRENT BIGGS

Department of Geography
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CURRENT POSITION:

Assistant Professor
Department of Geography, San Diego State University

EDUCATION:

- Ph.D. **Department of Geography, University of California, Santa Barbara**, December 2003
Principal advisor: Thomas Dunne
Co-advisors: John Melack, Oliver Chadwick
Dissertation title: *Regional deforestation and stream biogeochemistry in the southwestern Brazilian Amazon basin*
- M.A. **Department of Geography, University of California, Santa Barbara**, December 2000.
Principal advisor: Thomas Dunne
Thesis Title: Tropical land use change effects on regional stream chemistry.
- A.B. **Princeton University**, May 1995.
Magna Cum Laude in Ecology and Evolutionary Biology
Senior Thesis Title: GIS snow map for Gray Wolf habitat in Yellowstone National Park.

WORK EXPERIENCE:

Senior Scientist, INTERA Incorporated, Niwot, Colorado. May 2006-May 2007.
Water resources and quality modeling, including groundwater recharge estimation, geostatistics of groundwater contamination using GIS, reservoir hydrodynamic modeling for organic carbon simulation.

Post-doctoral Scientist, International Water Management Institute, Hyderabad, India. September 2003-September 2005. Developed continental-scale hydrological analyses, modeling tools, and remote sensing products for water resources management in the Krishna Basin, Southern India. Integrated satellite and ground-based data for potential and actual evaporation calculations (SEBAL), determined irrigated areas using MODIS satellite imagery, and carried out field studies of runoff processes for rainfall-runoff modeling (KINEROS, SCS).

Teaching assistant, University of California, Santa Barbara, 2000 and 2001, Groundwater Hydrology and Water Pollution. Developed lectures and laboratory exercises for groundwater flow experiments.

Instructor, Desert Sun Science Center, Idyllwild, California. September-November 1996. Conducted courses and developed curricula for outdoor adventure, environmental education, and astronomy.

GIS and Remote Sensing Technician, Pacific Meridian Resources, Emeryville, California. September 1995-June 1996. Classified LandsatTM imagery for mapping of crops. Digitized maps into ARC/INFO for the U.S. Forest Service and other clients.

AWARDS AND HONORS:

- Two papers selected as top eight research papers of the year, International Water Management Institute, 2005 and 2006.
- Graduate Student Research Award, Department of Geography, UCSB, 2001
- NASA Earth Systems Science Graduate Student Research Fellowship, July, 2000
- Senior Thesis Poster Award, Best Theoretical Subject. Princeton, May 1995
- Sigma Xi Scientific Research Society, 1995
- National Merit Finalist, June 1991

REVIEWER FOR:

Hydrological Processes

Biogeochemistry

Ecological Applications

Water Resources Research

Journal of the American Water Resources Association

International Journal of Remote Sensing

Hydrological Sciences

Journal of Hydrologic Engineering

Geography Compass

Journal of Spatial Hydrology

Soil Use and Management

SKILLS:

- Proficient in Matlab, R (statistics), ARC/INFO, ArcView, ERDAS Imagine.
- Hydrological modeling including HYDRUS-1D, CE QUAL W2, trained in WASP
- Graduate coursework includes advanced fluid mechanics and partial differential equation solution techniques.
- Fluent in Portuguese, conversational Spanish and German, and basic Hindi.

RESEARCH PROJECTS

Sediment and erosion in urban Tijuana: Socioeconomic interactions with sediment budgets under rapid urbanization of marginal lands, June 2008-August 2009., \$70,000.

Funding agency: Southwest Consortium for Environmental Research and Policy.

Urban landscapes and sediment production potential from Tijuana, January 2008-May 2009. \$5100

Funding agency: University Grants Program, San Diego State University.

Particle size and accumulation rates of sediment within fluvial and feeder canyon depositional environments of the Tijuana Estuary Reserve, Fellowship award to Shannon Webber, June 2008-May 2009, \$20,000.

Funding agency: National Estuarine Research Reserve, National Oceanic and Atmospheric Administration.

Water Allocation in the Krishna River Basin to Improve Water Productivity in Agriculture. 2004-2008, \$234,800

International Water Management Institute.

Funding Agency: Australian Council for International Agricultural Research.

Collaborators: University of Melbourne, and Jawaharlal Nehru Technological University.

Large Scale Biosphere-Atmosphere Project in the Amazon (LBA). 1998-2003.

University of California, Santa Barbara.

PIs: Dar Roberts, Oliver Chadwick.

Funding agency: NASA

Collaborators: Centro de Energia Nuclear na Agricultura, University of Sao Paulo.

Regional deforestation and stream biogeochemistry in the Amazon Basin. 2000-2003
\$64,000

NASA Graduate Student Research Fellowship.

University of California, Santa Barbara.

PUBLICATIONS

In press:

Biggs, T.W., C.A. Scott, A. Gaur, T. Chase, and E. Lee. in press. Impacts of irrigation and anthropogenic aerosols on the water balance, heat fluxes and surface temperature in a river basin. *Water Resources Research*.

Biggs, T.W., and B. Jiang. in review. Soil salinity and exchangeable cations in a wastewater irrigated area, India. *Journal of Environmental Quality*.

In print:

* Selected as one of the top papers of the year for presentation at the Annual Research Meeting, International Water Management Institute, Sri Lanka, 2005 or 2006.

Van Rooijen, D., H. Turrall, and **T.W. Biggs**. 2008. Urban and industrial water use in the Krishna Basin, India. *Irrigation and Drainage* online:10.1002/ird.439.

Biggs, T.W., P.K. Mishra, and H. Turrall. 2008. Evapotranspiration and regional probabilities of soil moisture stress in rainfed crops, southern India. *Agricultural and Forest Meteorology* 148:1585-1597.

Lee, E., Chase, T.N., Rajagopalan, B., Barry, R.G., **Biggs, T.W.** and Lawrence, P.J., 2008. Effects of irrigation and vegetation activity on early Indian summer monsoon variability. *International Journal of Climatology*: Early View, doi 10.1002/joc.1721.

Biggs, T.W., Dunne, T., Roberts, D.L., Matricardi, E., 2008. The rate and extent of deforestation in watersheds of the southwestern Amazon Basin. *Ecological Applications*. 18: 31-48.

Gaur, A., **Biggs, T.W.**, Gumma, M.K., Parthasaradhi, G. and Turrall, H., 2008. Water scarcity effects on equitable water distribution and land use in a major irrigation project--case study in India. *Journal of Irrigation and Drainage Engineering*, 134(1): 26-35.

Bouwer, L.M., **Biggs, T.W.**, Aerts, J.C.J.H. 2008. Estimates of spatial variation in evaporation using satellite-derived surface temperatures and a water balance model. *Hydrological Processes* 22: 670-682.

Biggs, T.W., A. Gaur, C.A. Scott, P. Thenkabail, R. Gangadhara Rao, M. Krishna Gumma, S.K. Acharya, and H. Turrall. 2007. Closing of the Krishna Basin: Irrigation development, streamflow depletion, and macroscale hydrology. Research Report IWMI Research Report 111. International Water Management Institute, Colombo, Sri Lanka.

Thenkabail, P., Parthasaradhi, G., **Biggs, T.W.**, Gumma, M.K., Turrall, H. 2007. Spectral Matching Techniques to Determine Historical Land use/Land cover (LULC) and Irrigated Areas using Time-series AVHRR Pathfinder Datasets in the Krishna River Basin, India. *Photogrammetric Engineering & Remote Sensing*, 73: 1029-1040.

Biggs, T.W., Scott, C.A., Rajagopalan, B. and Turrall, H., 2007, Trends in solar radiation due to clouds and aerosols, Krishna River Basin, Southern India, 1952-1997. *International Journal of Climatology*, 27: 1505-1518.

***Biggs, T. W.**, P. S. Thenkabail, M.K. Gumma, C. Scott, G. R. Parthasaradhi, and H. Turrall. 2006. Irrigated area mapping in heterogeneous landscapes using MODIS time-series, ground surveys, and agricultural census data in Krishna River Basin, India. *International Journal of Remote Sensing* 10: 4245-4266.

Biggs, T. W., T. Dunne, and T. Muraoka. 2006. Transport of water, solutes, and nutrients from a pasture hillslope, southwestern Brazilian Amazon. *Hydrological Processes* 20: 2527-2547.

Ahmad, M., **T. W. Biggs**, H. Turrall, and C. Scott. 2006. Application of SEBAL Approach to Map the Agricultural Water Use Patterns in the Data Scarce Krishna River Basin of India. *Water Science and Technology* 53: 83-90.

*Van Rooijen D., Turrall H., **Biggs T.W.** 2005. Sponge City: Water balance of mega-city water use and wastewater use in Hyderabad, India. *International Council on Irrigation and Drainage Wastewater Irrigation Special Issue*.

Biggs, T. W., T. Dunne, and L. A. Martinelli. 2004. Natural controls and human impacts on stream nutrient concentrations in a deforested region of the Brazilian Amazon basin. *Biogeochemistry* 68:227-257.

Holmes, K., D.A. Roberts, S. Sweeney, I. Numata, E. Matricardi, O.A. Chadwick, **T.W. Biggs**, G. Batista. 2004. Soil databases and the problem of establishing regional biogeochemical trends. *Global Change Biology*, 10, 796-814.

Biggs, T. W., T. Dunne, T. F. Domingues, and L. A. Martinelli. 2002. The relative influence of natural watershed properties and human disturbance on stream solute concentrations in the southwestern Brazilian Amazon basin. *Water Resources Research* **38**:doi 10.1029/2001WR000271.

Richey, J.E., Krusche, A., Deegan, L., Ballester, V., **Biggs, T.** and Victoria, R., 2001, Land use changes and the biogeochemistry of river corridors in the Amazon. *International Geosphere-Biosphere Programme, Global Change News Letter*, **45**, pp. 19-22.

ABSTRACTS AND PRESENTATIONS:

Biggs, T.W., 2008, Spatial Geometry of Urban Networks and Stream Biogeochemistry in the Amazon Frontier, Association of American Geographers, Boston, MA. April, 2008.

Biggs, T.W., Dunne, T., Roberts, D. A., Matricardi, E. 2007, Deforestation and pasture establishment in watersheds: Implications for stream biogeochemistry in the Amazon Basin, American Geophysical Union, San Francisco.

Biggs, T.W., C. Scott, and H. Turrall. 2005. Basin-scale effect of irrigation development and precipitation on potential evapotranspiration in the Krishna Basin, India. American Geophysical Union Conference, December 2005, San Francisco, CA.

Biggs, T.W. and H. Turrall. 2005. Water productivity of the Krishna Basin. International Water Management Institute Seminar, Colombo, Sri Lanka.

Ahmad, M., **T. W. Biggs**, H. Turrall, and C. Scott. 2005. Application of SEBAL Approach to Map the Agricultural Water Use Patterns in the Data Scarce Krishna River Basin of India. *in* 10th International Specialist Conference On Watershed and River Basin Management 2005, Calgary, Canada.

Jiang, B., and **T. W. Biggs**. 2004. Soil salinity and cropping patterns in a wastewater irrigated area, Musi River, Hyderabad. *in* International Conference on Soil and Groundwater Contamination, Hyderabad, India.

Gerwe, C., **T. W. Biggs**, and J. Ensink. 2004. An assessment of heavy metals contamination in the wastewater-irrigated area of the Musi River. *in* International Conference on Soil and Groundwater Contamination, Hyderabad, India.

Biggs, T.W., Dunne, T., Roberts, D.A., Martinelli, L.A., 2002. Scaling up from pastures to watersheds: the spatial and temporal structure of human impacts on stream nutrient concentrations, Oral presentation, LBA-Ecology Conference, Manaus, Brazil, July 2002.

Biggs, T.W., Dunne, T., and Martinelli, L.A., 2001. The effect of topography and rock type on soil cation contents and stream solute and phosphorus concentrations in the southwestern Brazilian Amazon basin, Poster Presentation, American Geophysical Union, San Francisco, December 2001.

Biggs, T.W., Dunne, T., and Domingues, T.F., 2001. The importance of urbanization and intensive agricultural production for the human impact on tropical stream nitrogen and phosphorus concentrations, Oral presentation, Open Meeting of LBA-Ecology, Atlanta, GA, February, 2001.

Biggs, T.W., Dunne, T., Domingues, T.F., Martinelli, L.A. 2000. The effect of deforestation, soil type, and urbanization on stream nitrogen, phosphorus, and chloride concentrations in the southwestern Brazilian Amazon basin, Poster presentation, American Geophysical Union, December, 2000.

Biggs, T.W., Dunne, T. Melack, J.M. and Bahia, M.A.S., 1999. Stream chemistry, solute fluxes and mesoscale land use change in Amazonia, Manaus99 International Symposium, Hydrological and Geochemical Processes in Large Scale River Basins, November, 1999.