

Tobias Siegfried

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Born: September 16, 1970 - Aarau, Switzerland

Nationality: Swiss

Current positions

Adjunct Assistant Professor, School of International and Public Affairs, Columbia University

Associate Research Scientist, Columbia Water Center, The Earth Institute at Columbia University

Areas of specialization

Multi-objective Water Resources Management, Hydrology, International Relations, Environmental Policy Analysis, Coupled Environmental and Economic Systems Modeling, Dynamic Game Theory and Mechanism Design, Decision Theory and Risk Management, Multi-Level Bayesian Statistical Modeling, Agent-Based Modeling by Reinforcement Learning.

Academic Qualifications / Appointments

2007 - date *Adjunct Assistant Professor*, School of International and Public Affairs, Columbia University

2008 *Associate Research Scientist*, Columbia Water Center, The Earth Institute at Columbia University

- 2006 - 2008 *Earth Institute Fellow*, The Earth Institute at Columbia University
- 2005 - 2006 *Visiting Research Scientist*, Department of Earth & Environmental Sciences, Columbia University
- 2005 *Postdoctoral Research Fellow*, Center for Comparative and International Studies, International Relations, Swiss Federal Institute of Technology, Zürich

Education

- 2004 PhD in Environmental Sciences, Swiss Federal Institute of Technology, Zürich, Switzerland
- 1999 MSc in International Relations, London School of Economics and Political Science, London, U.K.
- 1997 MSc in Environmental Sciences, Swiss Federal Institute of Technology, Zürich, Switzerland

Grants, honors & awards

- 2007 Named a Revolutionary Mind, Seed Magazine
- 2006 Earth Institute Researchers Award (USD 30,000)
- 2006 Earth Institute Fellowship, The Earth Institute at Columbia University, New York
- 2005 Postdoctoral Fellowship of the Swiss National Science Foundation
- 2004 Nomination , ETH Silver Medal for an outstanding doctoral thesis
- 1998 ETH-Award and Medal for an outstanding diploma thesis
- 1998 Scholarship of the *Emil Boral-Stiftung fuer Postgraduierte aus Oesterreich und der Schweiz*,
- 1989 Swiss Winner, European Space Agency competition

List of Publications

ARTICLES IN PREPARATION

- 2008 Siegfried, T., Riegels, N. & Bauer-Gottwein, P. (2008), "A Game-Theoretic Framework for Water Allocation Decisions Using Stochastic Learning Methods"
- 2008 Siegfried, T., Fishman, R., Vasquez, V., Modi, V. & Lall U. (2008), "An Entitlement Approach to Address the Water-Energy-Food Nexus in Rural India"
- 2008 Riegels, N., Pereira Cardenal, S., Ashakeeva, G., Siegfried, T., & Bauer-Gottwein, P. (2008), "Reinforcement Learning Multi-Agent Modeling of Decision-Making Agents for the Study of Transboundary Surface Water Conflicts with Application to the Syr Darya River Basin"
- 2008 Sobolowski, S., Siegfried, T. & Lall, U. (2008), "Hierarchical Spatio-Temporal Bayesian Model for Agricultural Production"
- 2008 Siegfried, T., Sobolowski, S. & Lall, U. (2008), "Agricultural Production and Groundwater Depletion Under Climate Variability in India - Results from a Regional Scale Multi-Level Modeling Approach"
- 2008 Athanassoglou, S. & Siegfried, T. (2008), "Preventing the Race to the Bottom - Addressing Groundwater Depletion with an Incentive-Compatible Mechanism"

BOOKS AND BOOK CHAPTERS

- 2005 Siegfried, Tobias (2005), "Optimal utilization of a non-renewable transboundary groundwater resource - Methodology, case study and policy implications", *Schriftenreihe des Instituts fuer Hydromechanik und Wasserwirtschaft, Zuerich*, ISSN 1423-7997
- 2004 Kinzelbach, W., P. Bauer, P. Brunner & T. Siegfried (2004), "Sustainable water management in arid and semi-arid environments", In: *Water Resources of Arid Areas*, Stephenson, Chemang & Chaoka (eds.), Taylor & Francis Group, London, p. 3-16
- 2004 Kinzelbach, W., Bauer, P. & Siegfried T. (2004), "Nachhaltige Wasserwirtschaft in ariden und semiariden Regionen, Warnsignal Klima: Genug Wasser für alle?, Wissenschaftliche Auswertungen", J. L. Lozán et al. (Hrsg.), Hamburg

JOURNAL ARTICLES

- 2008 Upmanu Lall, Tanya Heikkila, Casey Brown & Tobias Siegfried (2008), "Water in the 21st Century: Defining the Elements of Global Crises and Potential Solutions", *Journal of International Affairs*, Vol.61, No. 2, Spring/Summer 2008
- 2008 Foshee J. R., Gosh A., Graham C., Murray W., Ruben-Salama C. & Siegfried T. (2008), "Thirsty for Change: Considering Water Privatization in Developing Nations", *Consilience: Journal for Sustainable Development*.
- 2008 Kwon, H., Khalil, A. & Siegfried, T. (2008), "Analysis of Extreme Summer Rainfall Using Climate Teleconnections and Typhoon Characteristics In South Korea", *JAWRA*, Vol 44 Issue 2, pages 436 - 438
- 2008 Balloumi, M., Siegfried, T., Matoussi, M. & Kinzelbach, W. (2008), "An efficiency comparison of two institutional types of farms, Agricultural Systems", *Australian Journal of Agricultural and Resource Economics*, submitted
- 2008 Bernauer, T. & Siegfried, T. (2008), "On Cooperation, Compliance and Performance in International Water Management", *Global Governance*, forthcoming
- 2008 Siegfried, T., Bleuler, S., Laumanns, M. Zitzler, E. & Kinzelbach, W. (2008), "Multi-Objective Groundwater Management Using Evolutionary Algorithms", *IEEE Transactions on Evolutionary Computation*, forthcoming
- 2007 Zammouri M., Siegfried T., El Fahem T., Kriaa S. & Kinzelbach W. (2007), Salination of Groundwater in the Nefzawa Oases (Tunisia): Results of a Regional-Scale Hydrogeologic Approach, *Hydrogeology Journal*, Volume 15, Issue 7, pp.1357-1375
- 2006 Siegfried, T. & Bernauer, T. (2006), "Estimating the performance of international regulatory regimes: Methodology and empirical application to international water management in the Naryn/Syr Darya Basin", *Water Resour. Res.*, 43, W11406
- 2006 Siegfried, T., & W. Kinzelbach (2006), "A multiobjective discrete stochastic optimization approach to shared aquifer management: Methodology and application", *Water Resour. Res.*, 42, W02402
- 2003 Kinzelbach W., Bauer P., Siegfried T. & Brunner P. (2003), "Sustainable Groundwater Management Problems and Scientific Tools", *Episodes*, Vol. 26, No. 4, December Issue
- 2002 Siegfried T. & Kinzelbach W. (2002), "Management of Internationally Shared Groundwater Resources in Semiarid and Arid Regions - The Northern African Aquifer System", In: *Hydrology of Mediterranean and Semiarid Regions, IAHS Publication*, no. 278

- 2002 Kunstmann H., Kinzelbach W. & Siegfried T. (2002), "Conditional first-order second-moment method and its application to the quantification of uncertainty in groundwater modeling", *Water Resour. Res.*, Vol. 38, No. 4
- 1996 Schlaepfer D., Siegfried T. (1996), "The Lake Ohrid Conservation Project", *World Water and Environmental Engineering*, April Issue
- 1990 Siegfried T., Benz R. & Wachter G. (1990), "Astronomie im Weltraum", *Orion*, 48. Jahrgang, Nr. 237, April Issue

OTHER ARTICLES / PROCEEDINGS

- 2008 Riegels, N., Siegfried, T., Pereira Cardenal, S. J., Jensen, R. A. & Bauer-Gottwein, P. (2008), An economics driven approach for optimizing water use in transboundary river basins, *IV International Symposium on Transboundary Waters Management*, Thessaloniki, Greece
- 2006 Kinzelbach, W., Brunner, P. & Siegfried, T. (2006), "Concepts and methods for sustainable water resources management", *Proceedings of the XXIV Nordic Hydrological Conference*, Vingsted Centret, Denmark 6 - 9 August 2006. NHP report Nr. 49, p.29-36
- 2006 Siegfried, T. & Bernauer, T. (2006), "Measuring International Policy Performance", *The International Workshop on Governance and the Global Water System: Institutions, actors and scales of water governance facing the challenges of global change*, 20-23 June, Bonn, Germany
- 2004 El-Fahem, T., Siegfried T., Kinzelbach W., Pfeiffer, S. & Ben Baccar B. (2004), "Isotopic and hydrochemical investigation in the origins of groundwater salination in the Nefzawa Oases (Southern Tunisia)", In: *Conference Proceedings of the International Conference on Soil and Groundwater Contamination – Risk Assessment and Remedial Measures*, Hyderabad, India
- 2003 Kinzelbach W., Bauer P., Siegfried T. & Brunner P. (2003), "Nachhaltige Grundwasserwirtschaft Probleme und wissenschaftliche Werkzeuge", *Österreichische Wasser- und Abfallwirtschaft*, Heft 3/4, März/April, Springer Verlag
- 2003 Siegfried T. (2003), Knappe Ressource im Noerdlichen Afrika, *Bulletin ETH Zürich*, Nr. 289, Mai Heft
- 2002 Siegfried, T. (2002), "Die Wueste waechst", *Gegenworte, Zeitschrift für den Disput über Wissen*, Berlin-Brandenburgische Akademie der Wissenschaften (Hrsg.), 10. Heft, Herbst 2002

- 2000 Rumbou, A., Alberich, C., Kessler, P. & Siegfried, T. (2000), "The Nile – Addressing Future Water Scarcity", Research Paper, Swiss Federal Institute of Technology, Zürich, Switzerland
- 1997 Siegfried T., Mock R. (1997), Fuzzifizierung von Schadensindikatoren, *Report, Inst. for Energy Technology*, Swiss Federal Institute of Technology, Zürich
- 1997 Siegfried, T. & W. Kinzelbach (1997), "Modeling of Groundwater Withdrawal and its Consequences to the Aquifer, A Case Study in Semi-Arid Botswana", *Report, Inst. of Hydromechanics and Water Res. Management*, Swiss Federal Institute of Technology, Zürich
- 1995 Siegfried T. & Schubert R. (1995), "Umweltorientierte Entwicklungspolitik", *Report, Centre for Economic Research*, Swiss Federal Institute of Technology, Zürich

Teaching

- 2007 - date Political Economy of Freshwater, School of International and Public Affairs, Columbia University
- 2007 - date Management and Development of Water Systems, Earth & Environmental Engineering, Columbia University
- 2006 - date Environmental Sciences for Sustainable Development, School of International and Public Affairs, Columbia University

Invited Talks

- 2008 An entitlement approach to address the water-energy-food nexus in rural India, co-hosted by North-South Center and Center for International Studies at Swiss Federal Institute of Technology, Zürich, Switzerland
- 2008 China Water Conference (Panel), hosted by: The Columbia Water Center, The Earth Institute at Columbia University
- 2007 Water: A 21st Century Challenge for Sustainable Development (Panel) , The Earth Institute at Columbia University
- 2006 Sustainable Water and Soil Management in Arid Zones, Many Problems, Few Solutions - The Case of Northern Africa , CERC, Columbia University

- 2006 Multi-objective Groundwater Management , FIVA - Research School of Water Resources, University of Copenhagen, Denmark
- 2006 Estimating the Performance of International Regulatory Regimes, Application to Syr Darya River / Toktogul Reservoir, Technical University of Denmark, Lyngby, Denmark
- 2006 Sustainable Water Resources Management in Second-Best Environments, Dept. of Political Sciences, University of Arizona, Tucson, USA
- 2005 Multi-Objective, Transboundary Aquifer Management, School of Earth Sciences, Stanford University, Palo Alto, California, USA
- 2004 New Approaches to Managing Groundwater Resources, The Earth Institute at Columbia University, New York City, USA
- 2004 Optimal Groundwater Management Using Discrete Stochastic Multi-Objective Optimization, Swiss Federal Institute of Aquatic Science and Technology, Kastanienbaum, Switzerland
- 2004 Optimal Utilization of Groundwater Resources, Ecole des Mines, Fontainebleau, Paris, France
- 2004 Optimal Utilization of Groundwater Resources, University of Natural Resources and Applied Life Sciences, Vienna
- 2003 Sustainable Management of Internationally Shared Groundwater Resources - The North-West Sahara Aquifer System, Observatoire du Sahara et du Sahel, Tunis, Tunisia

Service to the profession

- 2008 - date *International Advisor*, Central Asia Research and Training Initiative, Open Society Institute, Budapest
- 2007 *Consultant*, UNDP, "Options for Water Resources Management in Darfur, Sudan"
- 2004 *Consultant*, ARMINES (in collaboration with Ecole des Mines, Paris, France), "Arlit Water Supply, Niger"
- 2002 - 2003 *Consultant*, Addis Ababa Water and Sewerage Authority, Federal Democratic Republic of Ethiopia, "Addis Ababa Water Supply Project, Stage III A and Groundwater Phase II"

- 1997 - 1998 *Consultant*, Groundwater Authority, Botswana, "Development of a sustainable water management practice in Botswana, Khurutse Area"
- 1996 *Consultant*, Ernst Basler + Partner, Switzerland, "Quantification and consequences of nitrate pollution in Switzerland"
- 1995 - 1996 *Internship*, Ernst Basler + Partner, Switzerland, "Environmental assessment report in the Lake Ohrid area in South-Eastern Europe (on behalf of the World Bank)"

Reviewer

National Science Foundation, Water Resources Research, Computational Optimization and Applications, Journal of Hydrology, ASCE Journal of Water Resources Planning and Management, Geophysical Research Letters, Journal of Environmental Management

Additional Qualifications

LANGUAGES

German, native language;
English, written and spoken both excellent;
French, written and spoken both good.

PROGRAMMING

Extensive knowledge in numerical and statistical modeling as well as in programming with symbolic and numerical toolkits (Matlab, Mathematica, Maple, WinBugs etc.).

References

Prof. Thomas Bernauer
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Swiss Federal Institute of Technology, ETH Zürich
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