

# Laura E Erban, PhD

Groundwater hydrologist | US EPA

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## Education

- |      |   |
|------|---|
| 2014 | PhD   Earth System Science<br>Stanford University, Stanford CA<br><i>Dissertation: Groundwater exploitation and arsenic occurrence in the Mekong Delta aquifer system</i>                 |
| 2013 | Hasso Plattner Institute of Design at Stanford (aka d.school)<br>Design for Science coursework and community engagement   |
| 2012 | MS   Civil and Environmental Engineering<br>Environmental Fluid Mechanics and Hydrology<br>Stanford University, Stanford CA   |
| 2006 | BS   Environmental Sciences with Distinction<br>University of Virginia, Charlottesville, VA   |
| 2005 | Sustainable Development and Social Change in Central America:<br>semester of study in Guatemala, Nicaragua, El Salvador<br>Center for Global Education, Augsburg College, Minneapolis, MN |

## Appointments

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|-----------|--|
| 2017-pres | Adjunct faculty, Biology<br>Salve Regina University, Newport, RI                                   |
| 2015-pres | Physical scientist, US EPA<br>Atlantic Ecology Division, Narragansett, RI                          |
| 2014-2015 | Postdoctoral Scholar, Hydrogeology and Water Resources<br>Stanford University, Stanford, CA        |
| 2008-2013 | Graduate Research Assistant, Hydrogeology and Water Resources<br>Stanford University, Stanford, CA |

- 2006-2008    Research Assistant, Geochemistry  
US Geological Survey, Woods Hole, MA
- 2005            Summer Research Assistant, Biocomplexity Project  
Marine Biological Laboratory, Woods Hole, MA
- 2002-2006    Laboratory Assistant, Department of Environmental Sciences  
University of Virginia, Charlottesville, VA

## **Funding**

- 2013-2015    Linking land subsidence to deep arsenic release in the Mekong  
Delta aquifer system. *NSF Hydrology award EAR-1313518, \$256,403*  
(co-authored with PIs S. Gorelick, S. Fendorf, H.Zebker)
- 2010-2014    Urban growth, land-use change, water resources management,  
and human exposure to arsenic in Cambodia  
*UPS Endowment Fund award, \$37,153*  
(co-authored with PI S. Gorelick)
- 2009-2010    Land use change impacts on arsenic contamination in the Mekong  
Delta: a study in hydrogeography  
*McGee Research Grant, Stanford School of Earth Sciences \$5869*
- 2004            Coastal study in Mozambique  
*DoubleHoo Research Award, University of Virginia \$5000*  
(co-authored with graduate student M. Ferdie)

## **Teaching**

- 2017            Adjunct faculty, Salve Regina University  
*BIO 140L: Humans and Their Environment Lab*, fall semester. Topics  
cover a range of issues related to the Anthropocene. Class of 14  
mixed-rank undergraduate students.
- 2015            Co-instructor, California State University, East Bay  
*Team-teaching of "Human's Dependence on Earth's Mineral Resources",*  
*NSF-InTeGrate module to class of 62 freshman*  
**Associated training:** InTeGrate's 2-day workshop on pedagogy  
specific to undergraduate-level earth sciences
- 2011-2012    Teaching Assistant, Stanford University  
EESS221/CEE260C Contaminant Hydrogeology

*Conducted office hours, exam reviews, assignment grading for advanced graduate-level course of 10-20 students*

- 2011 Guest lecturer, Geoscape workshop  
*Demonstrated groundwater contamination and remediation using a physical aquifer model to 13 high school science teachers*
- 2012 Guest lecturer, Hydrogeology, Stanford University  
*Delivered lecture "Darcy's Law and Hydraulic Properties" for graduate-level course*
- 2010-2011 Volunteer Instructor, Yerba Buena High School, San Jose, CA  
*Designed and conducted weekly lecture and lab instruction for AP Environmental Sciences classroom*
- 2009-2011 Volunteer Instructor, Flood Elementary, East Palo Alto, CA  
*With non-profit Science is Elementary, taught hands-on basic science lessons to kindergarten and first grade students*
- 2008 - 2009 Teaching Assistant, Stanford University  
EESS220/CEE260A Physical Hydrogeology  
*Conducted office hours, exam reviews, assignment grading for advanced graduate-level course of 15-25 students*

## **Mentoring**

- 2013 School of Earth Science Summer Undergraduate Research (SESUR) Program, Stanford University  
*Directed summer research project of Stanford undergraduate student*
- 2011 Earth Sciences High School Internship Program, Stanford University  
*Directed summer research project of high school intern*

## **Manuscripts**

- 2018 Minderhoud PSJ, L Coumou, **LE Erban**, E Stouthamer, EA Addink 2018  
The relation between land use and subsidence in the Vietnamese Mekong Delta, *Sci Tot Environ* 634(1) 715-726
- 2018 **Erban LE**, SB Balogh, DE Campbell, HA Walker 2018  
CityWaterBalance for R: an open, reproducible process for modeling

- urban water systems, with application to Chicago. *Open Water Journal*, 5(1) 26-40
- 2017 Minderhoud PSJ, G Erkens, VH Pham, VT Bui, **L Erban**, H Kooi, E Stouthamer 2017 Impacts of groundwater extraction on subsidence in the Mekong Delta, Vietnam. *Environmental Research Letters*, 12 064006
- 2016 **Erban LE**, Gorelick SM 2016 Closing the irrigation deficit in Cambodia: implications for transboundary impacts on groundwater and Mekong River flow *Journal of Hydrology* 535 85-92
- 2014 **Erban LE**, SM Gorelick, HA Zebker, 2014 Groundwater extraction, land subsidence, and sea-level rise in the Mekong Delta, Vietnam *Environmental Research Letters* 9 084010
- 2014 **Erban LE**, SM Gorelick, S Fendorf 2014 Arsenic in the multi-aquifer system of the Mekong Delta, Vietnam: analysis of large-scale trends and controlling factors *Environmental Science & Technology* 48(11) 6081-6088
- 2013 **Erban LE**, SM Gorelick, HA Zebker, S Fendorf 2013 Release of arsenic to deep groundwater in the Mekong Delta, Vietnam, linked to pumping-induced land subsidence *Proceedings of the National Academy of Sciences of the United States of America* 110(34) 13751-13756
- 2011 **Erban LE** 2011 Win-win: a story of research and outreach *The Earth Scientist* newsletter of the Stanford School of Earth Sciences, Fall 2011 edition
- 2007 Crusius J, P Berg, D Koopmans, **L Erban** 2007 Eddy correlation measurements of submarine groundwater discharge *Marine Chemistry* 109 77-85

### Conference presentations

- 2017 Campbell D, H Walker, S Balogh, **L Erban**, R Boumans, T Gleason 2017 “Change and transition in urban systems: The story of Chicago told with Energy Systems Language models” *The International Society for Ecological Modelling Global Conference*, Jeju, Jeju, South Korea, Sept

17 - 21, 2017

- 2017      **Erban, LE**, SB Balogh, HA Walker, DE Campbell, T Gleason 2017 Assessment of the urban water system with an open, reproducible process applied to Chicago. *Joint Conference of the International Society of Industrial Ecology (ISIE) & the International Symposium on Sustainable Systems and Technology (ISSST)*. Chicago IL, June 25-29, 2017
- 2017      Boumans R, D Campbell, **L Erban**, S Balogh, H Walker, T Gleason 2017 "Thermodynamics and the evolution of a city: a tale of how Chicago came to be, from biophysical and socio-economic perspectives" *US Regional Association of the International Association for Landscape Ecology Annual Meeting*, Baltimore MD, April 9 - 13, 2017
- 2014      **Erban LE**, Gorelick SM, Fendorf S 2014 Regional-Scale Controls on Arsenic Contamination in the Multi-aquifer System of the Mekong Delta, Vietnam. *American Geophysical Union Fall Meeting Abstract H32B-03*
- 2013      **Erban L**, S Gorelick, HA Zebker, SE Fendorf 2013 Arsenic in groundwater of the Mekong Delta, Vietnam: contaminant expulsion from deep clays due to over-exploitation of aquifers. *American Geophysical Union Fall Meeting Abstracts 1, 1382*
- 2008      Crusius J, KD Kroeger, P Zhang, S Zhao, JF Bratton, H Bokuniewicz, R Coffey, A Green, S Baldwin, **L Erban**, M Casso 2008 "Significant groundwater discharge of nutrients to Western Long Island Sound inferred from radioisotope, nutrient, and organic chemical tracers" *American Geophysical Union Fall Meeting Abstracts 1, 1279*
- 2008      SM Baldwin, JF Bratton, KD Kroeger, JC Crusius, AC Green, **L Erban** 2008 "The role of submarine groundwater discharge in the delivery of nitrogen to the Corsica River estuary, Maryland" *American Geophysical Union Fall Meeting Abstracts 1, 08*
- 2007      **Erban L**, J Crusius, K Kroeger, D Koopmans, J Bratton and A Giblin 2007 "Improving our understanding of the control of radon-222 in groundwater with a goal of enhancing its value as a tracer of groundwater discharge to the coastal ocean" *Northeast Geological Society of America Meeting Abstracts 1, 1279*

- 2007 Crusius J, A Giblin, K Foreman, J Bratton, **L Erban**, D Koopmans 2007 "Nutrient delivery to West Falmouth Harbor (MA) from groundwater: examining the contribution from the wastewater treatment facility" *Northeast Geological Society of America Meeting*
- 2005 Ferdie M, **L Erban**, KJ McGlathery, and JC Zieman 2005 "Spatial variability of leaf nutrient (CNP) and isotope (<sup>13</sup>C, <sup>15</sup>N) content for seven seagrass species on Inhaca Island, Mozambique" *Estuarine Research Federation Meeting*

### Invited talks

- 2017 "CityWaterBalance: an open workflow with R, Git, GitHub" *US EPA Data Analytics and Community of Practice* webinar September 21, 2017
- 2015 "Arsenic in deep groundwater: a new source in the Mekong Delta, Vietnam linked to human activities" *US EPA Office of Research and Development, Atlantic Ecology Division* August 17, 2015
- 2015 "Hydrogeography in the Mekong Delta: water, people, arsenic, and pathways to sustainability" *University of Vermont Rubenstein School of Environment and Natural Resources* April 14, 2015
- 2015 "Groundwater exploitation and arsenic occurrence in the Mekong Delta aquifer system" *University of Massachusetts Lowell, Department of Environmental, Earth & Atmospheric Sciences* March 2, 2015
- 2013 "Arsenic in Deep Groundwater: InSAR and hydromechanical modeling in the Mekong Delta" *Consortium for the Advancement of Hydrologic Science, Inc (CUAHSI) Early Career Scientist Cyberseminar* October 25, 2013 <https://www.cuahsi.org/PageFiles/ZA2ZZP6HZ3CI2VF.pdf>

### Awards

- 2014 Graduate Student Award for Scholarly/Research Achievement
- 2011 Stanford Graduate Fellowship
- 2009, 2010 McGee Research Grant, Stanford School of Earth Sciences
- 2009 William K Whiteford Fellowship, Stanford School of Earth Sciences
- 2008 Blaustein Fellowship
- 2005 Hydrology Award, University of Virginia
- 2002 Echols Scholar, University of Virginia

## **Skills**

R, Python, Matlab, UNIX scripting, Git/GitHub  
Groundwater flow and transport modeling | MODFLOW/MT3D  
Geographic Information Systems | ArcGIS, QGIS  
Remote sensing | optical and radar  
MS Office | Word, Excel, Access  
Adobe CS | Illustrator, Photoshop, InDesign  
Spatial statistics  
Extensive field and lab experience  
Spanish, high proficiency | speaking, reading, writing

## **Software development and instruction**

R package *CityWaterBalance* v 0.1.0 available on [CRAN](#)  
development version at <https://github.com/USEPA/CityWaterBalance>

Assitant: rhodyRstats: Introduction to R Workshop. University of Rhode Island  
Coastal Institute. 2017-01-19. Materials available at:  
[https://github.com/rhodyrstats/intro\\_r\\_workshop](https://github.com/rhodyrstats/intro_r_workshop)

## **Peer review**

*Nature Geoscience; Scientific Reports, Environmental Science & Technology;  
Geophysical Research Letters; Remote Sensing; Environmental Health Perspectives;  
Estuarine, Coastal and Shelf Science; Water; Advances in Water Resources; Journal of  
Hydrology; Hydrological Sciences Journal; Hydrogeology Journal; Hydrology and Earth  
System Science*

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