



**Exponent®**  
Engineering & Scientific Consulting

## Renan Valenca, Ph.D.

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### Professional Profile

Dr. Renan Valenca is a Senior Associate in Exponent's Environmental & Earth Sciences practice. Dr. Valenca has a background in chemical and environmental engineering with emphasis on water, including stormwater, surface water and ground water, and green infrastructure.

Dr. Valenca has extensive experience with contaminant fate and transport in natural and engineered systems within the vadose and saturated zones. Contaminants within his expertise include pathogens, nutrients, metals, and emerging contaminants, such as microplastics, munitions, PFAS, and wildfire-related contamination. Dr. Valenca has experience advising clients about sustainable soil amendments (e.g., biochar, iron filings, compost, fly ash) utilized to improve contaminant removal during water infiltration. Throughout his graduate studies, Dr. Valenca developed climate-resilient stormwater treatment systems through a combination of laboratory and in-situ experiments. He optimized these stormwater systems to enhance the degradation of specific contaminants based on local climate conditions. Dr. Valenca is a registered Chemical Engineer in Brazil, where he worked in the ceramic industry developing waste management and reutilization programs and supporting the QA/QC process of ceramic tile production.

### Academic Credentials & Professional Honors

Ph.D., Civil Engineering, University of California, Los Angeles (UCLA), 2022

M.S., Civil Engineering, University of California, Los Angeles (UCLA), 2018

B.Sc., Chemical Engineering, Universidade Federal de Alfenas, Brazil, 2016

B.Sc., Science and Technology, Universidade Federal de Alfenas, Brazil, 2014

National Science Foundation Research Traineeship – Food, Energy and Water Systems, 2020-2021

University of California Los Angeles Dissertation Year Fellowship, 2020-2021

Los Angeles Urban Center Fellowship, 2020-2021

Martin Rubin Scholarship – High Achieving Civil and Environmental Engineering Graduate Student, 2020

### Prior Experience

Senior Researcher & Laboratory Manager, UCLA Subsurface Engineering & Analysis Laboratory, 2017–2022

Teaching Assistant, University of California Los Angeles, 2018–2022

Chemical Engineering Intern, Porto Ferreira Ceramic Industry, 2015

Research and Development Laboratory Analyst Intern, Porto Ferreira Ceramic Industry, 2012

## Professional Affiliations

American Society of Civil Engineers (ASCE)

American Chemical Society (ACS)

Bay Area Water Works Association (BAWWA)

## Languages

Portuguese (Brazil)

Italian (Italy)

Spanish

## Publications

Valenca R, Garcia L, Espinosa C, Flor D, Mohanty SK. Can water composition and weather factors predict fecal indicator bacteria removal in retention ponds in variable weather conditions? *Science of The Total Environment* 2022. 156410.

Valenca R, Borthakur A, Le H, Mohanty SK. Biochar role in improving pathogens removal capacity of stormwater biofilters. *Advances in Chemical Pollution, Environmental Management and Protection* 2021. Vol. 7, pp. 175-201.

Ghavanloughajar M, Borthakur A, Valenca R, McAdam M, Khor CM, Dittrich TM, Stenstrom MK, Mohanty SK. Iron amendments minimize the first-flush release of pathogens from stormwater biofilters. *Environmental Pollution* 2021. 281:116989.

Valenca R, Le H, Zu Y, Dittrich TM, Tsang DC, Datta R, Sarkar D, Mohanty SK. Nitrate removal uncertainty in stormwater control measures: Is the design or climate a culprit? *Water Research* 2021. 190:116781.

Valenca R, Borthakur A, Zu Y, Matthiesen EA, Stenstrom MK, Mohanty SK. Biochar selection for *Escherichia coli* removal in stormwater biofilters. *Journal of Environmental Engineering* 2021. 147(2):06020005.

Tirpak RA, Afrooz AN, Winston RJ, Valenca R, Schiff K, Mohanty SK. Conventional and amended bioretention soil media for targeted pollutant treatment: A critical review to guide the state of the practice. *Water Research* 2021. 189:116648.

Le H, Valenca R, Ravi S, Stenstrom MK, Mohanty SK. Size-dependent biochar breaking under compaction: implications on clogging and pathogen removal in biofilters. *Environmental Pollution* 2020. 266:115195.

Baalousha M, Wang J, Nabi MM, Loosli F, Valenca R, Mohanty SK, Afrooz N, Cantando E, Aich N. Stormwater green infrastructures retain high concentrations of TiO<sub>2</sub> engineered (nano)-particles. *Journal*

of hazardous materials 2020. 392:122335.

Valenca R, Ramnath K, Dittrich TM, Taylor RE, Mohanty SK. Microbial quality of surface water and subsurface soil after wildfire. *Water Research* 2020. 175:115672.

Ghavanloughajar M, Valenca R, Le H, Rahman M, Borthakur A, Ravi S, Stenstrom MK, Mohanty SK. Compaction conditions affect the capacity of biochar-amended sand filters to treat road runoff. *Science of the Total Environment* 2020. 735:139180.

Berger AW, Valenca R, Miao Y, Ravi S, Mahendra S, Mohanty SK. Biochar increases nitrate removal capacity of woodchip biofilters during high-intensity rainfall. *Water Research* 2019. 165:115008.

Valença RL, Ferraço F. Reutilization of the Solid Waste Materials Produced by a Ceramic Tiles Industry as a Raw Material for the Production of New Ceramic Tiles. In *Materials Science Forum* 2018. Vol. 912, pp. 180-184.

#### **Presentations**

**Valenca, R. and Mohanty, S.K. The relative importance of climate and design on nitrate removal in stormwater control measures. American Chemical Society Spring 2021 National Meeting. San Diego, CA, USA. March 20-24, 2021.**

**Valenca, R. and Mohanty, S.K. Turning the Nation's road infrastructure into a network of stormwater treatment systems. Council for Watershed Health (CWH) Rain or Shine: Soaking Up Success Symposium, Los Angeles, CA, USA. October 15, 2020.**

**Valenca, R. and Mohanty, S.K. Designing Resilient Stormwater Treatment Systems to Mitigate Climate Change Impact. ASCE International Conference on Sustainable Infrastructure. Los Angeles, CA, USA. November 7-9, 2019.**

**Valenca, R. and Mohanty, S.K. Microbial risk from wildfire residues. 258th American Chemical Society National Meeting, San Diego, CA, USA. August 25-29, 2019.**

**Valenca, R., Kalra, S., Lothe, A., Mahendra, S., and Mohanty, S.K. Fungi-augmented biofilters for the removal of energetic compounds from stormwater runoff and groundwater. 256th American Chemical Society National Meeting, Boston, MA, USA. August 19-23, 2018.**

**Valenca, R. L., Ferraco, F. Reutilization of the Solid Waste Materials Produced by a Ceramic Tiles Industry as a Raw Material for the Production of New Ceramic Tiles. 60th Brazilian Congress on Ceramics, Águas de Lindoia, SP, Brazil. May 15-18, 2016.**

**Le H, Valenca R, Ravi S, Stenstrom MK, Mohanty SK. Size-dependent biochar breaking under compaction: implications on clogging and pathogen removal in biofilters. *Environmental Pollution* 2020. 266:115195.**

**Baalousha M, Wang J, Nabi MM, Loosli F, Valenca R, Mohanty SK, Afrooz N, Cantando E, Aich N. Stormwater green infrastructures retain high concentrations of TiO<sub>2</sub> engineered (nano)-particles. *Journal of hazardous materials* 2020. 392:122335.**

**Valenca R, Ramnath K, Dittrich TM, Taylor RE, Mohanty SK. Microbial quality of surface water and subsurface soil after wildfire. *Water Research* 2020. 175:115672.**

**Ghavanloughajar M, Valenca R, Le H, Rahman M, Borthakur A, Ravi S, Stenstrom MK, Mohanty SK. Compaction conditions affect the capacity of biochar-amended sand filters to treat road runoff. *Science of the Total Environment* 2020. 735:139180.**

**Berger AW, Valenca R, Miao Y, Ravi S, Mahendra S, Mohanty SK. Biochar increases nitrate**

**removal capacity of woodchip biofilters during high-intensity rainfall. Water Research 2019. 165:115008.**

**Valença RL, Ferraço F. Reutilization of the Solid Waste Materials Produced by a Ceramic Tiles Industry as a Raw Material for the Production of New Ceramic Tiles. In Materials Science Forum 2018. Vol. 912, pp. 180-184.**

## Project Experience

### Stormwater treatment systems

Assessed the capacity of different biochar materials to remove pathogens from stormwater and provided guidance to stormwater managers for selecting biochar materials from suppliers. Performed laboratory studies with model biofilters to assess the removal of *Escherichia coli* and built statistical models to link short-term and long-term bacterial removal capacities of biochar with its commonly reported properties (surface area, carbon content, ash content, and volatile organic carbon content).

Advised stormwater engineers on testing procedures to choose the best soil amendment to remove nutrients, pathogens, and heavy metals from stormwater using bioretention systems that would be widely implemented in a major West Coast city. Assisted with influent water characterization, data processing, and experiment QA/QC.

### Water contamination risk

Evaluated the potential risks related to pathogen development in spa mud therapy material and the ingestion of locally-sourced mineral water. Developed reports, assisted with marketing strategies, and advised on how to utilize the local mineral water for drinking and irrigation purposes.

### Industrial waste management

Researched natural and engineered remediation strategies to manage phosphate-contaminated industrial wastewater prior to disposal. Evaluated the removal performance of biofilters for phosphate-contaminated water in the laboratory and designed cleanup strategy options including floating wetlands, submerged adsorbing material bags, and filtration-based systems.

Developed a waste management program to reutilize ceramic tile waste materials as raw materials. Analyzed the performance of the new ceramic tile recipe and quantified the cost reduction of the new waste management program.

## Peer Reviews

Water Research

Science of the Total Environment

Blue Green Systems