SIDHU, Balsher Singh

Postdoctoral Research Fellow
Institute for Resources, Environment and Sustainability
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CURRENT AFFILIATION

Postdoctoral Research Fellow 2021 – present
Institute for Resources, Environment and Sustainability
The University of British Columbia, Vancouver, Canada

EDUCATION

Ph.D., Resources, Environment and Sustainability 2016 – 2021
The University of British Columbia, Vancouver, Canada
Dissertation: Indian agriculture in a changing climate: A statistical analysis

M.A.Sc., Civil Engineering 2013 – 2016
The University of Toronto, Toronto, Canada
Thesis: Pre-oxidation strategies for improvement of biofiltration performance

B.Tech., Civil Engineering 2009 – 2013
The Indian Institute of Technology Delhi, New Delhi, India
Thesis: Performance evaluation of AERMOD and CALINE4 for air quality modelling

PUBLICATIONS

Articles under review

- **Sidhu BS** (2022). Likely impacts of the 2022 heatwave on India's wheat production. [Preprint]

Refereed journal articles

- **Sidhu BS**, Mehrabi Z, Ramankutty N, Kandlikar M (2023). How can machine learning help in understanding the impact of climate change on crop yields? *Environmental Research Letters*, *18*(2), 024008. doi.org/10.1088/1748-9326/acb164
- **Sidhu BS**, Mehrabi Z, Kandlikar M, Ramankutty N (2022). On the relative importance of climatic and non-climatic factors in crop yield models. *Climatic Change*, *173*(1), 1-21. doi.org/10.1007/s10584-022-03404-0
- Mehrabi Z, …, **Sidhu BS**, et al. (2022). Research priorities for global food security under extreme events. *One Earth*, *5*(7), 756-766. doi.org/10.1016/j.oneear.2022.06.008
- Ricciardi V, Wane A, **Sidhu BS**, et al. (2020). A scoping review of research funding for small-scale farmers in water scarce regions. *Nature Sustainability*, *3*, 836-844. doi.org/10.1038/s41893-020-00623-0
- **Sidhu BS**, Kandlikar M, Ramankutty N (2020). Power tariffs for groundwater irrigation in India: A comparative analysis of the environmental, equity, and economic tradeoffs. *World Development*, *128*, 104836. doi.org/10.1016/j.worlddev.2019.104836
- **Sidhu BS**, Taylor-Edmonds L, McKie MJ, Andrews RC (2018). Pre-oxidation strategies for biofiltration performance improvement. *Journal of Water Process Engineering*, *26*, 116-123. doi.org/10.1016/j.jwpe.2018.09.007

- Peleato NM, **Sidhu BS**, Legge, RL, Andrews RC (2017). Investigation of ozone and peroxone impacts on natural organic matter character and biofiltration performance using fluorescence spectroscopy. *Chemosphere*, *172*, 225-233. doi.org/10.1016/j.chemosphere.2016.12.118
- Gulia S, **Sidhu BS**, Khare M (2016). Comparative performance evaluation of CALINE4 and AERMOD for air quality assessment under heterogeneous traffic condition. *Consulting Ahead*, *10*, 40-48.
- Sahoo DR, **Sidhu BS**, Kumar A (2015). Behavior of unstiffened steel plate shear wall with simple beam-to-column connections and flexible boundary elements. *International Journal of Steel Structures*, *15*, 75-87. doi.org/10.1007/s13296-015-3005-5

Reports

- Mukherji A, …, **Sidhu BS**, et al. (2022). Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report. Working Group II. Chapter 4: Water. [link]
- Mukherji A, …, **Sidhu BS**, et al. (2021). Effectiveness of Water adaptation responses in reducing climate related risks: A meta review. *Australian Centre for International Agricultural Research*. Canberra, Australia. [link]

Book chapters

- **Sidhu BS**, Sharma D, Tuteja T, Gupta S, Kumar A (2014). Human health risk assessment of heavy metals from Bhalaswa landfill. In Raju NJ, Gossel W, Sudhakar M. (Eds.), *Management of Natural Resources in a Changing Environment*. 215-223. Switzerland: Springer International Publishing. doi.org/10.1007/978-3-319-12559-6_16

Non-refereed publications

- **Sidhu BS** (2022). Half the world is facing water scarcity, floods and dirty water — large investments are needed for effective solutions. In *The Conversation*. 28 Feb 2022. [link]
- **Sidhu BS** (2021). Farm reform needed for sustainability, but government's three acts won't deliver it. In *The India Cable*. 12 Mar 2021. [link]
- **Sidhu BS** (2020). Groundwater depletion in Punjab: Time for a major policy overhaul. In *Thrive, CGIAR Research Program on Water, Land and Ecosystems*. 5 Jun 2020. [link]
- **Sidhu BS** (2019). Don't demonise farmers. In *The Tribune*. New Delhi, India. 18 Nov 2019. [link]

PREVIOUS WORK AND RESEARCH EXPERIENCE

Contributing author, IPCC Sixth Assessment Report 2022 (Working Group II) 2020 – 2022
Contributing author for the Water chapter of the IPCC Sixth Assessment Report 2022 (Working Group II)

Short Term Consultant, The World Bank 2019 – 2020
Worked on chapter 13 (climate change) in The World Bank Sustainable Development Goals Atlas to discuss climate change trends, patterns, and consequences through interactive data visualizations

Researcher, CERES2030: Sustainable solutions to end hunger 2019 – 2020
Used machine learning methods for providing policy options (to the global donor community) on agricultural interventions that can improve farm income and productivity in water-scarce regions

Graduate research assistant, The University of British Columbia 2016 – 2021
Studied the impact of climate change on India's crop yields, and strategies to increase climate-resilience of Indian agriculture

Graduate academic assistant, The University of British Columbia 2018 – 2019
Developed data-driven, interdisciplinary case study modules for teaching sustainability analyses

Graduate research assistant, The University of Toronto 2013 – 2016
Operated and maintained a pilot-scale drinking water treatment plant to investigate pre-oxidation strategies for enhancing the performance of biological water filters

Trainee engineer, Shimizu Corporation India Pvt. Ltd. 2012
Worked on quality control and project management teams at a Honda construction project in Bhiwadi, India

Summer undergraduate researcher, Indian Institute of Technology Delhi 2011
Fabricated and tested steel shear walls as seismic-energy dissipaters for multi-storey buildings

INVITED TALKS AND CONFERENCE PRESENTATIONS

Invited talks

- What can statistical models tell us about future crop yields? At *Achieving the Sustainable Development Goals in Theory and Practice*. University of Delaware, USA. 07 Oct 2022.
- Making Indian agriculture resilient to climate change. At *Early Career Researchers Talk Series*. International Water Management Institute (virtual). 19 Sep 2022.
- Impact of climate variability on Indian crop yields. At *Science and Technology for the New Age: Acquisition, Analyses & Adaptation*. University of Alberta & IIT Delhi (virtual). 04 Mar 2021.
- Sensitivity of crop yields to climate variability. At *Food Seminar Series*. University of Sussex (virtual). 03 Mar 2021.

Conference presentations

- **Sidhu BS**, Ramankutty N, Kandlikar M, Donner SD (2022). Reconciling land-based natural climate solutions with clean fuel requirements for achieving net-zero emissions in Canada. *AGU Fall Meeting 2022*.
- **Sidhu BS**, Kandlikar M, Ramankutty N (2021). Indian agriculture in a changing climate: Using CMIP6 projections for predicting yields of multiple crops to 2100. *AGU Fall Meeting 2021*.
- **Sidhu BS**, Mehrabi Z, Kandlikar M, Ramankutty N (2020). Machine learning methods for estimating the impact of climate change on Indian crop yields. *AGU Fall Meeting 2020*.
- **Sidhu BS**, Kandlikar M, Ramankutty N (2019). Sub-seasonal monsoon variability as a driver of crop yields in India. *Water Future Conference*. Indian Institute of Science, Bangalore, India.
- **Sidhu BS**, Kandlikar M, Ramankutty N (2019). Power tariffs for groundwater irrigation in India: A comparative analysis of the environmental, equity, and economic tradeoffs. *Water Future Conference*. Indian Institute of Science, Bangalore, India.
- **Sidhu BS**, Mehrabi Z, Kandlikar M, Ramankutty N (2019). Assessing the resilience of Indian agriculture to monsoon variability. *Global Land Project*. University of Bern, Bern, Switzerland.
- **Sidhu BS**, Kandlikar M, Ramankutty N (2018). Restructuring agricultural power tariffs in India to meet multiple Sustainable Developments Goals. *Sustainability and Development Conference 2018*. University of Michigan, Ann Arbor, United States.
- **Sidhu BS**, Kandlikar M, Ramankutty N (2018). Optimized agricultural power tariffs as a means of achieving Sustainable Developments Goals in India. *International Conference on Engaging Canada and India: Challenges of Sustainable Development Goals*. New Delhi, India.
- **Sidhu BS**, Taylor-Edmonds L, McKie MJ, Andrews RC (2016). Combining biofiltration with pre-oxidation for improved removal of organic matter. *Water Quality Technology Conference and Exposition*. Indianapolis, United States.

- **Sidhu BS**, Taylor-Edmonds L, Andrews RC (2016). Pre-oxidation strategies for biofiltration performance improvement. *Canadian National Conference on Drinking Water*. Ottawa, Canada.
- **Sidhu BS**, Nemani V, Ondul B, Sharma D, Wong K (2016). In-pipe hydroelectricity generation from wastewater flow. *Cities of Tomorrow Showcase*. Toronto, Canada.
- **Sidhu BS**, Sharma, D, Tuteja, T, Gupta, S, Kumar, A (2013). Human health risk assessment of heavy metals from Bhalaswa landfill. *International Humboldt Kolleg on Management of Water, Energy and Bio-resources in Changing Climate Regime*. New Delhi, India.
- **Sidhu BS**, Pandit A, Kumar A (2012). Titanium dioxide nanoparticles removal from water. *6th World Aqua Congress*. New Delhi, India.

TEACHING EXPERIENCE

Course Instructor, Analytical Methods in Sustainability Science (ENVR440), UBC 2022
- **96% "favorable" score** (students who "agreed" / "strongly agreed") for facilitating overall learning
- **Letter of commendation** from the Dean of Sciences for some of the highest student evaluations

Course Instructor, Climate Change & Energy Futures (IRES VSP), UBC 2018 – 2019
With the help of four faculty members, I designed and taught a course on climate change and energy in UBC's Vancouver Summer Programs 2018 and 2019

Climate Expert, Climate Teaching Connector, UBC 2020 – present
Collaborating with multiple course instructors to deliver guest lectures on climate change and climate justice in undergraduate courses

Graduate Teaching Assistant, UBC 2017 – 2019
Courses: Introduction to sustainability, Analytical methods in sustainability, Sustainable energy: policy and governance

Graduate Teaching Assistant, University of Toronto 2013 – 2015
Courses: Water and wastewater treatment processes, Urban engineering ecology, Environmental impact and risk assessment

Undergraduate Teaching Assistant, IIT Delhi 2012 – 2013
Courses: Indian economic problems and policies, Introduction to environmental engineering

TEACHING CERTIFICATION

Course Instructor, Instructional Skills Workshop, UBC 2017
Associate, Centre for the Integration of Research, Teaching and Learning 2017

SCHOLARSHIPS AND AWARDS

Scholarships
- Vanier Canada Graduate Scholarship, NSERC Canada (150,000 CAD) 2018 – 2021
- Four Year Doctoral Fellowship, UBC (107,000 CAD) 2016 – 2020
- Olav Slaymaker Scholarship for Environment, UBC (10,000 CAD) 2016
- Graduate Student Fellowship, University of Toronto (10,500 CAD) 2013 – 2015
- Graduate Research Assistant Scholarship, University of Toronto (55,500 CAD) 2013 – 2016
- Scholarship for Academic Excellence, IIT Delhi 2011 – 2012
- National Talent Search Examination Scholarship, Government of India (36,000 INR) 2007 – 2013

Awards

- Graduate Student Travel Award, UBC 2018
- RES Student Travel Award, UBC 2016
- Faculty of Science Graduate Award, UBC 2016
- Winner, Cities of Tomorrow competition, Ontario Urban Mayors' Caucus, Canada 2016
- Summer Undergraduate Research Award, IIT Delhi 2011
- Third Rank, National Frank Anthony Memorial Debate 2007

PUBLIC OUTREACH

Are we running out of clean water?
Collaborated with TED-Ed to produce a short video lesson, accessible to a general audience, on the world's water use patterns and the role citizens can play in ensuring sustainable water consumption

Print, television, and radio interviews
Interviewed for my expertise on climate change and food systems by CBC (interview 1, interview 2), Omni News, Associated Press, Red FM (interview 1, interview 2) and The Conversation

Collaborator, The Colours of Food Security
An exhibit by the Land Use and Global Environment lab at UBC to showcase a series of maps which present a vivid picture of global agriculture and key issues surrounding our food systems

Contributor, The Nature of Food
A collaborative blog project of the Land Use and Global Environment lab at UBC on everything related to agriculture, food security, environment, and academia in general

LEADERSHIP AND SERVICE TO THE COMMUNITY

Reviewed articles for *PNAS*, *World Development*, *Climatic Change, Environmental Research Letters*, *Water Security, Theoretical and Applied Climatology*, *Agricultural Economics*

- **Mentor**, UBC Research Experience program (REX) 2022 – present
- **Mentor**, Project EduAccess 2022 – present
- **Executive member**, Postdoctoral Association, UBC 2022 – present
- **Expert reviewer**, Alberta Innovates 2021 – present
- **Student representative**, Climate Emergency Fund Advisory Committee, UBC 2021
- **Session moderator**, Sustainability & Development Conference, Univ. of Michigan 2018, 2021
- **Treasurer**, IRES Student Society, UBC 2017 – 2018
- **Graduate student mentor**, IRES, UBC 2017 – 2018
- **Student representative**, Graduate Council, UBC 2016 – 2018
- **Undergraduate researcher mentor**, Civil Engineering Department, Univ. of Toronto 2015
- **Session moderator**, Univ. of Toronto Sustainability Conference 2015
- **President**, Ontario Water Works Association, Univ. of Toronto Chapter 2014 – 2015
- **Organizer**, Indo-German Symposium: Sustainable Environment, IIT Delhi 2012
- **Mess secretary**, Shivalik Hostel, IIT Delhi 2011 – 2012
- **Student representative**, Board for Undergraduate Studies, IIT Delhi 2011 – 2012
- **Student representative**, Co-curricular and Academic Interaction Council, IIT Delhi 2011 – 2012