Duminda Vidana Gamage, Ph.D.

Senior Lecturer in Soil Physics

Department of Soil Science, Faculty of Agriculture

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Profile Summary

Academic with over a decade of experience in teaching and research in soil physics and hydrology, with a specific focus on:

- Soil moisture sensing and modeling across scales
- Vadose-zone hydrology and solute transport
- Climate-soil-water interactions in agricultural systems
- Applications of biochar for improving soil hydraulic properties
- Development and calibration of IoT-based soil sensors
- Application machine learning for predicting soil properties

Education

- **Ph.D. in Soil Physics**, McGill University, Canada (2014–2019)
  - Thesis: *New sensing technique to quantify spatio-temporal dynamics of soil water from point to field scale*
  - Supervisors: Prof. Asim Biswas, Prof. Ian Strachan
  - Date awarded: 19th February 2019
- **M.Sc. in Environmental Soil Science**, University of Peradeniya, Sri Lanka (2009–2012)
  - Thesis: *Digital mapping of soil properties using soil landscape relationships*
  - *Supervisors:* Prof. Udaya Vitharana & Prof. Ranjith B. Mapa
  - GPA: 3.89/4.0
  - Date awarded: 07th May 2012
- **B.Sc. (Hons) in Agricultural Technology & Management, Major in Soil Science** (2005–2009)
  - Thesis: *Use of GIS for fertility mapping of rice growing soils*
  - Supervisor: Prof. Ranjith B. Mapa
  - Date awarded: 27th April 2009

Academic & Professional Experience

- Head, Department of Soil Science, University of Peradeniya (2025–present)
- Senior Lecturer, Department of Soil Science, University of Peradeniya (2019–present)
- Doctoral research, Department of Natural Resource Sciences, McGill University (2014–2019) (Study leave period)
- Graduate Research & Teaching Assistant, McGill University (2014–2019)
- Lecturer, University of Peradeniya (2013–2019)
- Research Scientist, Soils & Plant Nutrition Division, Coconut Research Institute (2012–2013)
- Teaching Assistant, University of Peradeniya (2009–2011)

Teaching experience

- Undergraduate teaching
  - SS1101 - Soil Resources & Ecosystem (2 credits, 2019–present)
  - SS1201 - Properties & Functions of Soil (3 credits, 2019 –present)
  - SS3201 - Soil Physics (2 credits, 2019–present)
  - SS 4102 - Land Degradation & Conservation (2 credits, 2019–present)
- Graduate teaching
  - SS5101 - Environmental Soil Physics (3 credits, 2019–present)
  - SS 6201 - Land use & Environment (2 credits, 2019–present)

Supervision & Mentorship

- Currently supervising four (4) M.Sc. students
- Supervised over ten (10) undergraduate thesis student projects.

Research Impacts

- Total number of citations (as of 18th April 2025)
  - Google scholar – 391
- Indices (as of 18th April 2025)
  - Google Scholar h-index: 8
  - Google Scholar i10-index: 7
  - ResearchGate Interest score: 309.2

Publications

- Peer Reviewed Journal Papers (selected)
  - **Vidana Gamage, D.N.,** Peiris, T., Kasthuriarachchi, I., Mohotti, K.M., and Biswas, A. 2025. Enhancing Soil Resilience to Climate Change: Long-Term Effects of Organic Amendments on Soil Thermal and Physical Properties in Tea-Cultivated Ultisols. Sustainability. 17: 1184. https://doi.org/10.3390/su17031184

  - Kularathna, K.M., **Vidana Gamage, D.N**., Wijewardana, Y.N.S., and Herath, H.M.S.K. (2024). Effects of Conversion of Rubber to Oil Palm Plantations on Soil Properties and Hydrological Dynamics in the Low Country Wet Zone of Sri Lanka. Tropical Agricultural Research. DOI: 10.4038/tar.v35i3.8789

  - Ghosh, M., Ashiq, W., Bhogilal Vasava, H., **Vidana Gamage, D. N**., Patra, P. K., & Biswas, A. (2021). Short-term carbon sequestration and changes of soil organic carbon pools in rice under integrated nutrient management in India. *Agriculture*, *11*(4), 348. https://doi.org/10.3390/agriculture11040348

  - **Vidana Gamage, D. N**., Vasava, H. B., Strachan, I. B., Adamchuk, V. I., & Biswas, A. (2021). Comparison of heating strategies on soil water measurement using actively heated fiber optics on contrasting textured soils. *Sensors*, *21*(3), 962. https://doi.org/10.3390/s21030962

  - **Vidana Gamage, D. N**., Biswas, A., & Strachan, I. B. (2020). Scale and location dependent time stability of soil water storage in a maize cropped field. *CATENA*, *188*, 104420. https://doi.org/10.1016/j.catena.2019.104420

  - **Vidana Gamage, D. N**., Biswas, A., & Strachan, I. B. (2019). Spatial variability of soil thermal properties and their relationships with physical properties at field scale. *Soil and Tillage Research*, *193*, 50–58. https://doi.org/10.1016/j.still.2019.05.012

  - **Vidana Gamage, D. N**., Biswas, A., & Strachan, I. B. (2019). Field water balance closure with actively heated fiber-optics and point-based soil water sensors. Water, 11(1), 135. https://doi.org/10.3390/w11010135

  - **Vidana Gamage, D. N**., Biswas, A., Strachan, I., & Adamchuk, V. (2018). Soil water measurement using actively heated fiber optics at Field Scale. *Sensors*, *18*(4), 1116. https://doi.org/10.3390/s18041116

  - **Vidana Gamage, D. N**., Biswas, A., & Strachan, I. B. (2018). Actively heated fiber optics method to monitor three-dimensional wetting patterns under drip irrigation. *Agricultural Water Management*, *210*, 243–251. https://doi.org/10.1016/j.agwat.2018.08.019

- **Vidana Gamage, D. N**., Mapa, R. B., Dharmakeerthi, R. S., & Biswas, A. (2016). Effect of rice-husk biochar on selected soil properties in Tropical Alfisol. *Soil Research*, *54*(3), 302. https://doi.org/10.1071/sr15102

- **Vidana Gamage, D. N**., Vitharana, W. A. U., & Mapa, R. B. (2011). Geostatistical analysis of soil properties to support spatial sampling in a paddy growing alfisol. *Tropical Agricultural Research*, *22*(1), 34. https://doi.org/10.4038/tar.v22i1.2668

- Conference Proceedings (selected)
  - Rangana A.M.N., **Vidana Gamage, D.N.,** and Perera R.A.C.J. 2025. Impacts of Deficit Irrigation Strategies on the Growth of Chili (Capsicum Annum L.) Cultivated in Reddish Brown Earth Soil in Sri Lanka. Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, Faculty of Agriculture, University of Peradeniya.

  - Rajapaksa S.S., **Vidana Gamage, D.N.,** and Kodikara K.M.S. 2025. Assessing the Effects of Substrate and Fertilizer Mixtures on the Growth and Yield of Salad Cucumber (Cucumis sativus L.) Cultivated Under Protected Agriculture Conditions. Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, Faculty of Agriculture, University of Peradeniya.

  - Kasthuri Arachchi, K.A.I.L., and **Vidana Gamage, D.N. 2025**. Evaluating Machine Learning Methods to Predict Water Retention Properties of Tropical Soils. Pages 188 9th International Conference Agri-Next Future Trends in Agriculture. Brainware University, Kolkata, Brainware University, Kolkata.

  - Madhumali, D.P.S.S., **Vidana Gamage, D.N.,** Rathnayaka R.A.A.S. and Duminda, D.M.S. 2024. Evaluating soil aggregate stability of organically and conventionally grown tea plantations in Uva region of Sri Lanka. In 16th Annual Symposium Proceedings. Paper presented at the 16th Annual Research Symposium of the Faculty of Agriculture, Rajarata University of Sri Lanka held on 20th November 2024 (pp. [24]). Anuradhapura: Faculty of Agriculture, RUSL.

  - Kodikara, P.L., **Vidana Gamage, D.N.,** and N.A.R., 2023. Evaluating Different Coir-based Substrate Mixtures on the Growth of Salada Cucumber (Cucumis sativus) in Protected Agriculture under Varied Fertigation Frequencies. Pages 28, Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, Faculty of Agriculture, University of Peradeniya.

- Sathiyaseelan, P., Munasinghe, S.T., Dharmakeerthi, R.S., and **Vidana Gamage, D.N.** 2022. Impacts of biochar and compost on soil hydrological dynamics of a tropical Alfisol. ASA, CSSA, SSSA International Annual Meeting.
- Kasthuri Arachchi, K.A.I.L. & **Vidana Gamage, D.N**. (2022). Developing a Soil Moisture Content Monitoring System Based on Internet of Things Technology (IoT). Paper presented at the Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, University of Peradeniya.

- Perera, L.D.P., **Vidana Gamage, D.N**. & Nissanka N.A.A.S.P. (2022). Investigating the Water Usage of Oil Palm (Elaeis guineensis) and Rubber (Hevea brasiliensis) Trees in the Low Country Wet Zone of Sri Lanka. Paper presented at the Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, University of Peradeniya.

- Peiris, T.T.K., **Vidana Gamage, D. N**., & Mohotti, K.M. (2022). Influence of long-term application of organic amendments on soil thermal properties. Paper presented at the Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, University of Peradeniya.

- Kularathna, K.M., **Vidana Gamage, D. N**., Dharmakeerthi, R. S., & Nugawela, R.C.W.M. R.A. (2022). Investigating selected soil properties of young Oil palm and rubber plantation in the low country wet zone of Sri Lanka. Paper presented at the 34th Annual Congress of Postgraduate Institute of Agriculture, University of Peradeniya.

- Sathiyaseelan, P., Munasinghe S.T., Dharmakeerthi, R. S., & **Vidana Gamage, D. N**. (2022). Impacts of biochar and compost on soil hydrological dynamics of a tropical Alfisol. Paper presented at the ASA, CSSA, SSSA International Annual Meeting.

- Chandrasekara, K. A. H. D., Abeyrathna, R. M. R. D., **Vidana Gamage, D. N**., & Nissanka, S.P., (2021). Validation of Implexx sap flow sensor to determine the crop water usage of oil palm (Elaeis guineensis). Paper presented at the Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, University of Peradeniya.

- Rathnasiri, G. A. G. I., **Vidana Gamage, D. N.**, Dharmakeerthi, R. S., & Munasinghe, S. T. (2021). Evaluation of Hydrus 1D hydrological model to simulate soil water content dynamics in a tropical Alfisol cultivated with corn (Zea mays). Paper presented at the Faculty of Agriculture Undergraduate Research Symposium, University of Peradeniya.

- Edirisinghe, G. E. A. S. J., **Vidana Gamage, D. N**., Dharmakeerthi, R. S., & Munasinghe, S. T. (2021). Effects biochar & compost on soil hydrological dynamics in an Alfisol cultivated with Corn in the Dry zone of Sri Lanka. Paper presented at the Faculty of Agriculture Undergraduate Research Symposium University of Peradeniya.

- Sathiyaseelan, P., Munasinghe S.T., Dharmakeerthi, R. S., & **Vidana Gamage, D. N**. (2020). Impact of biochar and compost on soil physical and hydrological properties of an Alfisol cultivated with Corn in the dry zone of Sri Lanka. Paper presented at the Faculty of Agriculture Undergraduate Research Symposium Faculty of Agriculture, University of Peradeniya.

- **Vidana Gamage, D. N**., Biswas, A., & Strachan, I. B. (2018). Seasonal dependent time stability of soil water storage within a maize cropped field. Paper presented at the Canadian Soil Science Society Annual Meeting, Niagara Falls.

- **Vidana Gamage, D. N.**, Biswas, A., & Strachan, I. B. (2018). Soil water measurement from laboratory soil column to field scales using actively heated fiber optics. Paper presented at the 20th EGU General Assembly, EGU2018, Vienna, Austria.

- **Vidana Gamage, D. N.**, Biswas, A., & Strachan, I. B. (2017 a). Active heat pulse method with fiber optic temperature sensing to monitor three-dimensional wetting patterns under drip irrigation. Paper presented at the Canadian Soil Science Society Annual Meeting Trent University, Peterborough Ontario

- **Vidana Gamage, D. N.**, Biswas, A., & Strachan, I. B. (2017b). High resolution soil moisture monitoring using active heat pulse method with fiber optic temperature sensing. Paper presented at the Canadian Soil Science Society Annual Meeting Trent University, Peterborough Ontario.

- **Vidana Gamage, D. N.** & Biswas, A. (2016). Comparison of power and heating time in fiber optic distributed temperature sensing to measure soil water. Paper presented at the Canadian Soil Science Society Annual Meeting Kamloops, BC, Canada.

- **Vidana Gamage, D. N**., Mapa, R. B., Dharmakeerthi, R. S., & Biswas, A. (2015). Impact of rice husk biochar on selected soil properties of two Alfisols of Sri Lanka. Paper presented at the Soil Interfaces for Sustainable Development-ISMOM McGill University, Montreal, Canada.

- **Book chapters**
  - Nissanka, S.P., Dharmakeerthi, R.S., Dandeniya, W.S., and **Vidana Gamage, D.N.** 2024. Nutrient and Soil Moisture Dynamics Under Changing Climate. Pages 355-395 in M.M. Rahman, J.C. Biswas and R.S. Meena, eds.Climate Change and Soil-Water-Plant Nexus: Agriculture and Environment. Springer Nature Singapore, Singapore. Available: https://doi.org/10.1007/978-981-97-6635-2_12.

  - **Vidana Gamage, D. N**., Delisle, J., Bissonnette, B. A., & Biswas, A. (2019). Soil Physical Properties in Biochar Amended Soils: Challenges and Perspectives for Agronomic Implications. In A. Rakshit, B. Sarkar, & P. Abhilash (Eds.), *Soil Amendments for Sustainability: Challenges and Perspectives* (pp. 428). Boca Raton: CRC Press. https://doi.org/10.1201/9781351027021

Research Grants

- As principal investigator

  - Investigator Driven grants by National Research Council of Sri Lanka (2021-2024) - 13800.00 USD, PI (Title - Investigation of crop water usage and soil hydrological dynamics of oil palm (Elaeis guineensis Jacq.) and rubber (Hevea brasiliensis Muell. Arg.) plantations in the low country wet zone of Sri Lanka).

  - Sri Lanka Council for Agricultural Research & Policy under the national agricultural research plan (2019-2023) - 13000.00 USD, PI (Title -Identifying the impacts of climate variable on soil water and thermal dynamics in selected cropped fields of the Dry Zone of Sri Lanka).

  - University of Peradeniya research grant (startup grant-2019-2022) - 3000.00 USD, PI (Title -Identifying the impacts of climate variable on soil water dynamics in selected rainfed cropped fields of the Dry Zone of Sri Lanka).

  - University of Peradeniya research grant (startup grant-2013-2015) - 1000.00 USD, PI (Title - Impacts of biochar application on soil properties of tropical soils).

- As Core-Investigator

  - Swiss National Science Foundation (SNSF) (2021-2023) 504595.00 USD, project partner, (Title - *Can organic farming practices increase nitrogen (N) use efficiency and decrease N losses in mature tea (Camellia sinensis L. (O.) Kuntze) plantations in Sri Lanka?*).

- Sri Lanka Council for Agricultural Research & Policy under the national agricultural research plan (2021-2023) - 10,000.00 USD, CI (Title - *Long term effect of single application of Rice Husk Biochar and Corn Cob Biochar on physical, hydrothermal properties and carbon dynamics in maize cultivated Reddish Brown Earth soil*).

Supervision & Mentorship

- Currently supervising 4 M.Sc. students
- Supervised over 10 undergraduate thesis projects across themes like IoT sensors, biochar, and irrigation modeling

Awards & Scholarships

- Early carrier research award under the University of Winnipeg Queen Elizabeth II Diamond Jubilee International Scholars Program (2021 March - October 2021) at University of Winnipeg
- Canadian Geophysical Union travel award (2018).
- Best poster award (President's award), Canadian Society of Soil Science (CSSS 2017) annual meeting in Trent University, Peterborough.
- GREAT award - Department of Natural Resource Sciences 2016 and 2018.
- Differential tuition fee waiver award, McGill University (2014-2016).
- Graduate excellence award McGill University (2014-2017).
- Graduate student mobility award (2014-2015).

Selected Presentations

- Oral presentations

  - **Use of Implexx Sap Flow Sensors to Quantify Crop Water Use in Oil Palm**
    Invited talk, Faculty of Agriculture, University of Peradeniya, Sri Lanka, presented to the plantation industry (2022).
  - **Sensing Systems for Quantifying Soil–Plant–Atmosphere Water Dynamics**
    Invited speaker, Annual General Meeting of the Soil Science Society of Sri Lanka (2022).
  - **New Sensing Techniques to Monitor Soil Water Dynamics from Point to Field Scale**
    Invited seminar, Faculty Board, Faculty of Agriculture, University of Peradeniya, Sri Lanka (2021).
  - **Impacts of Biochar and Compost on Soil Hydrological Dynamics of a Tropical Alfisol**

Virtual oral presentation, ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT, USA (2021).

- **Soil Water Measurement from Laboratory to Field Scale Using Actively Heated Fiber Optics**
  Oral presentation, 20th European Geosciences Union (EGU) General Assembly, Vienna, Austria (2018).
- **High-Resolution Soil Moisture Monitoring Using Active Heat Pulse and Fiber Optic Temperature Sensing**
  Oral presentation, Canadian Soil Science Society (CSSS) Annual Meeting, Trent University, Peterborough, ON, Canada (2017).
- **Impacts of Rice Husk Biochar on Soil Properties in Tropical Alfisols**
  Oral presentation, International Symposium on Interactions of Soil Minerals with Organic Components and Microorganisms (ISMOM), McGill University, Montreal, Canada (2015).
- **Digital Soil Mapping Using Soil–Landscape Relationships**
  Invited talk, Mid-Year Technical Sessions, Soil Science Society of Sri Lanka (2012).
- **Geostatistical Analysis for Optimized Spatial Sampling in Paddy-Grown Alfisols**
  Oral presentation, Annual Research Congress, Postgraduate Institute of Agriculture, University of Peradeniya, Sri Lanka (2011).

- Poster presentations

  - **Seasonal Time Stability of Soil Water Storage in a Maize Field**
    Poster presentation, Canadian Soil Science Society Annual Meeting, Niagara Falls, ON, Canada (2018).
  - **Monitoring 3D Wetting Patterns under Drip Irrigation Using Fiber Optics**
    Best Poster Award, Canadian Soil Science Society Annual Meeting, Trent University, Peterborough, ON, Canada (2017).
  - **Comparison of Power and Heating Time for Fiber Optic DTS in Soil Water Measurement**
    Poster presentation, Canadian Soil Science Society Annual Meeting, Kamloops, BC, Canada (2016).

Academic Service

- Chairperson, Board of Study in Soil Science, PGIA (2025–present)
- Secretary, Board of Study in Soil Science, PGIA (2020–2024)
- Peer Reviewer – ORCiD
- Senior Advisor, Soil Science Student Society, Faculty of Agriculture

Workshops and Training Programs

- Certificate course on Leading and Managing Universities (2024)
- Workshop on developing e-Learning Modules in Moodle LMS (April 2022), University of Kelaniya, Sri Lanka.
- Program on Rice Yield Increasing Technology organized by Yuan Longping High - tech Agriculture Co., Ltd. China (August 2019- September 2019).
- Short course on Thermo-TDR sensors organized by North Carolina State University, USA (2018).
- Training on Distributed Temperature Sensing Systems at Oregon State University (June 2015-July 2015).
- Induction training for academic staff at University of Peradeniya, Sri Lanka (2014).
- Workplace Hazardous Materials Information System (WHIMIS) laboratory training at McGill University (2014).
- Hazardous Waste Management & Disposal training at McGill University (2014).
- Training program on ISO/IEC 17025:2005 internal auditing of laboratory management systems conducted by the Sri Lanka Accreditation Board (2013).

Referees

1. Professor Asim Biswas

   School of Environmental Sciences, University of Guelph, Canada

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2. Professor Ian Strachan

   Department of Geography and Planning, Queen's University, Canada

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