# Ram L. Ray, Ph.D., P.E., ACUE

**Professor**

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## EDUCATION

| Institution and Location | Degree | Year | Major Program |
|---|---|---|---|
| The University of New Hampshire, NH, USA | Ph.D. | 2009 | Civil Engineering (Water Resources) |
| Vrije Universiteit Brussel, Belgium | M.S. | 2004 | Soil Science |
| Ghent University Ghent, Belgium | B.S. | 2003 | Complimentary Study in Soil Science |
| Tribhuvan University, Kathmandu, Nepal | B.E. | 1993 | Civil Engineering |

## PROFESSIONAL POSITIONS

- 2023-Present, Professor, Prairie View A&M University, Prairie View, TX
- 2019-2023, Associate Professor, Prairie View A&M University, Prairie View, TX
- 2013-2018, Research Scientist, Prairie View A&M University, Prairie View, TX
- 2011- 2013, Postdoctoral Researcher, University of California (UC), Merced
- 2009-2011, Postdoctoral Researcher, San Diego State University and UC San Diego, CA
- 2005-2009, Graduate Research Assistant, the University of New Hampshire, Durham, NH
- 2002-2004, Graduate Research Fellow, Ghent University & Vrije University, Belgium
- 1996-2002, Civil Infrastructure Engineer, DOLIDAR, Government of Nepal
- 1993-1996, Civil Engineer, TAEC Consult P. Ltd. Nepal

## FELLOWSHIP AND AWARDS

- Excellence in Sponsored Research Awards, Prairie View A&M University (PVAMU)-2023
- Faculty Senate Awards for Excellence in Research in the Tenure Track category, Prairie View A&M University (PVAMU)-2022
- Emerging Research Award, College of Agriculture, Food, and Natural Resources (CAFNR), PVAMU-2022
- NASA Earth System Science Fellowship, USA, 2005-2008
- Vlaamse Interuniversitaire Raad (VLIR) Scholarships, Belgium, 2002-2004
- Tribhuvan University Merit Scholarships, Nepal, 1989-1992
- Excellent job performance award from District Technical Office Sarlahi, Nepal, 2001

**Awards for Student Advisees:**

- Graduate Student Employee of the Year *Tolulope Olutimehin* **Winner**, Prairie View A&M University, 2019-2020
- Graduate Student Employee of the Year *Abayomi Adekanmbi* **Winner**, Prairie View A&M University, 2017-2018
- **1st place award in poster presentation –** Undergraduate Category-Jasmine Hayes, Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) in

Pittsburgh, PA, March 30 – April 1, 2017

- **3rd place award in poster presentation** - Graduate Category – Abayomi Adekanmbi, Association of 1890 Research Directors Research Symposium 2017, April 1- 4, 2017, Atlanta, Georgia, USA.

## FUNDED/ACTIVE GRANTS (* Lead PI)

1. **USDA-NIFA**: Climate-Smart Cotton: Developing Precision Regenerative Practices and Market Opportunities for Addressing Climate Change in the US Cotton Belt. Budget: $10,000,000/$81,836 (PVAMU). **Lead PI**: M. Bagavathiannan (Texas A&M University), Co-PI - **Ram Ray.** 2023-2026.
2. **USDA-ARS**: Developing fiber phenotyping methods for Industrial Hemp. **Budget**: $322,790. **PI**-A. Werasooriya, Co-PI: **R.L. Ray**. 2023-2025.
3. ***USDA-NRCS-Congressional:** Improving the Resilience of Underserved Clientele to Multiple Environmental and Social Stressors. **Budget**: $1.5 million. **PI-R.L. Ray**. 2023-2024.
4. ***USDA-NIFA-EGP**: Biochar Application: A Sustainable Approach to Improve Soil Health and Enhance Soil Carbon Sequestration. **Budget**: $499,500. **PI-R.L. Ray**. 2023-2026.
5. **NSF**: Equipment: MRI: Acquisition of High-Resolution Multichannel Electrical Resistivity Imaging (ERI) System for Interdisciplinary Research. **Budget**: $141,032. PI: Md. J.B. Alam, Co-PI – **Ram Ray**. 2023-2026.
6. **USDA-NIFA**: Fostering Sustainable Organic Cotton Production in the US through Research and Outreach on Organic Regenerative Practices. Budget: $3,498,357/$53,504 (PVAMU). **Lead PI**: M. Bagavathiannan (Texas A&M University), Co-PI - **Ram Ray.** 2023-2026.
7. ***PVAMU-TAMU-PRISE**: Plant Biomass Estimation in Cropland Using Multimodal Deep Learning. Budget $40,000. **Lead PI**: **Ram Ray (PVAMU)**. Collaborator: M. Bagavathiannan (PI-TAMU). 2023-2025
8. **EPA**: Demonstrating nutrient removal in urban-dominated watersheds using floating aquatic plants. **Budget** $1.5 million/$ 576,280. Lead PI: V. Balan (UH), **Co-PI Ram Ray** (**PVAMU Lead**). 2023-2025
9. ***USDA-NIFA-CBG**: Quantifying Carbon Sequestration Potential of Sorghum Cultivars through Field Experiments and Modeling. **Budget** $500,000. **Lead PI**: **Ram Ray (PVAMU)**. Collaborator: D. Hays (PI-TAMU). 2023-2026
10. ***USDA-NRCS**: Supporting small-scale, underserved, and limited resources farmers for climate-smart commodities. **Budget** $5 million. **Lead PI**: **Ram Ray**. 2023-2027
11. **USDA-NIFA**: Research and Extension Experience for Undergraduates on Remote Sensing SAR Data for Agricultural Applications. **Budget** $750,000/$125,221 (PVAMU). **Lead PI**: N. Das (Michigan State University), Co-PI - **Ram Ray**. 2023-2027
12. ***USDA-NRCS**: Texas Climate-Smart Initiative. **Budget** $65.0 million/2.0 mill. **Lead PI**: J. Howe (TAMU), Co-PI – **Ram Ray (PVAMU-lead)**. 2023-2027
13. ***USDA-NIFA-EGP**: Assessing Soil $CO_2$ Emissions using an Automated Soil Carbon Flux Monitoring System. **Budget**: $190,500. **PI-R.L. Ray**. 2022-2026
14. ***DOE-FOA**: Producing Algal Biomass from Wastewater as Cotton Plant Fertilizer to Reduce Carbon Footprint. **Budget** $399,680. **PVAMU PI – Ram Ray**, Co-PIs - Venkatesh Balan, Abdul Latif Khan, Xiaonan Shan, University of Houston, Martin Gross, Gross-Wen Technologies; Eleazer Resurreccion, Independent Consultant. 2023 – 2024.

15. ***Shell**: Enhancing soil carbon sequestration by implementing innovative tools and interventions under different Ecosystems. **Budget** $2,576,237. **PI** – **Ram Ray,** Co-PI – G. Richard, L. Carson, Y. Gao, J. Boroui, et al., 2023-2025.
16. ***NASA**: Characterizing precipitation distribution using in situ and satellite measurements over the agricultural watershed. **Budget** $499,599. **PI** – **Ram Ray**, Co-PI – Md. Jobair Alam. 2022 - 2027
17. **USDA-NIFA-CBG**: AI-based Program for Advancing Research, Education, and Extension Activities in Precision Agriculture at PVAMU. **PI– Ali Fares**, Co-PIs-Ahmed Ahmed, Ripendra Awal, **Ram Ray**, K. Henry, and M. Chouikha. Funding Agency – USDA-NIFA: **$750,000**: 2022-2024
18. **USDA-NIFA-CBG**: Multi-functional crosslinked carbon nanotube/hydrogel nanocomposites for enhanced fertilizer utilization efficiency and drought alleviation. **PVAMU –PI -Yunxiang Gao,** Co-PI-**Ram Ray**. **TAMU** - Xingmao Ma, Virender K. Sharma. Funding Agency – USDA-NIFA: **$500,000**: 2022-2024
19. **USDA-NIFA-CBG**: Multi-scale Multi-resolution Agriculture Data Analytics for Crop/Vegetation Health Prediction and Optimization. **PVAMU – PI** –**Lijun Qiang**, Co-PIs-**Ram Ray**, and X. Dong. Funding Agency – USDA-NIFA: **$450,000**: 2022-2024
20. **USDA-NIFA**: GetAgSmart: Building Capacity in Smart Agricultural Technologies for Underserved Communities, **Lead PI:** A. Fares, Co-PI - **R.L. Ray**. Funding Agency – USDA-NIFA: $**749,719**: 2021-2024

## FUNDED/COMPLETED GRANTS

1. *An Integrated Approach to Study the Impact of Climate Change on Agriculture and Water Quality: **R.L. Ray (PI)**, A. Fares, R. Awal, P Ampim, N. Daniels, and S. Woldesenbet: Funding Agency- USDA-NIFA: $595,751. 2018-2023.
2. *Faculty RISE-Graduate Research Award - Division of Research & Innovation: R.L. Ray (**PI**). Funding Institution- Prairie View A&M University: $14,400: 2022-2023
3. Fighting climate change through the connection between study abroad and the UN SDGs. **Lead PI**: G. Fonjweng, Co-PI - R.L. Ray. Funding Agency – US department of State: $**15,000**: 2022-2023.
4. Utilizing Technology to Enhance Food Security and Agricultural Disaster Resilience in the Caribbean, **Lead PI:** N. Estwick, Co-PI - **R.L. Ray**. Funding Agency - 1890 Universities Center of Excellence for Global Food Security and Defense: $200,000/$50,000 (PVAMU): 2021-22
5. TAMU: Crop Growth, Air and Water Quality, Yield, and Economic Benefits of Sweet Corn in Response to Organic Amendment Types and Rates. **Budget**: $57,190. 2021-2022
6. **TAMU at Galveston**: Navasota River Flood Study. PI – Ali Fares, Co-PI - Ram Ray. **$131,610.** 2022
7. **Faculty RISE-Undergraduate Research Award** - Division of Research & Innovation: **R.L. Ray** (**PI**). Funding Institution- Prairie View A&M University: $5,000: 2021-2022
8. Integrating Culture in the Design of an Adaptive Technology to Address Management Issues in Times of Disaster, **Lead PI:** N. Estwick, Co-PI - **R.L. Ray**. Funding Agency - 1890 Universities Center of Excellence for Global Food Security and Defense: $40,000/$10,000 (PVAMU): 2020-22
9. Faculty RISE-Graduate Research Award - Division of Research & Innovation: R.L. Ray (**PI**). Funding Institution- Prairie View A&M University: $10,000: 2021

10. PVAMU-UAPB Collaborative Motivate and Educate for Achievement (MEA): L. Carson (**PI**), **R.L. Ray (Co-PI)**. Funding Agency - 1890 Center of Excellence: $100,000: 2020-21
11. Real-time site-specific irrigation scheduling tools for crops and urban landscape in Texas using mobile web app: **Co-PI**: $589,101 (USDA-NIFA). 2017-22.
12. Integrated approach to develop, test, and disseminate optimum water and nitrogen practices for a sustainable environment in a changing climate: **Co-PI**: $57,190 (Texas A&M Experimental Station). 2020-2021
13. Integrated approach to develop, test, and disseminate optimum water and nitrogen practices for a sustainable environment in a changing climate: **Co-PI**: $57,190 (Texas A&M Experimental Station). 2019-20
14. Integrated approach to develop, test, and disseminate optimum water and nitrogen practices for a sustainable environment in a changing climate: **Co-PI**: $57,190 (Texas A&M Experimental Station). 2018-19.
15. Soil health assessment and monitoring on the PVAMU farm in East-Central, Texas: **Co-PI**: $30,000 (USDA-NRCS). 2018-20.
16. Impact of anthropogenic and natural changes on natural resources and the environment: **Co-PI**: $321,800 (USDA-NIFA). 2014-18.
17. Integrated approach to develop, test, and disseminate optimum water and nitrogen practices for a sustainable environment in a changing climate: **Co-PI**: $228,760 (Texas A&M Experimental Station). $57,190/year, 2014-18
18. An experimental approach to study water quality and water conservation in an agricultural watershed. **PI:** $20,000 (Office of Research, Prairie View A&M University). 2016
19. Study on climate change impacts on agriculture and the evaluation of adaptation measures in Texas. **Co-PI**: $20,000 (Office of Research, Prairie View A&M University). 2016.

## PENDING GRANTS

1. **USDA-NIFA**: Partnership: Elucidating biogeochemical cycling of Silicon to improve plant biomass, climate stress tolerance and $CO_2$ sequestration. **Budget**: $800,00/$150,000 (PVAMU). **Lead PI**: A. Khan (University of Houston), Co-PI - **Ram Ray. 2023.**
2. **USDA-NIFA**: Development of Sustainable Climate-smart Biobased Products from Industrial Hemp. **Budget**: $1,000,000/500,000 (UH). PI: Aruna Weerasooriya, Co-PI – **Ram Ray. 2023**
3. **USDA-NIFA-CBG**: Establishing The Breeding Value For Various Economic Traits Of Industrial Hemp Using Multi-Omics Data. **Budget**: $599,643. PI: Aruna Weerasooriya, Co-PI – **Ram Ray. 2023**
4. **USDA-NIFA-CBG**: An Integrated Field-Laboratory-AI/Modeling Approach to Enhance Soil Health, Microbiome, and Carbon Sequestration and Reduce GHG Emissions. **Budget**: $740,485. PI: Ripendra Awal, Co-PI – **Ram Ray. 2023**
5. **USDA-NIFA-CBG**: An Integrated Approach to Advance Education and Research Activities in Climate Smart Agriculture to Support New NRES Degree Programs. **Budget**: $598,165. PI: Kwaku Addo, Co-PI – **Ram Ray. 2023**
6. **NSF:** Does Microbiome help plants escape Flooding Stress Factors? **Budget**: $800,00/$201,342 (PVAMU). **Lead PI**: A. Khan (University of Houston), Co-PI - **Ram Ray. 2023.**
7. **USDA-NIFA**: Empowering Underrepresented NRES Graduate Students with Data Science Skills. **Budget**: $244,000. PI: Ripendra Awal, Co-PI – **Ram Ray. 2023**

8. **DoD**: Center of Excellence in Advanced Computing-based Combat Environment-aware Smart System (ACCESS). **Budget**: $9,896,187. PI: Suxia Cui, Co-PI – **Ram Ray. 2023**
9. **DOE**: Prairie View A&M University Resilience Center: Integrated Design for Environmental and Climate Justice Research (IDEA-CJR). **Budget**: $998,450. PI: April Ward, Co-PI – **Ram Ray. 2023**
10. **NSF**: Excellence in Research: Investigation of Root Induced Changes in Soil Hydraulic Properties. **Budget**: $547,720. PI: Md. J.B. Alam, Co-PI – **Ram Ray. 2022**
11. **Texas OneGulf**: Guarding Against Flooding in Texas: A Science-based Cost-Effectiveness Approach for Prioritizing Flood Mitigation Projects. **Budget:** $800,000/$100,000. Lead PI: N. Gharaibeh. Co-PI -**Ram Ray** (PVAMU Lead). **2022**
12. **Department of Housing and Urban Development**: Center of Excellence for Disaster Resilient, Energy efficient, Affordable housing and urban Management System (DREAMS). **Budget: $**3,570,664. **Lead PI**: S. Cui. Co-PI – **Ram Ray. 2022**

## PANELIST

- Panelist of USDA-NIFA Federal Grant Peer Review-2020
- Panelist of the NASA New Investigator Program (NIP) Review Panel
- Panelist of the NASA Terra-Aqua Land Review Panel
- Panelist of NSF CyberSEES Panel
- Panelist NASA Climate Assessment Products and Indicators Panel
- Panelist NASA Postdoctoral Program Review Panel

## PROFESSIONAL LICENSURE

- Professional Engineer, Texas Board of Professional Engineers, License No: 126870
- Professional Civil Engineer, Nepal Engineering Council, License No: 2022
- EIT: License No: 149247
- The Association of College and University Educators (ACUE)

## PROFESSIONAL MEMBERSHIP AND AFFILIATIONS

- Member of American Geophysical Union since 2005
- Member of the Institute of Electrical and Electronics Engineers (IEEE) since 2007
- Life member of Nepal Engineers' Association since 1993
- Member of the American Society of Civil Engineers (ASCE) since 2010
- Member of SIGMA XI since 2011
- Member of Soil Science Society of America since 2016
- Member of the American Society of Agronomy since 2020
- Member of Crop Science Society of America since 2020

## PROFESSIONAL SERVICE

### Committees

### University

- **Faculty Senate -** College of Agriculture, Food, and Natural Resources (CAFNR), PVAMU
- **Member**, Academic Integrity Review Board, Prairie View A&M University
- **Member**, Graduate Council, Prairie View A&M University

- **Member**, Undergraduate Research Symposium Planning Committee (2017 to present)
- **Member,** Promotion, Tenure, and Due Process committee
- **Member,** American Association of American Professors (AAUP)-PVAMU

**College**

- **Member,** Tenure and Promotion Committee, College of Agriculture, Food, and Natural Resources (CAFNR)
- **Member,** CAFNR Spring Conference Steering Committee
- **Member,** Curriculum Committee, CAFNR, PVAMU
- **Chair,** Academic Integrity Review Committee, CAFNR
- **Co-director**, MS degree in Natural Resources and Environmental System (NRES) program
- **Chair**, Associate/Assistant Professor in Plant and Soil Sciences, CAFNR, PVAMU, 2020
- **Member**, Search Committee, Assistant Professor, Agri-Business, CAFNR, PVAMU, 2019
- **Member**, MS, and BS degree curriculum committee in Natural Resources and Environmental System (NRES) program
- **Member,** MS degree curriculum committee in Food Security

**External**

- **Member**, Water and Sediment Quality (WSQ) Subcommittee of The Galveston Bay Council, Galveston Bay Estuary Program (GBEP) (2019 to present)

**Editors**

- ***Editorial Board Member:***
  - Scientific Reports, Nature
  - Journal of Civil Engineering and Construction
  - Journal of Geography and Cartography
  - International Journal of Agriculture, Soil, and Environment
- ***Associate Editor:***
  - Agronomy Journal
  - Remote Sensing in Earth System Sciences
  - Agricultural and Environmental Letters
- ***Guest Editor:***
  - Geoscience Data Journal
  - Sustainability
- ***Topic Editor***:
  - Remote Sensing

**Reviewers**

- ***Reviewer in Journals:*** Nature, Journal of Hydrology, Hydrologic Engineering, Natural Hazard, Advances in Water Resources, Hydrology Research, Remote Sensing of Environment, Irrigation Science, American Water Resources Association, KSCE Journal of Civil Engineering, Journal of Mountain Science, Engineering Geology, Natural Hazards, and Earth System Sciences, Remote Sensing.

**Member of Workshop/Conference Organizing Committee**

- Conference on Water, Climate, and Food Security for Student and Early Career Scientists. March 6-10, 2023, Prairie View, TX. USAID, PVAMU and TAMU's Feed the Future

Innovation Lab for Small Scale Irrigation.

- **Third In-situ and Remote Soil Moisture Sensing Technology Conference**: Challenges and Opportunities in a Changing World, March 2014.

**Coordinators**

- Land Grant Research Symposium, April 18, 2018, Prairie View A&M University, Prairie View, TX.
- Leafy Greens Workshop: From Farm to Table, February 15, 2018, Prairie View A&M University, Prairie View, TX.

**Member of Judges/Session Chairs in Oral/Poster Session**

- Session Chair – Natural Resources, agriculture, and the environment-T6-0S1-3rd Euro-Mediterranean Conference for Environmental Integration, 10-13 June 2021, Sousse, Tunisia
- Session Chair – Natural Resources, agriculture, and the environment-T6-0S1-3rd Euro-Mediterranean Conference for Environmental Integration, 10-13 June 2021, Sousse, Tunisia
- 2021 PVAMU Undergraduate Research Symposium, April 01, 2021, Prairie View, TX
- Outstanding Student Presentation Awards (OSPA), AGU Fall Meeting, 1-17 December 2020, Virtual
- National Club Poster Contest, ASA-CSSA-SSSA International Annual Virtual Meeting, 9-13, November 2020.
- Outstanding Student Presentation Awards (OSPA), AGU Fall Meeting, 10-14 December 2018, Washington, DC
- Outstanding Student Presentation Awards (OSPA), AGU Fall Meeting, 11-15 December 2017, New Orleans, LA
- 2016 PVAMU Undergraduate Research Symposium, March 2, 2016, Prairie View, TX.
- 12th Annual Texas A&M University System Pathways, Student Research Symposium, Texas A&M University-Corpus Christi, October 22-23, 2015, Corpus Christi, TX.

## RESEARCH INTERESTS

- *Water Resources*, *Hydrology*, *Ecohydrology*: Hydrology-land surface-atmosphere interactions, Soil water dynamics, Experimentation/instrumentation, Landcover change impacts on agricultural water resources, irrigation/crop water requirements, Land surface dynamics, watershed hydrology and modeling, Remote sensing, and GIS applications; Soil Carbon Sequestration
- *Hydroclimatology*: Climate change impact on water resources, parameterization of land surface characteristics in hydrology, Agricultural water resources management using remote sensing, GIS, and climate forecasts
- *Geomorphology*: Natural hazard and risk analysis using GIS/remote sensing and spatial statistical analysis, Fluvial geomorphology, Flood hydrology, Flood risk analysis, Flood hazards, and Control

## PUBLICATIONS

Journal Papers -**70** (9 under review)
Book – **2**

Book Chapters – **9**
Peer-Reviewed International Conference Papers – **9**
Conference Abstracts/Presentations – **94**
Research Project Reports – **3**
Extension Bulletins – **6**

## BOOKS

1. **Ray, R.L**., Panagoulia, D., and Abeysingha, N. 2023. River Basin Management: under a Changing Climate. IntechOpen, London, UK. ISBN: 978-1-80355-559-1. https://doi.org/10.5772/intechopen.100758
2. **Ray, R.L**., Lazzari, M., 2020. Landslides: Investigation and Monitoring. IntechOpen, London, UK. ISBN 978-1-78985-824-2. DOI: https://doi.org/10.5772/intechopen.78130

## BOOK CHAPTERS

1. Fang, W., Xiao-Dong, C., Jun-Hui, S., Khan, N., and **Ray, R.L**. ***In press***. Effects of climate change and food security on sustainable development, and potential solutions: Evidence from China, In M.B. Baig (ed.), **Climate Change and Food Security**. *Springer*.
2. Raza, A., Hu, Y., Acharki, S., Buttar, N.A., **Ray, R.L**., Khaliq, A., Zubair, N., Zubair, M., et al. 2023. Evapotranspiration Importance in Water Resources Management Through Cutting-Edge Approaches of Remote Sensing and Machine Learning Algorithms. In: Pande, C.B., Kumar, M., Kushwaha, N.L. (eds) Surface and Groundwater Resources Development and Management in Semi-arid Region. Springer Hydrogeology. Springer, Cham. https://doi.org/10.1007/978-3-031-29394-8_1
3. **Ray, R.L**., and Abeysingha, N. 2023. Introductory Chapter: Water Resources Planning, Monitoring, Conservation, and Management. In Ray, R.L., Panagoulia, D., and Abeysingha, N (eds.), River Basin Management: under a Changing Climate. IntechOpen, London, UK. https://doi.org/10.5772/intechopen.109176
4. **Ray, R.L**., Sishodia, R., and Olutimehin, T. **2022**. Rainwater harvesting for sustainable water resources management under climate change. In Q. Tang and G. Leng (eds.), **Climate Risk and Sustainable Water Management** (pp. 374-400)**.** *Cambridge: Cambridge University Press*. https://doi.org/10.1017/9781108787291.021
5. **Ray, R.L**., Lazzari, M. 2020. Importance of investigating landslide hazards, In R.L. Ray and M. Lazzari (eds.), **Landslides-Investigation, and Monitoring.** *IntechOpen*, London, UK. https://doi.org/10.5772/intechopen.94279
6. **Ray, R.L**., Ampim, P., and Gao, M., 2020. Crop protection under drought stress, In K. Jabran, S. Florentine, and B.S. Chauhan (eds.), **Crop Protection under Changing Climate.** *Springer International Publishing*, New-York, USA. 450 pp. https://doi.org/10.1007/978-3-030-46111-9_6
7. Lazzari, M., Piccarreta, M., **Ray, R.L**., Manfreda, S. 2020. Modeling Antecedent Soil Moisture to Constrain Rainfall Thresholds for Shallow Landslides, In R.L. Ray and M. Lazzari (eds.), **Landslides-Investigation and Monitoring.** *IntechOpen*, London, UK. https://doi.org/10.5772/intechopen.92730
8. **Ray, R.L**., Lazzari, M., Olutimehin, T. 2020. Remote Sensing approaches and related techniques to map and study landslides, In R.L. Ray and M. Lazzari (eds.), **Landslides-Investigation, and Monitoring.** *IntechOpen*, London, UK.

https://doi.org/10.5772/intechopen.93681

9. **Ray, R.L**., and Dogan, A., 2016. Contemporary Methods for Quantifying Submarine Groundwater Discharge to Coastal Areas, In A. Fares (ed.), **Emerging Issues in Groundwater Resources.** *Springer International Publishing*, New-York, USA. 498 pp. https://doi.org/10.1007/978-3-319-32008-3_12

## REPORTS

1. Ampim, P., Woldesenbet, S., **Ray, R.L**., Awal, R., and Fares, A. (2016). The response of goat lagoon manure sludge microbes to IBT2 treatment in-situ and in the laboratory at Prairie View A&M University. 18 pp.
2. Conklin, M., Bales, R., Saksa, P., Martin, S., and **Ray, R.L**. (2015). Water-Sierra Nevada Adaptive Management Project. In: Hopkinson P & Battles JJ (eds.) Learning how to apply adaptive management in Sierra Nevada forests: An integrated assessment. 1264pp.
3. Guo Q., Zhou Y, **Ray R.L.**, Zhu J., and Bales R.C. (2013). Vulnerability of giant sequoia to moisture stress in a changing climate: A pilot study of potential moisture proxies. National Resource Report NPS/SEKI/NRR – 2013/XXX: 182 pp.

## EXTENSION BULLETINS

1. Robertson, A., Alexander, T., **Ray, R.L.**, and Xu, H. 2022. A new strategic partnership for research into nature-based solutions. *Transition, Shell TechXplorer Digest*. 73-77.
2. **Ray, R.L.,** Ampim, P., and Gao, M. Drought's impact on crop production: *USDA National Institute of Food and Agriculture Bulletin*, September 23, 2020. https://content.govdelivery.com/accounts/USDANIFA/bulletins/2a134aa
3. Sobayo, R., **Ray, R.L**., Qian, L. Technology shaping the future of farming. *TRI-AG News, Prairie View A&M University*, October 2018. https://issuu.com/pvamucahs/docs/the_triag__october_2018
4. Adekanmbi, A., **Ray, R.L.,** Risch, E., and Fares, A. Making a difference: New development in groundwater monitoring: *USDA National Institute of Food and Agriculture Bulletin*, August 29, 2018. https://content.govdelivery.com/accounts/USDANIFA/bulletins/2098a7c
5. Adekanmbi, A., **Ray, R.L.,** Risch, E., and Fares, A. New development in groundwater monitoring: A web-based tool to monitor and visualize groundwater storage in Texas. *Morning AgClips Farming News, Harvested Daily*. August 26, 2018. https://www.morningagclips.com/new-development-in-groundwater-monitoring/
6. **Ray, R.L**., and Jacobs, J.M. Slide projector: Satellite data may help predict landslides. *The Magazine of the University of New Hampshire, Durham, NH*. Winter 2009. http://unhmagazine.unh.edu/w09/research.html

## PEER-REVIEWED PUBLICATIONS

1. Tefera, G.W., Ray, R.L., and Singh, V.P. ***In review***. Simulating the effect of climate change scenarios on surface water quality in the Bosque watershed, Central Texas, United States. *Nature/Scientific Reports.*
2. Chaulagain, R., **Ray, R.L**., Olatunji, Y.A., Ngando, S.N., Suh, D., and Huh, J-S., M. ***In review***. Effects on Hydrological Patterns and Ramification for Hydroelectric Power Generation Under Climate Change in Khimti River Basin, Nepal. *Environmental Science and Pollution Research.*

3. Sahabi, H., Moradi, R., **Ray, R.L**., and Saeidnejad, A. ***In review***. Mitigating greenhouse gas emissions in a cotton production system by managing tillage, crop, residue, and nitrogen fertilizer. *Mitigation and Adaptation Strategies for Global Change.*
4. Ahmed, W., Coffman, L., **Ray, R.L**., Balan, V., Weerasooriya, A.D., and Khan, A.L. ***In review***. Microbiome Diversity Variation in Industrial Hemp Genotypes. *Frontiers in Plant Sciences*.
5. M. Dilan D.R., Abeysingha, N.S., Duminda, D.M.S., **Ray, R.L.** ***In review***. Phytoextraction of Metals and Nutrients by Naturally Grown Sedges in Meadow of Mankadawala Tank - Anuradhapura, Sri Lanka. *Soil & Environmental Health*.
6. Shahzada, A., Khan, W., **Ray, R.L**., and Khan, N. 2024. Pak-Afghan bilateral agriculture trade: Challenges and opportunities. *International J. of Agricultural Extension*. https://dx.doi.org/10.33687/ijae.012.001.4989
7. Abeysingha, N.S., Muthunayaka, C.H., Nirmanee, K.G.S., Amarasekara, M.G.T.S., and **Ray, R.L.** 2024. Application of InVEST SDR model to assess soil erosion and sediment export: A Case Study from Deduru Oya River Basin, Sri Lanka. *Journal of Agricultural Engineering (India)*. https://doi.org/10.52151/jae2023603.1824
8. Tefera, G.W., **Ray R.L**., and Wootten, A.M. 2023**.** Evaluation of statistical downscaling techniques and projection of climate extremes in central Texas, USA**.** *J. of* Weather and Climate Extremes**.** https://doi.org/10.1016/j.wace.2023.100637
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## PUBLICATIONS IN CONFERENCE PROCEEDINGS

1. Alam, M.J.B., Aggarwal, M., and **Ray, R.L**. Performance comparison of evapotranspiration and engineered turf covers for landfill final closure. Geosynthetics 2023 Conference, February 5-8, 2023, Kansas City, Missouri.
2. **Ray, R.L.** and Tefera, G.W. Hydrological processes and hydrological extremes under climate change scenarios in North-Central Texas, USA. 4th Euro-Mediterranean Conference For Environmental Integration, November 2-4, 2022, Sousse, Tunisia.
3. Tefera, G.W and **Ray, R.L.** Statistical downscaling techniques and projection of future climate extremes in the Texas environment. 4th Euro-Mediterranean Conference For Environmental Integration, November 2-4, 2022, Sousse, Tunisia
4. **Ray, R.L.,** Joshi, M., Griffin, R.W., Neelgund, G., Awal, R., and Risch, E. Soil salinity management with saline soil and irrigation water: a case study from Mandvi, Kutch, Gujarat, India. 3rd Euro-Mediterranean Conference For Environmental Integration, June 10-13, 2021, Sousse, Tunisia.

5. Awal, R., El Hassan, A., Fares, A., Woldesenbet, S., **Ray, R.L**, Bayabil, B., Ampim, P., Risch, E., Griffin, R. and Habibi, H.: Soil Moisture and Nutrient Dynamics in Root Zone of Collard Greens Produced in Different Organic Amendments and Rates, 2018 Irrigation Show & Education Conference, Dec. 3-7, 2018, Long Beach, CA.
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## PEER-REVIEWED PUBLICATIONS IN PREPARATION

1. Zeeshan, A., Thompson, S.E., Oroza, C.A., Feng, X., Boisrame, G.F.S., **Ray, R.L**., Skiles, M., and Bales, R.C. Towards a process-based understanding of precipitation phase impacts on streamflow in the Southern Sierra Nevada, anticipated submission, October 2023.
2. **Ray, R.L**., He, Y., and Choi, M. The effects of hurricanes on the carbon cycle, anticipated submission, November 2023.
3. Tefera, G.W., and **Ray, R.L**. Change in hydrological signatures under climate change scenarios in the Bosque watershed, North-Central Texas, anticipated submission, November 2023.
4. **Ray, R.L.,** Griffin, R., Fares, A., El Hassan, A., Awal, R., and Ampim Peter. Effects of Organic Amendment Types and Rates on Root Distribution of Collard Greens in a Humid Climate, anticipated submission, December 2023.

## INVITED TALKS

- **Ray, R.L**. Opportunities for Entrepreneurship in Carbon Removal. Texas Entrepreneurship Exchange for Energy (TEX-E), TEX-E Bootcamp, Greentown Labs, September 22-24, 2023.
- **Ray, R.L.** The interdisciplinary Nature of Climate Change and Our Role in Adaptation and Mitigation. Fighting climate change through the connection between study abroad and the UN SDGs Workshop with Increase and Diversify Education Abroad for U.S. Students (IDEAS), US Department of State, April 14, 2023.
- **Ray, R.L**. Status and perspectives of greenhouse gas (GHG) emissions. Department of Engineering Technology, **The University of Houston**, March 3, 2023.
- **Ray, R.L**. Effects of climate change on agriculture and food security. *USDA-Pathway to University Programs (USDA-PUP),* **The University of Houston**, June 13-15, 2022.

- **Ray, R.L**. Building biodiversity through natural resources management. Virtual presentation. Solvay Chemicals Company. October 12, 2021.
- **Ray, R.L**. How do plants help reduce global warming and mitigate climate change. *International Summer Course 2021: Green Infrastructures Adapting to Climate Change*, **Jakarta, Indonesia**, July 19-27, 2021.
- **Ray, R.L.** Impact of Climate Change on Ecosystem. Internal Education Week, November 16, 2020. Office of International Programs, **Prairie View A&M University, Prairie View, TX**.
- **Ray, R.L**., Bales R.C., and Conklin M.C.: Hydrologic response of mountain catchments to snow, rain, and forest thinning in California's Sierra Nevada. *The 2nd International Conference on Geobiology*, **Wuhan, China**, September 4-8, 2012.
- **Ray, R.L**, May 27, 2010. Hydrologic simulation in large basins with limited in-situ measurements using the Hillslope River Routing Model. **Hydrologic Research Center**, **San Diego, CA, USA**.
- **Ray, R.L**, May 4, 2010. Simulating the hydrologic cycle in large basins with limited in-situ measurements using the Hillslope River Routing Model, Department of Civil and Environmental Engineering, **University of California, Irvine**, **CA, USA**.

## CONFERENCE ABSTRACTS/PRESENTATIONS (*student presenter)

1. Ray, R.L., Tefera, G.W., and Alam, M.J.B. An Experimental Approach to Investigate the Relationships between Soil and Atmospheric Carbon and Hydrologic Fluxes. ASA, CSSA, and SSSA International Annual Meeting, Saint Louis, MO, October 29 - November 1, 2023.
2. Jackson*, O.R., **Ray, R.L**.,Carson, L., Woldesenbet, S., Ampim, P., Geremew, A. Increasing applications of fertilizer effect on water quality within and below root zone. Conference on Water, Climate, and Food Security for Students and Early Career Scientists, March 8 – 10, 2023, Prairie View A&M University, Prairie View, TX.
3. Tefera, G. W and **Ray, R.L**. Changes in hydrological extremes under future climate change scenarios in the Bosque watershed, North-Central Texas. Conference on Water, Climate, and Food Security for Students and Early Career Scientists, March 8 – 10, 2023, Prairie View A&M University.
4. Jackson*, O.R., **Ray, R.L**.,Carson, L., Woldesenbet, S., Ampim, P., Geremew, A.Increasing applications of fertilizer effect on water quality within and below root zone. TAMUS 18th Annual Pathways Student Research Symposium, Texas A&M University at Galveston, March 2-3, 2023, Galveston, Texas.
5. Alam, M.J.B., Aggarwal, M., and **Ray, R.L**. Performance comparison of evapotranspiration and engineered turf covers for final landfill closure. Geosynthetics 2023 Conference, February 5-8, 2023, Kansas City, Missouri.
6. **Ray, R.L.,** and Tefera, G.W. Evaluation of statistical downscaling techniques and climate change scenarios: a case study from Texas, USA, *American Geophysical Union*, Chicago, IL, December 12-16, 2022.
7. Tefera, G.W. **Ray, R.L.,** and Taddele, Y.D. Evaluating the impact of statistical bias correction on precipitation extreme indices in the Jemma sub-basin of Blue Nile Basin. Fall Meeting, *American Geophysical Union*, Chicago, IL, December 12-16, 2022.

8. **Ray, R.L.** and Tefera, G.W. Hydrological processes and hydrological extremes under climate change scenarios in North-Central Texas, USA. 4th Euro-Mediterranean Conference For Environmental Integration, November 2-4, 2022, Sousse, Tunisia.
9. Tefera, G.W and **Ray, R.L.** Statistical downscaling techniques and projection of future climate extremes in the Texas environment. 4th Euro-Mediterranean Conference For Environmental Integration, November 2-4, 2022, Sousse, Tunisia.
10. Zhang, S., Wu, B., Chen, R., Liang, J., Khan, N., and **Ray, RL**. Government intervention in Cooperative Development: a case study of Rural XM Beekeeping Cooperative from Sichuan Province of China. Asian Development Bank Institute (ADBI) Virtual Conference on Farmer's Organizations and Sustainable Development held in Tokyo, Japan, September 7 – 9, 2022.
11. Kalkura*, A., Jackson, D., Ozioko, C.N., **Ray, R.L**., Tefera, G., and Risch, E. Effects of Landuse and its Management Practices on Soil and Atmospheric $CO_2$ Emissions. Association of 1890 Research Directors (ARD) Research Symposium, April 2 - 5, 2022, Atlanta, GA.
12. Jackson*, D., Tefera, G., **Ray, R.L**., and Risch, E. An Experimental Approach to Understanding the Relationships between Carbon and Water Fluxes. Association of 1890 Research Directors (ARD) Research Symposium, April 2 - 5, 2022, Atlanta, GA.
13. Jackson*, R., **Ray, R.L**., Carson, L., Woldesenbet, S., Ampim, P., and Risch, E. Effects of Increasing Applications of Fertilizer on Water Quality Within and Below the Root Zone of Sorghum Grown in Southeast Texas. Association of 1890 Research Directors (ARD) Research Symposium, April 2 - 5, 2022, Atlanta, GA.
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15. **Ray, R.L**., Fares, A., and Risch, E. Investigating the impact of COVID-19 pandemic on the global carbon cycle. Association of 1890 Research Directors (ARD) Research Symposium, April 2 - 5, 2022, Atlanta, GA.
16. **Ray, R.L.,** Singh, V., Singh, S.K., Acharya, B.S., and He, Y. Impact of COVID-19 lockdown measures on global $CO_2$ emission using SMAP satellite data, *American Geophysical Union*, New Orleans, LA, December 13-17, 2021.
17. Umair, M., Azmat, M., **Ray, R.L.,** and Zohaib, M. Impacts of Climatic Variables and Cryosphere on the Future Projections of Water Cycle Components Using Observations and Hydrological Models. Fall Meeting, *American Geophysical Union*, New Orleans, LA, December 13-17, 2021.
18. **Ray, R.L**., Ampim, P.A.Y., Fares, A., Awal, R., and Risch, E. Quantifying Change in Soil Organic Carbon of Cropland Using Satellite Data. ASA, CSSA, and SSSA International Annual Meeting, Salt Lake City, UT, November 7-10, 2021.
19. **Ray, R.L.,** Joshi, M., Griffin, R.W., Neelgund, G., Awal, R., and Risch, E. Soil salinity management with saline soil and irrigation water: a case study from Mandvi, Kutch, Gujarat, India. 3rd Euro-Mediterranean Conference For Environmental Integration, June 10-13, 2021, Sousse, Tunisia.
20. Risch, E, **Ray, R.L.,** and Sishodia, R. Reviewing and Analyzing the Cyclical Occurrences of Droughts Using Satellite Data in South-East Texas. American Meteorological Society's 35th Conference on Hydrology, 101st Annual Meeting. Virtually 11-15 January 2021.

21. **Ray, R.L**., and Acharya, B.S. Evaluating the effects of change in imperviousness on watershed hydrology: A case study of five major basins in Texas. Virtual Meeting February 10-12, 2021.
22. Sishodia, R.P., **Ray, R.L**., and Ayanbanjo, O. Evaluating SMAP satellite $CO_2$ using Eddy Covariance Flux Tower Measurements. AmeriFlux Annual Virtual Meeting, Oct. 6 - 8, 2020.
23. **Ray, R.L**., Griffin, R.W., Fares, A., El Hassan, A., Sishodia, R.P., Awal, R. Effects of organic manure application on root distribution of collard greens in a humid climate. ASA, CSSA, and SSSA International Annual Virtual Meeting, November 9-13, 2020.
24. **Ray, R.L**., Sishodia, R., He, Y., and Choi, M. The effects of Hurricanes on the Carbon Cycle. Fall Virtual Meeting, *American Geophysical Union*, December 1-17, 2020.
25. Sishodia, R., **Ray, R.L**., Fares, A., Awal, R., and Ampim, P. Effects of climate change on surface water flows and crop water requirements in North-Central Texas. Fall Virtual Meeting, *American Geophysical Union*, December 1-17, 2020.
26. Ayanbanjo* O., **Ray, R.L.,** Sishodia, R., and Risch, E. Impact of frequent floods and droughts on Groundwater Storage in Texas. *15th Annual Research Symposium*, Prairie View, A&M University, April 13-16, 2020.
27. Hull-Littlejohn*, T., Sishodia, R., **Ray, R.L.,** and Risch E. Evaluating the Effects of Rainfall and Temperatures on Root Zone Soil Moisture and Evapotranspiration. *15th Annual Research Symposium*, Prairie View, A&M University, April 13-16, 2020.
28. Okafor*, W., Olutimehin, T., Sishodia, R., **Ray, R.L.,** Carson, L., Awal, R., El Hassan, A., and Fares, A. Study the effects of cover cropping on soil $CO_2$ emissions: An experimental approach. *15th Annual Research Symposium*, Prairie View, A&M University, April 13-16, 2020.
29. **Ray, R.L.,** He, Y., Kim, D., Choi, M., Awal, R., Risch, E., and Fares, A. Exploring the impact of Hurricane Harvey on the carbon cycle. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 9-13, 2019.
30. Awal, R., Fares, A., Habibi, H., and **Ray, R.L.** Gridded climate databased irrigation-scheduling tool for crops and urban landscapes in the United States. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 9-13, 2019.
31. Kim, D., Umair, M., Kim, U., Cho, Y., **Ray, R.L.,** and Choi, M. Assessment of water use efficiency over croplands in the Korean Peninsula. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 9-13, 2019.
32. Asghar, Z., Oroza, C., Thompson, S.E., Feng, X., Boisrame, G.F.S., **Ray, R.L.,** Skiles, M., and Bales, RC. Toward a process-based understanding of precipitation-phase impacts on streamflow. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 9-13, 2019.
33. Ayanbanjo*, O., and **Ray, R.L**. Assessing the effects of change in imperviousness on flooding at five major watersheds of Texas. Association of 1890 Research Directors (ARD) Research Symposium, March 30-April 3, 2019, Jacksonville, FL.
34. Olamofe*, J., **Ray, R.L**., Risch, E., Awal, R., Elhassan A., Ampim, P., and Fares, A. Effects of Organic Amendments and climate on Soil $CO_2$ exchange. Association of 1890 Research Directors (ARD) Research Symposium, March 30-April 3, 2019, Jacksonville, FL.
35. Olutimehin*, T., **Ray, R.L**., Griffin, R., Risch, E., Awal, R., Elhassan A., Ampim, P., and Fares, A. Effects of Organic Amendment Types and Rates on Root Distribution of Collard Greens in a Humid Climate. Association of 1890 Research Directors (ARD) Research Symposium, March 30-April 3, 2019, Jacksonville, FL.

36. Johnson*, J., Risch, R., and **Ray, R.L.** Impact of Droughts, Floods, and Hurricane Harvey on Groundwater Storage in Texas. Association of 1890 Research Directors (ARD) Research Symposium, March 30-April 3, 2019, Jacksonville, FL.
37. Hull-Littlejohn*, T., **Ray, R.L.,** and Risch, E. Assessing the Effects of Rainfall and Temperature on Root Zone Soil Moisture in a Humid Climate. Association of 1890 Research Directors (ARD) Research Symposium, March 30-April 3, 2019, Jacksonville, FL.
38. **Ray, R.L**., and Fares, A. An integrated approach using satellite soil moisture and terrestrial water storage products in studying hydrological extremes across Texas under a changing climate. Fall Meeting, *American Geophysical Union*, Washington, DC, Dec. 10-14, 2018.
39. Olamofe*, J., **Ray, R.L**., Griffin, R., Risch, E., Awal, R., Elhassan, A., Ampim, P., and Fares, A. Soil $CO_2$ emissions from an experimental research farm: Effects of organic amendments, rain and temperature, TAMUS 15th Annual Pathways Student Research Symposium, West Texas A&M University, November 1-2, 2018, Canyon, Texas.
40. Olamofe*, J., Olutimehin, T., **Ray, R.L**., Griffin, R., Risch, E., Awal, R., Elhassan, A., Ampim, P., and Fares, A. Effects of organic amendments on soil carbon and collard greens production. World Food Day. Tuesday, October 16, 2018, Prairie View A&M University, Prairie View, TX.
41. Ampim, P., and **Ray, R.L.** Efficient crop production-The modern and smart way. Annual Industry Day meeting, Prairie View A&M University, Prairie View, TX, April 12, 2018.
42. Adekanmbi*, A., **Ray, R.L.,** Risch, E., and Fares, A. A web application for visualizing and predicting groundwater storage in Texas. *13th Annual Research Symposium*, Prairie View, A&M University, April 5, 2018.
43. Badmus*, F., Risch, E., **Ray, R.L.,** Awal, R., Bayabil, H., Elhassan, A., Ampim, P., and Fares, A. Effects of organic amendments for Collard Greens farming on soil $CO_2$ emissions. *13th Annual Research Symposium*, Prairie View, A&M University, April 5, 2018.
44. Olamofe*, J., **Ray, R.L.,** Risch, E., and Fares, A. Impact of land-use and climate changes on groundwater storage in Texas. *13th Annual Research Symposium*, Prairie View, A&M University, April 5, 2018.
45. Abiose*, O., **Ray, R.L.,** Risch, E., and Fares, A. The impact of rainfall and temperature on soil moisture dynamics. *13th Annual Research Symposium*, Prairie View, A&M University, April 5, 2018.
46. **Ray, R.L**., Fares, A., Awal, R., and Risch, E.: Exploring the interactions between land use, climate change, and carbon cycle using satellite measurements. Fall Meeting, *American Geophysical Union*, New Orleans, LA, December 11-15, 2017.
47. Hayes*, J., **Ray, R.L.,** and Fares, A. Effects of frequent droughts and floods on groundwater storage in Texas. Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) in Pittsburgh, PA, March 30 – April 1, 2017.
48. Awal, R., Fares, A., **Ray, R.L.,** Bayabil, H., and Risch, E. Spatial interpolation of daily reference evapotranspiration in Northwest Texas. ASA, CSSA and SSSA International Annual Meetings: Oct. 22-25, 2017, Tampa, Florida.
49. Adekanmbi*, A., Olawale, O., **Ray, R.L**., Risch, E., and Fares, A. A web-based tool to monitor and visualize groundwater storage in Texas. TAMUS 14th Annual Pathways Student Research Symposium, November 2-3, 2017.
50. Badmus*, O., Olawale, O., **Ray, R.L**., Risch, E., and Fares, A. Impact of Hurricane Harvey's storm surge on groundwater resources. TAMUS 14th Annual Pathways Student Research Symposium, November 2-3, 2017.

51. **Ray, R.L**., Fares, A., Awal, R., and Risch, E. Monitoring terrestrial carbon cycle in Texas using satellite products. Association of 1890 Research Directors (ARD) Research Symposium, April 1-4, 2017, Atlanta, GA.
52. Adekanmbi*, A., **Ray, R.L**., Fares, A., and Risch, E. Effect of land-use change and drought on groundwater storage in Texas. Association of 1890 Research Directors (ARD) Research Symposium, April 1-4, 2017, Atlanta, GA.
53. Jones*, K., Taylor, A., **Ray, R.L**., Risch, E., and Fares, A. Effect of rainfall and temperature on root zone soil moisture profile. Association of 1890 Research Directors (ARD) Research Symposium, April 1-4, 2017, Atlanta, GA.
54. **Ray, R.L**., Fares, A., Awal, R., and Risch, E. Assessing the effects of change in impervious areas on flooding in Texas. The Geological Society of America, South-Central Section, 51st annual meeting, March 13-14, 2017, San Antonio, TX.
55. El Hassan, A., Awal, R., Bayabil, H., **Ray, R.L**., Risch, E., and Fares, A. Modeling the effect of land-use change on the hydrologic response of a semi-urbanized watershed using a physically-based distributed model. The Geological Society of America, South-Central Section, 51st annual meeting, March 13-14, 2017, San Antonio, TX.
56. Abayomi*, A., **Ray, R.L**., Fares, A and Risch, A. Effect of recent torrential rain and drought on groundwater storage in Texas. TAMUS 13$^{th}$ Annual Pathways Student Research Symposium, November 3-4, 2016, Prairie View, TX.
57. Jones*, K., **Ray, R.L**., Risch, E., and Fares, A. The influence of rain on water and energy balance components at the land surface. TAMUS 13$^{th}$ Annual Pathways Student Research Symposium, November 3-4, 2016, Prairie View, TX.
58. Upadhya*, A., **Ray, R.L**., and Fares, A. Evaluating land-use effects on net ecosystem $CO_2$ exchange using satellite measurements. TAMUS 13$^{th}$ Annual Pathways Student Research Symposium, November 3-4, 2016, Prairie View, TX.
59. **Ray, R.L.,** Fares, A., He, Y., Awal, R., Johnson, A.B., and Risch, E. Assessment of soil moisture, evapotranspiration and $CO_2$ levels under different land covers and environments. ASA, CSSA, and SSSA International Annual Meetings: Nov. 6-9, 2016, Phoenix, Arizona.
60. Awal, R., Fares, A., **Ray, R.L.,** Johnson, A.B., and Risch, E. Potential impact of climate change on crop yield of major crops in northern high plains of Texas. ASA, CSSA, and SSSA International Annual Meetings: Nov. 6-9, 2016, Phoenix, Arizona.
61. **Ray, R.L.,** He, Y., Fares, A., and Awal, R. Evaluation and inter-comparison of remotely sensed soil moisture from three different satellites. American Water Resources Association, 2016 Summer Specialty Conference, GIS and Water Resources IX, Aug 11-13, 2016, Sacramento, California.
62. Awal, R., Fares, A., **Ray, R.L**., Johnson, A.B., and Risch, E. Potential Impact of Climate Change on Irrigation Water Requirements for Major Crops in Northern High Plains of Texas. American Water Resources Association, 2016 Summer Speciality Conference, GIS and Water Resources IX, Aug 11-13, 2016, Sacramento, California.
63. Hayes*, J., **Ray, R.L**., and Fares, A. Study the impact of drought on groundwater storage in the State of Texas. TAMUS 12$^{th}$ Annual Pathways Student Research Symposium from October 22-23, 2015, Corpus Christi, TX.
64. Awal, R., Fares, A., Cherif, Y., Mohammad, M., **Ray, R.L**. and Johnson, A.B.: Potential Impact of Climate Change on Some Crops' Irrigation Water Requirements at the Brazos Headwaters Basin, Texas, *14$^{th}$ National Watershed Conference*, May 17-20, 2015, Fort Worth, TX.

65. **Ray, R.L**., Fares, A., Awal, R., and Johnson, A.: Potential Hydrological Responses, and Carbon and Nitrogen Pools of a Two Distinct Watersheds to Rainfall and Brush Management. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 15-19, 2014.
66. Fares, A., Awal, R., Johnson A.B., and **Ray, R.L.**: Effective Rainfall, Water Yield, and Groundwater Recharge Under Different Crops Across the Brazos Watershed, Texas. *American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA) International Annual Meeting* in Long Beach, CA, USA, Nov. 2-5, 2014.
67. Awal, R., Fares, A., **Ray, R.L**., and Johnson A.B.: Analysis of Streamflow Trends in San Jacinto River Basin, Texas. *Joint 6th International Workshop on Catchment Hydrological Modeling and Data Assimilation (CAHMDA-VI) and the 3rd International Workshop on Data Assimilation for Operational Hydrology and Water Management of the Hydrologic Ensemble Prediction Experiment (HEPEX-DAFOH III) in* Austin, Texas, USA, September 8-12, 2014.
68. Awal, R., Fares, A., Abbas, F., Fares, S., **Ray, R.L**., and Johnson A.B.: Comparative Study of Laboratory and Field Calibrations of Soil Moisture Sensors. *Third In-situ and Remote Soil Moisture Sensing Technology Conference: Challenges and Opportunities in a Changing World* in Houston, TX, USA, March 12-14, 2014.
69. Fares, A., Awal, R., Johnson A.B., and **Ray, R.L**.: In-situ Soil Moisture Sensing in Response to Organic Matter Content, Bulk Density, and Inter and Intra-Sensor Variations. *Third In-situ and Remote Soil Moisture Sensing Technology Conference: Challenges and Opportunities in a Changing World* in Houston, TX, USA, March 12-14, 2014.
70. **Ray, R.L**., Guo, Q., Bales, R., Fares, A., and Awal, R.: Moisture Stress Analysis by Linking Soil and Canopy Moisture in Forested Catchments. *Third In-situ and Remote Soil Moisture Sensing Technology Conference: Challenges and Opportunities in a Changing World* in Houston, TX, USA, March 12-14, 2014.
71. Khadka, D., Fares, A., Abbas, F., **Ray, R.L**., Fares, S., Valenzuela, H., Awal, R., and Safeeq, M.: Mitigating Temperature Effects on the Performance of a Multisensor Capacitance Probe in Two Hawaiian Tropical Soils. *Third In-situ and Remote Soil Moisture Sensing Technology Conference: Challenges and Opportunities in a Changing World* in Houston, TX, USA, March 12-14, 2014.
72. Saksa P.C., **Ray R.L.,** Bales R.C., and Conklin, M.C.: Impact of forest thinning and climate on transpiration and runoff rates in Sierra Nevada mixed-conifer headwater catchments. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 9-13, 2013.
73. Guo Q., Zhou Y., **Ray R.L.**, and Bales R.C.; Vulnerability of Giant Sequoia to moisture stress in a changing climate using remotely sensed canopy moisture. Southern Sierra Adaptation Workshop, Visalia, CA, Feb. 20-22, 2013.
74. **Ray R.L.,** Saksa P.C., Bales R.C., and Conklin, M.C.: Forest management effects on snow, runoff and evapotranspiration in Sierra Nevada mixed-conifer headwater catchments. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 3-7, 2012.
75. **Ray R.L.,** Bales R.C., and Guo Q.: Moisture stress monitoring in Giant Sequoia Groves. Yosemite Hydro-Climate Meeting, Yosemite National Park, California, October 11-12, 2012.

76. **Ray, R.L**., Bales R.C., and Conklin M.C.: Hydrologic response of mountain catchments to snow, rain, and forest thinning in California's Sierra Nevada. The 2nd International Conference on Geobiology, Wuhan, China, September 4-8, 2012.
77. **Ray, R. L.,** Bales R.C., and Conklin, M.C.: Hydrologic response of Sierra Nevada headwater catchments to rain versus snow inputs using spatially distributed, data-driven hydrologic modeling. CUAHSI 3rd Biennial Colloquium Meeting, Boulder, CO, July 14-18, 2012.
78. Saksa P.C., Bales R.C., and **Ray R.L**: Forest management for water: a hydro-ecological modeling exercise of headwater catchments in the mixed-conifer belt of the Sierra Nevada. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 5-9, 2011.
79. **Ray, R.L**., and Beighley, R.E.: Streamflow simulation in the snow-affected basin: a case study of the Susquehanna River Basin, USA. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 13-17, 2010.
80. Wilson, C.A., **Ray, R.L**., Beighley, R.E., and Moglen, G.E.: Predicting peak discharge uncertainty from standard methods due to variability in hydrologic characteristics. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 13-17, 2010.
81. de Linage, C., Lo, M., Famiglietti, J.S., **Ray, R.L**., and Beighley, R.E.: Using GRACE total water storage changes to constrain river routing models in the Amazon River basin. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 13-17, 2010.
82. Beighley, R.E., Eggert, K.G., **Ray, R.L**., Wilson, C.A., Greene, M.K., Altman, G.L., Rowland, J.C., Travis, B.J., and Lawrence, D.M.: Coupling hydrologic and hydraulic models in the Mackenzie Basin to quantify the spatial and temporal distribution of surface and subsurface water storages. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 13-17, 2010.
83. Wei, Y., Beighley, R.E., **Ray, R.L**., Lee, H., Alsdorf, D.E., and Shum, C.: Characterizing terrestrial runoff patterns from the Western US. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 13-17, 2010.
84. Beighley RE, **Ray RL**, Lee H, Alsdorf D, Shum CK, Mocko DM.: Characterizing terrestrial runoff patterns to the Pacific Ocean from the Western US. *Ocean Surface Topography Science Team (OSTST) Meeting*, Lisbon, Portugal, October 18-22, 2010.
85. **Ray, R.L**., and Beighley, R.E.: Linking HRR model with VIC-3L hydrologic model for flow routing in the Susquehanna River Basin. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 14-18, 2009.
86. Beighley, R.E., **Ray, R.L**., He, Y., Guo, J., and Shum, C.: Integrating GRACE measured water storage change observations into the Hillslope River Routing (HRR) in the Amazon and Congo River Basins. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 14-18, 2009.
87. Beighley, R.E., **Ray, R.L**., He, Y. and Melack, J.: Quantifying model uncertainty in terrestrial water cycle models due to channel hydraulics, *LTER All Scientists Meeting*, Estes Park, Colorado, September 14-16, 2009.
88. **Ray, R.L**., and Jacobs, J.M.: Remotely sensed soil moisture and landslide hazards, SMAP Application Workshop, Silver Spring, MD. September 9-10, 2009.
89. **Ray, R.L**., and Jacobs, J.M.: Landslide susceptibility mapping using remotely sensed soil moisture. *IEEE International Geosciences and Remote Sensing Symposium* (IGARSS), Boston, MA, July 6-11, 2008.

90. **Ray, R.L**., and Jacobs, J.M.: Landslide forecasting using microwave remote sensing. Fall Meeting, *American Geophysical Union*, San Francisco, CA, December 10-14, 2007.
*91*. Ray, R.L., and Jacobs, J.M.: Linking landslides with remotely sensed soil moisture and satellite-derived rainfall at Cleveland Corral, El Dorado County in California. *1st North American Landslide Conference*, Vail, Colorado, June 3-8, 2007.
92. **Ray, R.L**., and Jacobs, J.M.: Surficial slope stability using satellite soil moisture and rainfall, *Geological Society of America*, Northeastern Section-42nd Annual Meeting, University of New Hampshire, Durham, NH, 12-14 March 2007.
93. **Ray, R.L**., Jacobs, J.M., and Choi, M., Relationships among remotely sensed soil moisture, precipitation and landslide events, Spring Meeting, *American Geophysical Union*, Baltimore, MD, May 23-26, 2006.
94. Jacobs, J.M., Douglas, E.M., **Ray, R.L**., Mecikalski, J., Sumner, D.M., and Paech, S.: Satellite-based solar radiation and potential and reference evapotranspiration estimates in Florida, Spring Meeting, *American Geophysical Union*, Baltimore, MD, May 23-26, 2006.
95. Choi, M., Jacobs, J.M., Cosh, M.H., **Ray, R.L**.: Soil moisture structure for different soil depths from the field to watershed scale during the Soil Moisture Experiment 2005 (SMEX05), Fall Meeting, *American Geophysical Union*, San Francisco, CA, Dec. 5-9, 2005.

## TEACHING AND ADVISING EXPERIENCE

**Prairie View A&M University, Prairie View, TX** 2013-Present

***Professor (Fall 2023 to present)***

*Spring: Natural Resources Conservation Management (AGRI 1301)*
*Spring: Surveying and Soils (CONS 3363)*
*Fall: Geospatial Technology (AGHR 4413) and Hydrologic Processes in Soils (NRES 5323)*

***Associate Professor (Fall 2019 to Aug 2023)***

*Spring: Natural Resources Conservation Management (AGRI 1301)*
*Spring: Surveying and Soils (CONS 3363)*
*Fall: Geospatial Technology (AGHR 4413)*

***Guest Lecturer***

- Fundamentals of Agricultural Engineering
- Farm Drainage

***Advising***

**Undergraduate Student's Projects**

1. Study the impact of drought on groundwater storage in the State of Texas
2. Influence of rain on water and energy balance components at the land surface

**Graduate Students (Ph.D., and Master Dissertation/Thesis)**

**Ph.D. Degree**

1. A multi-modeling approach to evaluate the impacts of land use and climate change in a humid sub-tropical River Basin. University of Allahabad, UP, India (Co-Advisor). Mr. Nirmal Kumar

2. Multi-scale multi-resolution agriculture data analytics for crop/vegetation health prediction and optimization. College of Engineering, Prairie View A&M University, Mr. John Olamofe (Co-Advisor, Advisor -Dr. Qian Lijun

**MS Degree**

1. Monitoring vegetation health using satellite data and machine learning is ongoing. M.S. Electrical Engineering (Co-Advisor): Student – Jocquia Levy
2. Prediction of groundwater level using machine learning with spatial information, August 2020. M.S. Electrical Engineering (Co-Advisor): Student- Yohn Ellis
3. A web application for visualizing and predicting groundwater storage in Texas, May 2018. M.S. Computer Science (Co-Advisor): Student- Adekanmbi Abayomi
4. Deep learning for soil moisture estimation from thermal images, Aug 2017. M.S. Electrical Engineering (Co-Advisor): Student- Remilekun Sobayo
5. Evaluation of land-use and climate change effects on carbon dioxide flux in Texas using satellite measurements, Aug 2017. M.S. Civil and Environmental Engineering (Co-Advisor): Ademola O. Ibironke

**The University of California-Merced, Merced, CA** 2011-2012

*Lecturer*

School of Engineering and Sciences

- Climate and Hydrology for undergraduate students, Fall 2011, Fall 2012
- Mountain Hydrology for graduate and undergraduate students, Spring 2012

**San Diego State University, San Diego, CA** 2009-2010

*Lecturer*

Department of Civil, Construction, and Environmental Engineering

- Environmental Engineering for graduate and undergraduate students, Fall 2010

**University of New Hampshire, Durham, NH** 2005-2009

*Guest Lecturer*

- Engineering Hydrology, Fall 2007
- GIS and Water Resource, Spring 2008

*Teaching Assistant*

Fluid Mechanics lab class, including lectures and experiments for 87 students in two semesters

## RESEARCH AND PROFESSIONAL EXPERIENCES

### RESEARCH EXPERIENCE

**Prairie View A&M University, Prairie View, TX** 2019-present

*Associate Professor*

Cooperative Agricultural Research Center, and Department of Agriculture, Nutrition, and Human Ecology, College of Agriculture and Human Sciences

- Conducting field experiments for different cropping systems to monitor greenhouse gases, hydrologic fluxes, and climatic data

- Evaluating satellite products, such as soil moisture, carbon flux, precipitation, terrestrial water storage, and evapotranspiration to study critical water resources, drought, and climate change issues at a range of scales
- Developing a web application tool to monitor groundwater in the State of Texas
- Investigating the effects of climate change on the hydrological cycle and land-cover changes/agriculture and water quality

**Prairie View A&M University, Prairie View, TX** 2013-2018

*Research Scientist*

Cooperative Agricultural Research Center, College of Agriculture and Human Sciences

- Developed a well-equipped research testbed to monitor greenhouse gases, hydrologic fluxes, and climatic data
- Evaluated satellite products, such as soil moisture, carbon flux, precipitation, terrestrial water storage, and evapotranspiration, to study critical water resources, drought, and climate change issues at a range of scales

**The University of California-Merced, CA** 2011-2012

Postdoctoral Researcher

Sierra Nevada Research Institute, University of California, Merced**,** CA, USA

- Effects of climate and land-cover changes on the hydrological cycle and carbon-nitrogen cycle in the Sierra Nevada Mountain Region using Regional Hydro-Ecologic Simulation System (RHESSYS) model (Southern Sierra Critical Zone Observatory (CZO) project)
- How do landscape patterns of climate, regolith, and vegetation control soil moisture, ET, and streamflow, and how will montane watersheds respond to climate change, disturbance (fire), and management (forest thinning)

**The University of California-San Diego, San Diego, CA** 2010-2011

Visiting Research Scholar

Scripps Institution of Oceanography

- Daily streamflow forecasting via coupled Soil Vegetation Atmosphere Transfer (SVAT) and hydrologic routing models
- Climate change impact assessment on water supply and demand in the southern California region using historical and predicted climatic data (1949-2030)

**San Diego State University, San Diego, CA** 2009-2010

Postdoctoral Researcher

Department of Civil, Construction, and Environmental Engineering

- Rainfall-runoff modeling to predict streamflow using Variable Infiltration Capacity (VIC-3L) and Hillslope River Routing (HRR) Models: Susquehanna River Basin, USA
- Application of GRACE-measured water storage change observations to the Hillslope River Routing (HRR) in the Congo River Basin
- Streamflow estimation and validation using ENVISAT stage data for an un-gauged basin (Congo River Basin)
- Quantitative and qualitative analysis and comparison of TRMM, PERSIANN, and CMORPH satellite-derived rainfall in the Congo River Basin

**University of New Hampshire, Durham, NH** 2005-2009

Graduate Research Fellow

Department of Civil and Environmental Engineering

- Hydrological modeling and landslide analysis using in-situ measurements as well as remote sensing data such as AMSR-E, TRMM, MODIS, SRTM
- Potential and reference evapotranspiration estimation in Florida (All five Water Management Districts)

## PROFESSIONAL EXPERIENCE

**Ministry of Local Development, Nepal** 1996-2002

Civil Infrastructure Engineer

- Supervised and trained 10 Junior Engineers, 102 Civil Engineering Technicians, and 102 county agents.
- Worked for water resources planning and management, water supply, and sanitary engineering projects at the district and regional level
- Conducted feasibility analysis, planning, and design, of highways, river training/flood control, stormwater restoration, and major infrastructure development.
- Developed District Master Plan and presented at district and regional level workshops
- Specific Projects:
  - Detailed survey, geological investigation, underground reservoir design for groundwater collection, and overhead distribution tank design for Machhegoun Water Supply Project in Kathmandu District
  - Design, cost estimation, and report preparation of Hariaun village development committee building project in Sarlahi District
  - Design and construction supervision of the Isworpur VDC Office building Project in Sarlahi District
  - Foundation, superstructure design, and cost estimation of the Lalbandi Campus Building Project in Sarlahi District
  - Design, preparation of the tender document, specifications, and construction supervision of the Office building of Lalbandi VDC in Sarlahi district
  - Structural design, preparation of tender documents, specifications, and construction supervision of the Higher Secondary School Building Project in Babarganj VDC in Sarlahi district

- Detail survey, geological investigation, hydrological analysis, soil testing, design, cost estimation, and construction supervision of Tala Nadi Steel Truss Bridge (span=32 m) in Sarlahi District.
- Engineering survey, design, and cost estimation and report preparation of Hariaun groundwater Irrigation Project, Atrauli Ground Water Irrigation Project In Sarlahi District
- Engineering survey, socio-economic survey, traffic analysis, map preparation, and final report preparation of District Transport Master Plan (DTMP) of Sarlahi District
- Feasibility study, geological investigation, and soil erosion analysis to control the landslide at Kalinjor VDC in Kalinjor Khola in Sarlahi District
- Feasibility study, geological investigation, hydrological analysis, foundation and superstructure design, and cost estimation of Dhungre Khola Reinforced Cement Concrete (RCC) Bridge and Manushmara River RCC Bridge in Sarlahi District
- Detailed engineering survey, hydrological analysis, geological investigation, design of Earthen Dam along the Bagmati River to control the overflow of water during the rainy season and to construct the Earthen Dam across the Dhangra Khola to divert the river flow into the Lakhandehi River to stop the agricultural land erosion during the rainy season

**TAEC Consult P. Ltd., Nepal** 1993-1996

Civil Engineer

- Led topographical survey, design, and cost estimation of the flood control structure
- Conducted feasibility study, geological investigation, quality control, and supervision of Irrigation Head Works Improvement Project in Eastern Nepal
- Topographical survey, design, cost estimation, finalization of contractors, day-to-day construction supervision of the main Administrative Building, Hospital Building, Compound Wall, Approach road, and RCC culvert in Adult Orthopedic Hospital Project at Jorpati Kathmandu
- Topographical survey, Soil testing to know the bearing capacity of the soil, foundation design, and day-to-day construction supervision of Multi-Storied Building covering Administrative Block, Workshop Building, Guest House, Principle Quarter, Staff Quarter, Guard House, Girls Hostel Building, Teaching Block, Boundary Wall, Approach Road, RCC Bridge having span 10 m. Sewage Disposal System, Drainage construction, Overhead Water Distribution Tank (capacity 200000 liters), in Bheri Technical School Construction Project at Nepalgunj in Banke District
- Topographical and engineering survey of the site, soil testing, geological investigation, design, and construction supervision of the Primary Education Training Center Building Project in Bhojpur District
- Engineering survey, design, and geological investigation at the Bhojpur Water Supply Project of gravity flow system in Bhojpur District, Nepal

## PROFESSIONAL TRAINING & WORKSHOPS

### Training

- *Assessing the Impacts of Fires on Watershed Health*, June 6 – July 13, 2023. NASA's Applied Remote Sensing Training (ARSET).
- Global Quality Enhancement Plan to modify course syllabus to include global competencies, June 10 – August 5, 2022, Global Infusion Institute, PVAMU.

- *Professional development through teaching online for faculty*, August 1 – 31, 2021. Strategic Education Inc. and University Partnerships.
- *Faculty Research Education Development (FRED) Summer Grant Writing Workshop*, July 29 – 31. American Society for Cell Biology (ASCB) – An international forum for cell biology.
- *Enhancing our Teaching to Foster Student Success*, September 1, 2020-May 31, 2021, Prairie View A&M University/ Association of College and University Educators (ACUE) Program.
- *Using Google Earth Engine for Land Monitoring Applications*, June 16 – 30, 2021. NASA's Applied Remote Sensing Training (ARSET).
- *Satellite Observations and Tools for Fire Risk, Detection, and Analysis*, May 11 – 27, 2021. NASA's Applied Remote Sensing Training (ARSET).
- *Introduction to Population Grids and their Integration with Remote Sensing Data for Sustainable Development and Disaster Management*, March 30 - April 6, 2021. NASA's Applied Remote Sensing Training (ARSET).
- *Use of Solar Induced Fluorescence and LIDAR to Assess Vegetation Change and Vulnerability*, March 16 - 25, 2021. NASA's Applied Remote Sensing Training (ARSET).
- *Mapping and Monitoring Lakes and Reservoirs with Satellite Observations*, February 9 - 23, 2021. NASA's Applied Remote Sensing Training (ARSET).
- *Hyperspectral Data for Land and Coastal Systems*, January 19 – February 2, 2021, NASA's Applied Remote Sensing Training (ARSET).
- *Remote Sensing for Mangroves in support of the UN sustainable development goals*, November 5 – 19, 2020, NASA's Applied Remote Sensing Training (ARSET).
- *Remote Sensing of Coastal Ecosystems*, August 25 - September 8, 2020, NASA's Applied Remote Sensing Training (ARSET).
- *Understanding Phenology with Remote Sensing*. June 30 - July 14, 2020, NASA's Applied Remote Sensing Training (ARSET).
- *An Inside Look at how NASA Measure Air Pollution*, May 2 – 28, 2020, NASA's Applied Remote Sensing Training (ARSET).
- *Satellite Remote Sensing for Agricultural Applications*, April 14 – May 05, 2020, NASA's Applied Remote Sensing Training (ARSET).
- *Applications of GPM IMERG Reanalysis for Assessing Extreme Dry and Wet Periods*, January 28 – February 4, 2020, NASA's Applied Remote Sensing Training (ARSET).
- *High Resolution NO2 Monitoring From Space with TROPOMI*, May 28 – June 3, 2019, NASA's Applied Remote Sensing Training (ARSET).
- Decision Support System for Agrotechnology Transfer (DSSAT). 2019 International Training Program: Assessing Crop Production, Nutrient Management, Climatic Risk and Environmental Sustainability with Simulation Models – May 20 – 25, 2019 at Griffin, Georgia, USA.
- *Investigating Time Series of Satellite Imagery*, Apr 15 – 17, 2019, NASA's Applied Remote Sensing Training (ARSET).

- *Advanced Webinar: Change Detection for land Cover Mapping*, September 28 – October 5, 2018, NASA's Applied Remote Sensing Training (ARSET).
- *High Temporal Resolution Air Quality Observations from Space,* Sep 4 – 25, 2018, NASA's Applied Remote Sensing Training (ARSET).
- *Advanced Webinar: Processing Satellite Imagery for Monitoring water Quality*, Sep 5 – 19, 2018, NASA's Applied Remote Sensing Training (ARSET).
- *Introduction to Using the VIC Hydrologic Model with NASA Earth Observations,* February 15 – March 1, 2018, NASA's Applied Remote Sensing Training (ARSET).
- *Remote Sensing of Land Indicators for Sustainable Development Goal 15*, Jun 20 – 22, 2017, NASA's Applied Remote Sensing Training (ARSET).
- *Land Cover Classification with Satellite Imagery*, January 31 – February 7, 2017, NASA's Applied Remote Sensing Training (ARSET).
- Water Quality Analysis Simulation Program (WASP) workshop held at Atlanta Federal Center (Host: EPA Region 4), Atlanta, Georgia: Aug 1-5, 2016.
- Eddy Covariance Training course held at LI-COR, Lincoln, Nebraska: Jan 12-14, 2016.
- "Utilization of cyberinfrastructure-based data systems and tools in geoscience education and research." Training Participant, organized by Cyberinfrastructure Summer Institute for Geoscientists (CSIG'10) to be held at the **San Diego Supercomputer Center (SDSC)** on the campus of the University of California, San Diego (UCSD): Aug 9-13, 2010.
- "Use of Response Surface Methods (RSM) and other methods for modern Design of Experiments (DOE) using JMP software." Invited Participant and organized by **Statistical Analysis Software (SAS)** in San Diego, CA, USA: March 2010.
- School Physical Facilities Improvement Program, Kathmandu, Nepal: September 23, 2001 to September 27, 2001.
- Decentralized and Participatory Development of Rural Roads, Kathmandu, Nepal: September 1-7, 1997
- Local Development Planning and Management, held at Kathmandu, Nepal, January 1, 1997, to February 7, 1997.
- Major maintenance of Trial Suspension Bridges, Suspension Bridge Division, Kathmandu, Nepal: Dec 1-5, 1996.

**Workshops**

- *Post-Harvey Era: Resilient Engineering, Infrastructure & Policy*, October 8-9, 2019, Rice University, TX.
- *Resilient Houston Living with Water (LWW) Design Workshop,* May 28-30, 2019, Rice University, TX.
- *Texas Water Research Network,* May 8-9, 2017, The University of Texas at Austin, Pickle Research Campus, TX
- *2017 FEW Nexus Workshop and Multi-Stakeholder Dialogue on Integrated Science, Engineering, and Policy*, January 26-27, 2017, College Station, TX. |

## FIELD EXPERIENCES

- Participated in Soil Moisture Experiment 2005 (SMEX05), Ames, Iowa, conducted by USDA and NASA
    - Measured in-situ surface soil moisture
    - Monitored soil moisture root zone profiles
- Collected snow depth, snow water equivalent (SWE), precipitation, soil moisture, and other climatic data in a combination of field measurements and sensor networks at Last Chance, Sugarpine, and Providence watersheds in the Sierra Nevada Mountains
- Ongoing field experiments: Eddy Covariance Flux Tower, Leafy Greens, and Cover Crops

## OUTREACH ACTIVITIES

### International

1. Conducted two weeks of training for researchers, extension specialists, farmers, students, and other stakeholders in **Morocco** under the farmer-to-farmer USAID program on Greenhouse Gas Emissions and Soil Carbon Sequestration, January 3, 2023, to January 14, 2023
2. Conducted two weeks of training for researchers, extension specialists, farmers, students, and other stakeholders in the **Dominican Republic** under the farmer-to-farmer USAID program on Greenhouse Gas Emissions and Soil Carbon Sequestration, December 11, 2022 to December 24, 2022
3. Conducted training on carbon sequestration and geospatial technology for staff and field officers of **Jamaica** Agricultural Commodities Regulatory Authority (JACRA), Jamaica, under the farmer-to-farmer USAID program, October 16-30, 2022
4. Conducted virtual training for faculty, researchers, students, and other stakeholders at Lamjung Campus, Sundar Bazar, Lamjung, **Nepal,** under the farmer-to-farmer USAID program, on the application of GIS and Remote sensing to agriculture and natural resources management, April 16-30, 2022
5. Conducted two weeks of training for researchers, extension specialists, farmers, students, and other stakeholders in the **Dominican Republic** under the farmer-to-farmer USAID program, on Soil Carbon Sequestration, September 19, 2021, to October 3, 2021
6. Conducted virtual training for researchers, extension specialists, farmers, students, and other stakeholders in the **Dominican Republic** under the farmer-to-farmer USAID program on Soil Carbon Sequestration from July 16, 2020, to March 12, 2021.
7. Conducted virtual training for faculty, researchers, students, and other stakeholders at Wolkite University, **Ethiopia**, under the farmer-to-farmer USAID program, on the application of GIS and Remote sensing to agriculture and natural resources management, October 1-23, 2020
8. Conducted two weeks of training for researchers, extension specialists, farmers, students, and other stakeholders in the **Dominican Republic** under the farmer-to-farmer USAID program on Soil erosion, Floods, and Landslides, April 28 to May 12, 2019.
9. Conducted two weeks of training for researchers, extension specialist, farmers, students, and other stakeholders in Gujarat, **India**, under the farmer-to-farmer USAID program, on Climate Smart Agriculture, April 28 to May 11, 2018.

**National/Regional**

**K-12 (Since 2013)**

Conducted field demonstrations and hands-on laboratory exercises on natural resources and environmental sciences, including Ground Penetrating Radar (GPR), EM-38, and other sensing equipment and technologies at various summer events, training, and programs organized by the College of Agriculture and Human Sciences (CAHS), PVAMU:

- Research Extension Apprentice Program (REAP)
- Conducted AG Discovery program each summer from 2015 to the present.
- Youth leadership laboratory
- Junior Youth Leadership Laboratory

**Others**

**2023**

- Rainwater Harvesting for Sustainable Water Resource Management under Climate Change. Sustainable Agriculture Program, Water Resources Management Workshop, March 9, 2023. Jefferson, Marion County, TX.
- Rainwater Harvesting for Sustainable Water Resource Management under Climate Change. Sustainable Agriculture Program, Rainwater Harvesting Workshop, February 28, 2023. Luling Foundation, Luling, Caldwell County, TX.

**2022**

- Climate-Smart Tools and Technologies for Agriculture under Changing Climate, June 6-17, 2022, USDA AG Discovery Program, Prairie View, TX.
- Rainwater Harvesting for Sustainable Water Resource Management under Climate Change. Sustainable Agriculture Program, Impact of drought and climate change on agricultural production Virtual Workshop, August 16, 2022

**2021**

- Virtual lecture on Smart Systems for Soil Exploration and Monitoring, July 5 to 16, 2021, Research Extension Apprentice Program (**REAP**), Prairie View, TX.

**2020**

- Virtual lecture on soil health monitoring and pH measurements, July 6 to 16, 2020, Research Extension Apprentice Program (**REAP**), Prairie View, TX.

**2019**

- Presentation on natural resources management and food security, World Food Day, October 16, 2019, Prairie View, TX
- Field demonstration: Precision Agriculture, June 20, 2019, USDA AG Discovery Program, University Research Farm, Prairie View, TX.
- Field demonstration of Collard Greens, GPR, EM-38, Soil $CO_2$ Sensors, and different measurement techniques, **Ag Day On The Hill**, April 26-27, 2019.
- Field demonstration to understand soil-water-vegetation relationships using GPR, EM-38,

Soil $CO_2$ Sensors and other tools, **British Virgin Islands Seventh-day Adventist School visit**, April 4, 2019.
- Field demonstration: Alvin ISD 8th Graders Visit, PVAMU, March 22, 2018.
- Field demonstration: Middle School Students Visit, PVAMU, March 20, 2018.
- Exhibitor of CAHS, **Houston Livestock Show and Rodeo**, Houston, TX, February 27, 2019.

**2018**

- Field demonstration: Drones, GPR and VR, June 13, 2018, Research Extension Apprentice Program (**REAP**), Outside of CARC Building, Prairie View, TX.
- Hands-on demonstration: **2018 World Water Day celebration at PVAMU**, March 22, 2018, Prairie View A&M University, Prairie View, TX.
- Exhibitor of CAHS, **Houston Livestock Show and Rodeo**, Houston, TX, March 16, 2018.
- Field demonstration, **Leafy Greens Workshop: From Farm to Table**, February 15, 2018, Prairie View A&M University, Prairie View, TX.

**2017**

- Laboratory demonstration: Watershed/Nonpoint Source Pollution, July 18, 2017, Youth Leadership Laboratory, Cho-Yeh Camp & Conference Center, Livingston, TX.
- Field demonstration: Drones, GPR and VR, June 13, 2017 (**two sessions**), Research Extension Apprentice Program (**REAP**), Outside of CARC Building, Prairie View, TX.
- Field Demonstration: Performance of Legume and Grain Cover Crops under Southeast Texas, Agricultural Field Day, April 29, 2017.
- Exhibitor of CAHS, **Houston Livestock Show and Rodeo**, Houston, TX, March 9, 2017.

**2016**

- Academic demonstration: Agricultural Remote Sensing Technologies, November 4, 2016, Participants of the 13th TAMU Pathways Student Research Symposium
- Field demonstration: Drone and GPR, June 14 and 15, 2016 (two sessions), Research Extension Apprentice Program (**REAP**)
- Laboratory demonstration: Natural Resources: Soil and Water Resources Management, March 11, 2016, Middle School Day
- Exhibitor of CAHS, Houston Livestock Show and Rodeo, Houston, TX, March 10, 2016.

**2014**

- Field demonstration: GPR, and EM-38, Research Extension Apprentice Program (REAP
- Exhibitor of CAHS, **Houston Livestock Show and Rodeo**, Houston, TX, March 10, 2014.

**Blogs**

- Effects of climate change and the importance of Earth Day, April 22, 2020.
    - https://www.pvamu.edu/blog/pvamu-professor-shares-effects-of-climate-change-importance-of-earth-day/
    - https://www.pvamu.edu/blog/pvamu-receives-5-million-from-usda-to-assist-small-scale-texas-farmers/