

Si Gao

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PROFESSIONAL APPOINTMENTS

- 2022 – **Assistant Professor**, Department of Environmental Studies, College of Social Sciences & Interdisciplinary Studies, California State University, Sacramento, CA, USA
- 2021 – 2022 **Postdoctoral Research Associate**, Department of Life & Environmental Sciences, College of Natural Sciences, University of California, Merced, CA, USA
- 2020 – 2021 **Postdoctoral Research Associate**, Department of Forest Ecosystems & Society, College of Forestry, Oregon State University, Corvallis, OR, USA
- 2017 – 2020 **Graduate Research Assistant**, Department of Forest Management, W.A. Franke College of Forestry & Conservation, University of Montana, Missoula, MT, USA
- 2016 – 2017 **Graduate Research Assistant**, School of Environmental & Forest Sciences, College of the Environment, University of Washington, Seattle, WA, USA

EDUCATION

- 2020 Ph.D. Forest & Conservation Sciences. University of Montana, Missoula, MT, USA
- 2016 M.Sc. Environmental & Forest Sciences. University of Washington, Seattle, WA, USA
- 2014 B.Sc. Environmental Science. China Agricultural University, Beijing, China

PUBLICATIONS

Manuscripts under review:

- 2023 B.P. Harrison, Z. Moo, E. Perez-Agredano, **S. Gao**, X. Zhang & R.A. Ryals. Biochar-composting substantially reduces methane and air pollutant emissions from dairy manure. Submitted to ***Environmental Research Letters***.

Peer-reviewed journal articles and book chapters:

- 2023 K. McCool, S. Holub, **S. Gao**, B. Morrisette, J. Blunn, A. Gallo & J.A. Hatten. Quantifying impacts of forest fire on soil carbon in a young, intensively managed tree farm in the western Oregon Cascades. ***Soil Science Society of America Journal*** 87(6): 1-16.
- 2023 T. Thao, B.P. Harrison, **S. Gao**, R.A. Ryals, R. Dahlquist-Willard, G. Diaz, & T.A. Ghezzehei. The effects of biochar-manure co-composts on soil hydraulic properties, nutrient retention, greenhouse gas emissions, and tomato productivity. ***Agrosystems, Geosciences & Environment*** 6(3): e20408.

- 2023 **S. Gao**, B.P. Harrison, T. Thao, M.L. Gonzales, D. An, T.A. Ghezzehei, G. Diaz & R.A. Ryals. Biochar co-compost improves nitrogen retention and reduces carbon emissions in a winter wheat cropping system. *GCB Bioenergy* 15(4): 462-477.
- 2022 B.P. Harrison, **S. Gao**, M.L. Gonzales, T. Thao, E. Bischak, T.A. Ghezzehei, A.A. Berhe. G. Diaz & R.A. Ryals. Dairy manure co-composting with wood biochar plays a critical role in meeting global methane goals. *Environmental Science & Technology* 56(15): 10987-10996.
- 2022 **S. Gao** & T.H. DeLuca. Rangeland application of biochar and rotational grazing interact to influence soil and plant nutrient dynamics. *Geoderma* 408: 115572.
- 2022 S. Wen, Y. Tian, S. Ouyang, M. Song, X. Li, Y. Zhang, **S. Gao**, X. Xu & Y. Kuzyakov. High frequency of extreme precipitation increases *Stipa grandis* biomass by altering plant and microbial nitrogen acquisition. *Biology and Fertility of Soils* 58: 63-75.
- 2021 **S. Gao** & T.H. DeLuca. Influence of fire retardant and pyrogenic carbon on microscale changes in soil nitrogen and phosphorus. *Biogeochemistry* 152: 117-126.
- 2020 T.H. DeLuca, M.J. Gundale, R.J. Brimmer & **S. Gao**. Pyrogenic carbon generation from fire and restoration fuel treatments. *Frontiers in Forests and Global Change* 3: 24.
- 2020 **S. Gao** & T.H. DeLuca. Biochar alters nitrogen and phosphorus dynamics in a western rangeland ecosystem. *Soil Biology and Biochemistry* 148: 107868.
- 2020 Q. Tan, T. Hao, **S. Gao**, X. Liu, G. Wang & Q. Yu. Soil organic carbon turnover recovers faster than plant diversity in grassland ecosystems when high loading nitrogen addition is ceased: Derived from soil ¹⁴C evidences. *Global Ecology and Conservation* e01229.
- 2019 **S. Gao** & T.H. DeLuca. Use of microdialysis to assess short-term soil soluble N dynamics with biochar additions. *Soil Biology and Biochemistry* 136: 107512.
- 2019 T.H. DeLuca, M.R.A. Pingree & **S. Gao**. Assessing soil biological health. Pp 25-49. In: Busse, M., Giardina, C., Morris, D. & Page-Dumroese, D. (Eds.), *Global Change and Forest Soils: Cultivating Stewardship of a Finite Natural Resource*. Elsevier. ISBN: 9780444639981.
- 2019 **S. Gao**, T.H. DeLuca & C.C. Cleveland. Biochar additions alter phosphorus and nitrogen availability in agricultural ecosystems: A meta-analysis. *Science of the Total Environment* 654: 463-472.
- 2019 T.H. DeLuca & **S. Gao**. Use of biochar in organic farming. Pp 397-426. In: Chandran, S.C., Thomas, S. & Unni, M.R. (Eds.), *Organic Farming: New Advances Towards Sustainable Agricultural Systems*. Springer. ISBN: 9783030046569.
- 2018 **S. Gao** & T.H. DeLuca. Wood biochar impacts soil phosphorus dynamics and microbial communities in organically-managed croplands. *Soil Biology and Biochemistry* 126: 144-150.
- 2017 **S. Gao**, K. Hoffman-Krull & T.H. DeLuca. Soil biochemical properties and crop productivity following application of locally produced biochar at organic farms on Waldron Island, WA. *Biogeochemistry* 136(1): 31-46.
- 2016 **S. Gao**, K. Hoffman-Krull, A.L. Bidwell & T.H. DeLuca. Locally produced wood biochar increases nutrient retention and availability at agricultural soils of the San Juan Islands, USA. *Agriculture, Ecosystems & Environment*, 233: 43-54.

- 2016 **S. Gao** & T.H. DeLuca. Influences of biochar on soil nutrient transformations, nutrient leaching, and crop yield. *Advances in Plants & Agriculture Research*, 4(5): 00150.

RESEARCH PRESENTATIONS

Invited talks:

- 2023 *Transforming wastes into resources to advance circular agricultural economies*. Delivered at the 2023 California Plant and Soil Conference, Fresno, CA
- 2022 *Sources and mitigation of methane from dairy manure management*. Delivered at the California Climate & Agriculture Network 2022 Summit, Davis, CA
- 2022 *Climate change, forests, fire, and soil health*. Delivered at the San Juan Island Forest Health Collaborative 2022 Summit, Friday Harbor, WA
- 2021 *Locally produced wood biochar in the US Northwest: Influence on soil nitrogen and phosphorus*. Delivered at the Environ-lunch Symposium, University of California, Merced, CA
- 2020 *Fire retardant and pyrogenic carbon on microscale changes in soil nutrients*. Delivered at the Cascadia Wildfire and Urban Smoke Workshop, Portland State University, Portland, OR.
- 2020 *Influence of fire retardant and biochar on microscale changes in soil nutrient fluxes*. Delivered at the 9th Annual Research Symposium, Oregon State University, Corvallis, OR
- 2020 *Biochar in the Northwestern US: Impacts on ecosystem carbon and nutrients*. Delivered at the Communities of Excellence Environment and Sustainability Symposium, University of Montana, Missoula, MT
- 2019 *Wood biochar application in agricultural and forest ecosystems of the western US: Impacts on soil N and P dynamics*. Delivered at the Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang, China
- 2018 *Connections to natural soil carbon: Can prescribed fire help restore charcoal to forest soils?* Delivered at the Forest Biomass and the Bioeconomy Workshop, Vancouver, WA
- 2017 *Biochar, organic farming, and soil health*. Delivered at the San Juan Islands 2017 Agricultural Summit, Friday Harbor, WA

Contributed presentations:

- 2023 **S. Gao**, B.P. Harrison, T. Thao, M.L. Gonzales, D. An, T.A. Ghezzehei, G. Diaz & R.A. Ryals. *Biochar co-compost improves nitrogen retention and reduces carbon emissions in a winter wheat cropping system*. Ecological Society of America (ESA) 2023 Annual Meeting, Portland, OR, USA.
- 2023 T.H. DeLuca, **S. Gao**, C. Eisenberg & S. Morford. *Fire exclusion, pyrogenic carbon, and ecosystem function: What have we lost?* Ecological Society of America (ESA) 2023 Annual Meeting, Portland, OR, USA.
- 2023 B.P. Harrison, **S. Gao** & R. Ryals. *Biochar co-composting of dairy manure substantially reduces methane and can play a critical role in meeting climate goals*. US Compost Council 2023 Conference, Ontario, CA, USA.

- 2022 B.P. Harrison, **S. Gao**, M. Gonzales, T. Thao, L. Hale, T. Ghezzehei & R. Ryals. *Methane emissions during biochar co-composting are driven by biochar application rate and aggregate formation*. 2022 American Geophysical Union (AGU) Annual Meeting, Chicago, IL, USA.
- 2022 D. An, D. Hollenbeck, **S. Gao** & Y. Chen. *A field study of soil biochar treatment response using small unmanned aerial systems (sUAS)*. 2022 International Conference on Unmanned Aircraft Systems, Dubrovnik, Croatia.
- 2022 B.P. Harrison, **S. Gao**, M. Gonzales, T. Thao, A.A. Berhe, T. Ghezzehei & R. Ryals. *Reducing methane emissions from dairies using biochar*. Ecological Society of America (ESA) 2022 Annual Meeting, Montréal, Québec, Canada.
- 2022 M. Gonzales, **S. Gao** & A.A. Berhe. *The influences of organic amendments on soil carbon dynamics in Central Valley, California, USA*. 8th International Symposium on Soil Organic Matter, Seoul, South Korea.
- 2022 **S. Gao**, B.P. Harrison, M. Gonzales, T. Thao, T. Ghezzehei, A.A. Berhe, G. Diaz & R. Ryals. *Locally produced organic amendments on soil health and greenhouse gas fluxes in agroecosystems of Central California, USA*. Soil Ecology Society Biennial Meeting, Richland, WA, USA.
- 2022 B.P. Harrison, **S. Gao**, M. Gonzales, T. Thao, A.A. Berhe, T. Ghezzehei & R. Ryals. *Reducing methane emissions from dairies using biochar*. Soil Ecology Society Biennial Meeting, Richland, WA, USA.
- 2021 **S. Gao** & T.H. DeLuca. *Pyrogenic carbon buffers excess nutrient fluxes in forest soils exposed to fire retardant chemicals*. Ecological Society of America (ESA) 2021 Annual Meeting.
- 2021 B.P. Harrison, **S. Gao**, M. Gonzales, T. Thao, A.A. Berhe, T. Ghezzehei & R. Ryals. *Reducing methane emissions from dairies using biochar*. 2021 UC Global Climate Leadership Council Spring Meeting.
- 2020 **S. Gao** & T.H. DeLuca. *Wood biochar alters soil nitrogen and phosphorus dynamics in a western rangeland ecosystem*. 2020 ASA, CSSA, and SSSA International Annual Meeting.
- 2020 **S. Gao** & T.H. DeLuca. *Use of microdialysis to assess short-term soil soluble N dynamics with biochar additions*. Ecological Society of America (ESA) 2020 Annual Meeting.
- 2018 **S. Gao**, T.H. DeLuca & K. Hoffman-Krull. *Locally produced wood biochar alters soil phosphorus dynamics and microbial communities in organically-managed croplands of western WA, USA*. Ecological Society of America (ESA) 2018 Annual Meeting, New Orleans, LA, USA.
- 2017 **S. Gao**, T.H. DeLuca & A.L. Bidwell. *The intersection of sustainable forestry and farming: Locally produced wood biochar increases soil nutrient availability and plant productivity of the San Juan Islands, USA*. Ecological Society of America (ESA) 2017 Annual Meeting, Portland, OR, USA.
- 2016 **S. Gao**, T.H. DeLuca, K. Hoffman-Krull & A.L. Bidwell. *Locally produced wood biochar increases nutrient retention and availability in agricultural soils of the San Juan Islands, WA, USA*. US Biochar Initiative (USBI) 2016 Annual Meeting, Corvallis, OR, USA.
- 2015 **S. Gao**. *Biochar as a soil amendment for sustainable agriculture in the Pacific Northwest*. Graduate Student Symposium at the University of Washington, Seattle, WA, USA.

AWARDS, GRANTS & ACADEMIC SCHOLARSHIPS

Research funding:

- 2023 **Co-Principal Investigator** (Gao at Sacramento State). Bureau of Land Management at the US Department of Interior. “*Pacific Northwest Tribal Forest Restoration and Native Seed Project*”. Principal Investigator: Dr. Cristina Eisenberg at Oregon State University. Project duration: 2023-2025.
- 2021 **Co-Principal Investigator** (Gao at UC Merced). Facilities Integrating Collaborations for User Science (FICUS) Award at the US Department of Energy Office of Science National User Facilities. “*Interactions between soil microbial communities and soil organic matter dynamics along a climatic and vegetation gradient in the continental United States*”. Principal Investigator: Dr. Jessica Miesel at Michigan State University. Project duration: 2021-2023.
- 2020 **Co-Investigator** (Gao at Oregon State Univ). Washington State Department of Commerce Forest Products Financial Assistance Program Grant. “*Biochar technologies and application for forest health enhancement and carbon sequestration*”. Principal Investigator: Dr. Thomas DeLuca at Oregon State University. Project duration: 2020-2022.
- 2020 **Co-Investigator** (Gao at Univ of Montana). USDA McIntire-Stennis Forestry Research Grant. “*Evaluation of ecosystem carbon benefits of wood biochar in rangeland ecosystems*”. Principal Investigator: Dr. Thomas DeLuca at the University of Montana. Project duration: 2020-2021.
- 2016 **Co-Principal Investigator** (Gao at Univ of Washington). Amazon Catalyst Grant at the University of Washington. “*Sustainable charcoal: How charcoal changes the way we think about soil fertility*”. Principal Investigator: Dr. Thomas DeLuca at the University of Washington. Project duration: 2016-2017.

Professional development:

- 2022 College of Social Sciences & Interdisciplinary Studies Faculty Travel **Award** at California State University Sacramento, \$2,000
- 2020 Postdoc Association’s Professional Development **Award** at Oregon State University, \$150
- 2019 Associated Students’ Research & Creative **Scholarship** at the University of Montana, \$1,000
- 2019 Clarence and Martha Almen Memorial **Scholarship** at the University of Montana, \$1,200
- 2018 College of Forestry and Conservation **Scholarship** at the University of Montana, \$10,000

TEACHING EXPERIENCE

Pedagogical training:

- 2023 “Wellness in the Classroom”. Center for Teaching and Learning, California State University Sacramento.
- 2021 “Principles of Pedagogy”. Center for Engaged Teaching and Learning in Teaching Commons, University of California, Merced.

Instruction:

- 2023 – Instructor. ENVS 110 Contemporary Environmental Issues. California State University, Sacramento
- 2023 – Instructor. ENVS 149 Agroecology. California State University, Sacramento

- 2022 – Instructor. ENVS 10 Intro to Environmental Science. California State University, Sacramento
- 2018 Teaching assistant. NRS 385 Watershed Hydrology. University of Montana, Missoula
- 2017 Instructor. ESRM 429 Environmental Science and Resource Management. University of Washington, Seattle

ACADEMIC MENTORING EXPERIENCE

- 2022 – 2023 California State University, Sacramento, CA
- D. Tenorio. Environmental Studies (B.S.)
 - D. Singh. Environmental Studies (B.S.)
 - A. Murillo. Environmental Studies (B.S.)
 - S. Pineda. Environmental Studies (B.S.)
- 2021 – 2022. University of California, Merced, CA
- B. Harrison. Environmental Systems (Ph.D.)
 - T. Thao. Environmental Systems (Ph.D.),
 - M. Gonzales. Environmental Systems (Ph.D.)
 - M. Quintana. Environmental Systems (B.S.)
- 2020 – 2021. Oregon State University, Corvallis, OR
- K. McCool. Sustainable Forest Management (M.Sc.)
 - J. Blunn. Soil Science & Forest Restoration (B.S.)
- 2017 – 2020. University of Montana, Missoula, MT
- K. Krasaitis. Ecosystem Science & Restoration (B.S.)
 - H. Hodge. Environmental Science (B.S.)
- 2015 – 2017. University of Washington, Seattle, WA
- W. Johnstone. Biology (B.S.)
 - A. Lieu. Biochemistry (B.S.)
 - T. Wang. Environmental Science (B.S.)

RECOGNITION IN MEDIA

- 2023 “Sustainable Solutions: How organic waste is turned into marketable products” on *City of Elk Grove News and Review* by Gail Short at N&R Publications
- 2018 “Time for another look at biochar?” on *TimberWest* by Jack Petree
https://forestnet.com/TWissues/2018_july_august/guest.php
- 2017 “Is biochar a game-changer for sustainable farms?” on *Civil Eats* by Anna Guth
<https://civileats.com/2017/06/12/is-biochar-a-game-changer-for-sustainable-farms/>

PROFESSIONAL SERVICE & AFFILIATION

Editorial role:

2022 – Review editor, *Frontiers in Environmental Science*

Conference paper peer-review provided for:

2023 – Ecological Society of America, Soil Ecology Section

Grant proposal peer-review provided for:

2023 – National Science Foundation (NSF), Faculty Early Career Development Program

2022 – National Science Foundation (NSF), Environmental Sustainability Program

Journal article peer-review provided for (80+ reviews):

Applied Soil Ecology | Agronomy Journal | Archives of Agronomy and Soil Science | Biogeochemistry | Biology and Fertility of Soils | Communications Earth & Environment | Ecological Applications | Environmental Science and Pollution Research | Fire Ecology | Frontiers in Environmental Science | Global Change Biology | GCB-Bioenergy | Geoderma | Journal of Soils and Sediments | Nature Geoscience | Nutrient Cycling in Agroecosystems | Pedobiologia | Pedosphere | Plant and Soil | PLoS ONE | Science of the Total Environment | Scientific Reports | Soil Biology and Biochemistry | Soil and Tillage Research

Professional judging and conference session moderation provided for:

2023 – Ecological Society of America, Soil Ecology Section

2021 – American Society of Agronomy, Environmental Quality Division

2020 – Soil Science Society of America, Forest, Range & Wildland Soils Division

2020 – Soil Science Society of America, Soil Biology and Biochemistry Division

2020 – Soil Science Society of America, Soil Fertility and Plant Nutrition Division

Memberships in professional organization and honor society:

American Geographical Union

Ecological Society of America

International Biochar Initiative

Soil Science Society of America

Soil Ecology Society

Xi Sigma Pi Honor Society Alpha Chapter