

Christine Costello, PhD

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Education

Carnegie Mellon University, Pittsburgh, PA, USA

Civil and Environmental Engineering	PhD	2011
Civil and Environmental Engineering	MS	2007

Advisor: H. Scott Matthews

Committee: W. Michael Griffin, Amy E. Landis, Christopher L. Weber

Dissertation: *Relating Land Use and Select Environmental Impacts to U.S. Consumption with a Focus on Agricultural Products.*

Temple University, Philadelphia, PA, USA

Environmental Engineering Technology	BS	2003
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Academic Experience

Assistant Professor	Agricultural & Biological Engineering, The Pennsylvania State University (PSU)	Dec. 2019 – present
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Research Associate	The Rock Ethics Institute, PSU	Dec. 2019 – present
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Assistant Professor	Industrial & Manufacturing Systems Engineering, University of Missouri (MU)	Sept. 2017 – Dec. 2019
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Adjunct Professor	Civil & Enviro. Engineering MU	Feb 2014 – present
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Asst. Research Professor	Bioengineering, MU	May 2013 – Aug 2017
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Post-Doctoral Associate	Ecology and Evolutionary Biology, Cornell University	Jan 2011- May 2013
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Industry/Government Employment

Engineer-In-Training	Blasland, Bouck & Lee (now ARCADIS) - Syracuse, NY	Apr 2004 – Jun 2006
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	ARCADIS – Pittsburgh, PA	Aug 2006 – May 2007
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NNEMS Fellow	Environmental Protection Agency – D.C.	May 2003 – Aug 2003
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Intern	EPA – Region 3 – Philadelphia	Feb 2002 – May 2003
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Professional Licensure

Engineering-in-Training	New York State	2004
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Areas of Expertise *Teaching.* industrial ecology, life-cycle assessment (LCA), sustainable engineering. *Research.* LCA of agricultural and food systems, nitrogen cycling in agricultural systems, organic waste treatment, food waste reduction and management, capturing variability in sustainability research, modeling future climate scenarios in hydrology and crop productivity models.

Honors & Awards

Pursuit of Excellence in Engineering, Diversity, and Inclusion – Junior Faculty Award. 2018.

Dowd-ICES Fellowship, 2008-2009 for the project: *Development of a Land Use Inventory and Metric for Life Cycle Assessment*.

Dean’s Fellowship Award, Civil and Environmental Engineering Dept, CMU, 2007-2008.

National Science Foundation Graduate Research Fellowship, (Honorable Mention) 2007.

U.S. EPA Best Practices Award for Innovative Practices, Team Award for EPA Region 3 project. 2006. Played a key role in developing an approach to identify the occurrence of criteria pollutant emissions from unregulated processes in manufacturing, e.g., RCRA exemptions for wastewater treatment.

Courses Taught

Introduction to Life Cycle Assessment. Industrial and Manufacturing Systems Engineering (IMSE) Department. University of Missouri (MU). Undergraduate and Graduate level. Spring 2016 & 2017; Fall 2018, 2019. The Pennsylvania State University. Biorenewable Systems. Undergraduate level, Fall 2020-2023.

Contextual Integration of Leadership Skills for the Technical Workplace. Agricultural & Biological Engineering. The Pennsylvania State University. Undergraduate level. Spring 2020-2022.

Introduction to Biorenewable Systems. The Pennsylvania State University. Biorenewable Systems. Graduate level. Spring 2021-2022.

Advanced Methods in Life Cycle Assessment (Special topics). The Pennsylvania State University. Agricultural & Biological Engineering. Fall 2022.

Seminar: Representing Sustainability in Agroecology and Industrial Ecology Research. The Pennsylvania State University. Agricultural & Biological Engineering. Spring 2023.

Probability for Engineers. IMSE, MU. Undergraduate level. Fall 2019.

Sustainability in Engineered Systems. IMSE Dept. MU. Undergraduate and Graduate level. Spring 2018 & 2019. Covers core concepts in Industrial Ecology, Earth Systems Engineering and Management, and Life Cycle Assessment.

Summary of Recent Sponsored Research Activity

Current Support (as Principal Investigator)

Engaging Communities to Discover Environmentally and Socially Optimal Waste Management Decisions. National Science Foundation (NSF). \$480,000. July 2021 – June 2024.

Best options for agricultural plastics end of life in Pennsylvania. PA Dept. of Agriculture. \$185,000. Aug. 2022 – July 2024.

Consortium for Cultivating Human and Naturally reGenerative Enterprises (C-CHANGE). U.S. Department of Agriculture, Agriculture and Food Research Initiative. \$10,000,000 (PI at Penn State University, PI: Iowa State University, Dr. Lisa Schulte Moore)

Current Support (as Co-Principal Investigator/Sr. Personnel)

ECO-CBET: Transforming the Nitrogen Bioeconomy. NSF. \$1,700,00 (co-PI, PI: PSU, Dr. Rachel Brennan.

Lifecycle Analysis Design Framework for Sustainable Energy Infrastructure. Institutes of Energy and the Environment-Penn State \$29,920. (co-PI, PI: PSU, Dr. Steve Chmely)

CULTURED 1.0: Leading Higher Education Initiatives in Emerging Innovations for Sustainable Food Production. USDA – NIFA. \$30,000. (co-PI, Dr. Josephine Wee)

Life Cycle Analysis for the Advanced Sensing for Characterization and Sorting of Non-Recyclable Plastics Using Sensor Fusion with Artificial Intelligence Project. DOE-BETO, \$2.5M (Senior personnel, PI: Nalin Kumar)

Training Professionals in Biorenewable Systems for a Sustainable Future, \$150,000. USDA – NIFA HEC (co-PI, PI: Dr. Juliana Vasco-Correa)

Past Support (as Principal Investigator or co-Principal Investigator)

Analysis of Nutrient Flow from Farm to Globe using Agricultural Soil Water Sustainability Evaluation (ASWAE) Framework. \$497,079 total, \$199,610 to MU. 2017 – 2021. USDA-AFRI (PI: Amy E. Landis, Colorado School of Mines).

Environmentally and Economically Preferable Treatment Options for Food Waste, \$81,700 Mizzou Advantage (University of Missouri)

Climate change impacts on hydrology and productivity in Goodwater Creek Experimental Watershed. \$247,960. September 2014 – September 2017. United States Dept. of Agriculture. Cooperative Agreement.

Agricultural Sector Interactions with Water and Power Supply Infrastructure under Climate Change: The case of the Southeastern U.S. \$151,000 (to Mizzou) January 2016 – December 2020. National Science Foundation (PI: Paulina Jaramillo, Carnegie Mellon University).

Sustainability Evaluation of a Solid-Liquid Manure Separation Operation. \$71,993 June 2016 – December 2017. National Pork Board (PI: Teng Lim, MU)

Feasibility and Life Cycle Assessment of Anaerobic Co-Digestion of Campus Food Waste and Swine Manure, \$15,000 1 Aug 2014 – 31 July 2015. Environmental Protection Agency

Developing Hospitality Food Waste Audit and Measurement Procedures. World Wildlife Fund. \$43,000

Scholarship

Refereed Journal Articles

1. Gutierrez-Lopez, J., R.G. McGarvey, C. Costello, and D.M. Hall. Decision Support Frameworks in Solid Waste Management: A Systematic Review of Multi-Criteria Decision-Making with Sustainability and Social Indicators. *Sustainability*. (in-press)
2. Nguyen, H., A. Thompson, C. Costello. 2023. Impacts of historical droughts on maize and soybean production in the southeastern United States. *Agricultural Water Management*. 281(1), 108237. <https://doi.org/10.1016/j.agwat.2023.108237>
3. Algren, M., C. Costello, A.E. Landis. Potential of existing strategies to reduce net anthropogenic inputs of phosphorus to land in the United States. *Environmental Research: Infrastructure and Sustainability*. 3 015005. DOI: 10.1088/2634-4505/acbabb.
4. Pandara Valappil, F. C. Costello, R. Brennan. 2023. Spatial optimization of nutrient recovery from dairy farms to support economically viable load reductions in the Chesapeake Bay Watershed. *Agricultural Systems*. 58(6): 1575-1591. <https://doi.org/10.1016/j.agry.2023.103640>
5. Phung, Q. A., A.L. Thompson, C. Baffaut, C. Costello, and E.J. Sadler. 2022. Assessing Future Water Allocation Under Climate Variability and Land Management Change in an Agricultural Watershed. <https://doi.org/10.1111/1752-1688.13059>
6. Algren, M., C. Costello, A.E. Landis. 2022. Phosphorus (P) in animal diets as a driver of embodied P in animal products and net anthropogenic P inputs. *Journal of Industrial Ecology*.
7. Algren, M., C. Costello, A.E. Landis. Estimating Virtual Nitrogen Inputs to Integrated U.S. Corn Ethanol and Animal Food Systems. 2021. *Environmental Science & Technology*. 55(12):8393-8400. <https://doi.org/10.1021/acs.est.1c02208>
8. Costello C., Z. Oveysi, R.G. McGarvey. 2021. Assessment of the effect of urban agriculture on achieving a localized food system centered on Chicago, IL using robust optimization. *Environmental Science & Technology*. 55(4):2684-2694. <https://doi.org/10.1021/acs.est.0c04118>
9. Gautam, S. A. Thompson, B. Svoma, C. Baffaut, J. Sadler and C. Costello. 2021. Projection of future drought and extreme events occurrence in Goodwater Creek Experimental Watershed. *Hydrological Sciences*. 66(6):1045-1058. <https://doi.org/10.1080/02626667.2021.1906878>
10. García-Herrero, L., C. Costello, F. De Menna, L. Schreiber, and M. Vittuari. 2021. Eating away sustainability. Food consumption and waste patterns in a US school canteen.

Journal of Cleaner Production. 12(10):123571.

<https://doi.org/10.1016/j.jclepro.2020.123571>

11. Berardy, A. T. Seager, C. Costello, and C. Wharton. 2020. Beyond Life Cycle Assessment: Towards Holistic Food Sustainability Evaluation. *Journal of Agriculture, Food Systems, and Community Development*. 9(4):1-19. <https://doi.org/10.5304/jafscd.2020.094.009>
12. Quang Phung, A. Thompson, C. Baffaut, C. Costello, J. Sadler, A. Lupo, B.M. Svoma, S. Gautam. 2019. Evaluation of the effect of climate and land use changes on hydrologic processes in the Salt River Basin, Missouri, United States. *JAWRA*. 55(5):1196-1215.
13. Ayoub, N., C. Costello, and S. Jose. Systematic Application of a Quantitative Definition of Marginal Lands in Estimating Biomass Energy Potential in the Missouri/Mississippi River Corridor. 2019. *Biofuels*. (published online March 11, 2019)
14. Boehm, R., P.E. Wilde, M. Ver Ploeg, C. Costello, S. Cash. 2018. A Comprehensive Life Cycle Assessment of Greenhouse Gas Emissions from U.S. Household Food Choices. *Food Policy*. *Food Policy*. 79:67-76. <https://doi.org/10.1016/j.foodpol.2018.05.004>
15. Gautam, S., C. Costello, C. Baffaut, A. Thompson, B. Svoma, Q. A. Phung, and J. Sadler. 2018. Assessing Long-term Hydrologic Impact of Climate Change Using an Ensemble Approach and Comparison with Global Gridded Models – A Case Study on Goodwater Creek Experimental Watershed. *Water*. 10:564. DOI: 10.3390/w10050564
16. Costello, C., E. Birisci, and R. McGarvey. 2017. Waste Audit and Evaluation of Alternative Waste Management Options at a College Football Stadium. *Sustainability*. 9:1236. 20pp. doi:10.3390/su9071236
17. Dundar, B., C. Costello, R.G. McGarvey. Robust Optimization Evaluation of Reliance on Locally Produced Foods. *Environment Systems and Decisions*. DOI 10.1007/s10669-016-9617-2, published online Nov. 11, 2016.
18. Costello, C. E. Birisci and R.G. McGarvey. 2016. Food waste in campus dining operations: Inventory of pre- and post-consumer mass by food category, and estimation of embodied greenhouse gas emissions. *Renewable Agriculture and Food Systems*. 31(3):191-201. doi:10.1017/S1742170515000071, published online May 21, 2105.
19. Costello, C. X. Xue and R.W. Howarth. 2015. Comparison of production-phase environmental impact metrics derived at the farm- and national-scale for United States agricultural commodities. *Environmental Research Letters*. 10:114004.
20. Costello, C., W.M. Griffin, H.S. Matthews and C.L. Weber. 2011. Inventory Development and Environmental Input-Output Model of U.S. Land Use: Relating Land in Production to Consumption. *Environmental Science and Technology*. 45(11):4937-4943. 10.1021/es104245j <http://pubs.acs.org/doi/abs/10.1021/es104245j?journalCode=esthag>
21. Costello, C. W.M. Griffin, A.E. Landis and H.S. Matthews. Impact of Biofuel Crop Production on the Formation of Hypoxia in the Gulf of Mexico. *Environmental Science and Technology*. 2009.

Manuscripts in Preparation

(a working draft and preliminary results are completed)

1. Costello, C. Opportunities to reduce reactive nitrogen inputs to the U.S. agricultural system.
2. Nguyen, H., A. Thompson, C. Costello,. Evaluating changes in crop water demand under future climate scenarios in the Southeastern United States.

3. Chowdhury, Z. A. E. Landis, C. Costello. Nitrogen and Phosphorous embodied in Food Loss and Waste, an Input-Output LCA approach.

Project Reports & Technical Manuals

1. Li, C.J., C. Costello, and S. Thurston. 2018. *Chapter 32: Assessing the Effects of Community-based Forums in Central Missouri*. In: North American Association for Environmental Education. Using Environmental Issues Forums (EIF) to Enhance Deliberation: Case Studies. January 2018. Bora Simmons (ed).
2. Howarth, R.W. and Costello, C. Chapters: Safe Operating Space for Nutrients and Monitoring Global Nutrient Flows Induced by Countries. In: *Assessing Global Land Use and Soil Management for Sustainable Resource Policies*. United Nations Environment Programme.
3. Costello, C. 2003. Acid Mine Drainage: Innovative Treatment Technologies. US EPA Office of Solid Waste and Emergency Response Technology Innovation Office. 52 pp.

Book Chapters

1. Claire Baffaut, Christine Costello, Sagar Gautam, Quang Phung, and Allen Thompson Chapter 12: Soil Water Management and Climate Fluctuations: Modeling Approach
2. Costello, C. 2019. The concept of Zero Waste, in: Saving Food: Production, Supply Chain, Food Waste, and Food Consumption. in: Saving Food: Production, Supply Chain, Food Waste and Food Consumption. Elsevier. ISBN: 9780128153574 (eds: G. Charis)
3. Costello, C. and N. Ayoub. 2019. Exploring the potential for riparian marginal lands to enhance ecosystem services and bioenergy production, in: Biofuels, Bioenergy and Food Security. Elsevier. ISBN: 9780128039540 (eds: D. Debnath, S. C. Babu)

Refereed Conference Publications/Proceedings

1. Trihastuti, D., J.S. Noble*, and C. Costello. *Supply Chain Design from a Three-Dimensional Sustainability Perspective*. Twenty-first International Working Seminar on Production Economics. February 24-28, 2020. Innsbruck, Austria.
2. Niblick, B., C. Costello, M.A. Algren, J. Bare, J. Compton, P. Eranki, H. Golden, T. Hawkins, A. Henderson, B. Morelli, X. Xue, and A.E. Landis. *Challenges and Opportunities for Regional Nutrient Accounting in Life Cycle Assessment*. American Center for Life Cycle Assessment. LCA XVIII. September 25-27, 2018. Fort Collins, CO.
3. Algren, M.*, Landis, A., and C. Costello. *Demonstration of Enhanced Net Anthropogenic Nitrogen and Phosphorus Input Models for Estimating Commodity-specific and System-wide Agricultural Nitrogen and Phosphorus Flows*. International Conference on Environmental Science and Technology. June 25-29, 2018. Houston Texas.
4. Algren, M.A. Landis, A., C. Costello, P. Eranki. *Demonstration of enhanced net anthropogenic nitrogen inputs (NANI) model for estimating watershed-specific agricultural nitrogen flows*. 11th International Conference on Life Cycle Assessment of Food. October 17-19, 2018. Bangkok, Thailand.
5. Brown, J.T., T-T. Lim, J. Zulovich, and C. Costello. *Evaluation of Mechanical Scraper System Finishing Barn for Solid-Liquid Separation*. ASABE Meeting. July 16-19, 2017. Spokane, Washington.
6. Berardy, A., C. Costello and T. Seager. *Life Cycle Assessment of Soy Protein Isolate*. ISSST. 2015. Dearborne, MI.

Invited Presentations: National & International Meetings

1. [Iowa State University]
2. *Life Cycle Assessment: Past, Present and Future*. Millennium Café. Materials Research Institute. Penn State. February 21, 2021.
3. *Life Cycle Analysis in the Bioeconomy*. The Future of Bioenergy and Biorenewables. Penn State Center for Biorenewables Workshop. November 3, 2020 breakout session.
4. *In Pursuit of Zero Waste at Athletic Events*. Arkansas Recycling Coalition. Eureka Springs, AK. September 19, 2017.
5. *Adventures in Food Waste*. University of Missouri, Civil and Environmental Engineering Seminar. February 26, 2016.
6. *Adventures in Food Waste*. Arizona State University. April 21, 2015.
7. *Food, land use, nutrients...in search of more sustainable paths*. Web seminar. Union of Concerned Scientists. June 17, 2014.
8. *Evaluating the Environmental Sustainability of U.S. Agriculture and the American Diet*. Science Seminar Series, New York Botanical Garden, New York, NY. Oct 2013.
9. *Quantifying Land Use and Reactive Nitrogen Footprints associated with U.S. Consumption using Input-Output Life Cycle Assessment Methods*, Indiana University – Bloomington. February 9, 2012.
10. *Linking human consumption to land use and reactive nitrogen cycling*. Dept. of Bioengineering. University of Missouri. August 16, 2012.

Conference Presentations

(* presenting author)

1. L. de Lima Casseres dos Santos*, C. Costello. 2023. Change in nitrogen inputs to the Chesapeake Bay watershed with the introduction of perennial grasses. Oral Presentation. *International Symposium on Sustainable Systems and Technologies (ISSST)*. Ft. Collins, CO. June 12-15, 2023.
2. D. Kelly*, L. de Lima Casseres do Santos, D. Pant, C. Costello. A farm-scale LCA of a Dairy and Grass-to-Gas Production System in the Chesapeake Bay Region. [poster] (*ISSST*). Ft. Collins, CO. June 12-15, 2023.
3. D. Pant*. C. Costello. and R. Brennan. Life Cycle Assessment of Pelletized Duckweed from Farm Manure Wastewater. [poster] (*ISSST*). Ft. Collins, CO. June 12-15, 2023.
4. J. Gutierrez-Lopez, R. McGarvey, J. Noble, C. Costello, D. Hall. "Quantification Of Social Metrics For Solid Waste Management Optimization" Oral Presentation. INFORMS Annual Meeting. Phoenix, AZ. October 15 – 18, 2023.
5. Z.U. Md Chowdhury, Algren, M., J.S. Richter, A.E. Landis, C. Costello. Estimating nitrogen and phosphorous flows embodied in manufactured foods and per capita nutrient footprints in the United States. *ISSST*. June 21-24, 2021.
6. Algren, M., T.T. Burke, Z.U. Md Chowdhury, C. Costello, A.E. Landis. Assessing the potential of phosphorous loss mitigation strategies to eliminate both net anthropogenic phosphorous inputs and mineral P demand in the United States. *ISSST*. June 21-24, 2021.
7. Berardy, A.*, C. Costello*, E. Desiderio*, J. Melo-Velasco*, J. Richter*. Critical Examination of S-LCA for Holistic Sustainability Evaluation. *LCA 2020 Conference of American Center for Life Cycle Assessment*, Virtual Conference. September 22-24, 2020.
8. Z. Chowdhury*, M. Algren, A.E. Landis, and C. Costello. *Estimating Embodied Nitrogen and Phosphorous Flows for Food Loss in the US Economy*. LCA 2020 Conference of

- American Center for Life Cycle Assessment, Virtual Conference. September 22-24, 2020.
9. M. Algren*, Z. Chowdhury, C. Costello, A.E. Landis. *Quantifying Global Phosphorous Flows to Assess Scarcity and Opportunities for Recycling*. LCA 2020 Conference of American Center for Life Cycle Assessment, Virtual Conference. September 22-24, 2020.
 10. Trihastuti, D., J.S. Noble*, and C. Costello. *Supply Chain Design from a Three-Dimensional Sustainability Perspective*. Twenty-first International Working Seminar on Production Economics. February 24-28, 2020. Innsbruck, Austria.
 11. Z. Chowdhury*, M. Algren, A. E. Landis, and C. Costello. 2019. *Merging NANI With Input-Output Life Cycle Assessment Model For Tracking And Evaluating The Impacts Of Nutrients From A System Perspective*. LCA XIX Conference of American Center for Life Cycle Assessment, Tucson, Arizona, USA. September 24-26, 2019.
 12. Abbasian, P., C. Costello, M.T. Kwasniewski. 2019. *Quality versus Quantity: LCA of wines comparing volumetric and qualitative functional units*. LCA XIX Conference of American Center for Life Cycle Assessment, Tucson, Arizona, USA. September 24-26, 2019.
 13. C. Costello*. *Materials & Waste: Circular Economy of Food & Nutrients?* Project Drawdown. University Park, PA. September, 2019.
 14. Nguyen, H.*, C. Costello, K. Seo, and P. Jaramillo. *Climate change impacts on crop yield production in the Southeastern U.S.* International Symposium on Sustainable Systems and Technologies (ISSST). Portland, OR. June 25-28, 2019.
 15. P. Abbasian, M. T. Kwasniewski, and C. Costello*. 2019. *Using Wine Quality Indicators to Evaluate Life Cycle Environmental Impacts of Wine*. Oeno/IVAS: In Vino Analytica Scientia Combined conference: International Symposium of Enology. Bordeaux, France. June 25-28, 2019. Poster.
 16. L. García-Herrero*, C. Costello, F. DeMenna, L. Schreiber, and M. Vittuari. 2019. *The hidden environmental, cost, and nutritional impacts of food waste at school canteen: a preliminary assessment*. Associazione Italiana Di Economia Agraria E Applicata, 8th AIEA Conference Tomorrow's Food: Diet Transition and its implications on health and the environment. Pistoia, Italy. June 13-14, 2019.
 17. Costello, C.* and N. Ayoub, S. Jose. *Potential for perennial species planting & bioenergy on marginal lands in the Mississippi/Missouri River Corridor*. Society for Industrial Microbiology & Biotechnology. 41st Symposium on Biotechnology for Fuels and Chemicals. Seattle, WA. April 28 – May 1, 2019.
 18. Niblick*, B., C. Costello*, P. Eranki*, M. Algren, H. E. Golden, X. Xue, B. Morelli, T. R. Hawkins, A. D. Henderson, J. E. Compton, R. W. Howarth, J. C. Bare, A.E. Landis*. *Special Session: Challenges and Opportunities for Regional Nutrient Accounting in Life Cycle Assessment*. American Center for Life Cycle Assessment XVIII Conference. Fort Collins, September 25-27, 2018.
 19. C. Costello*, L. García-Herrero*. *Food Waste Prevalence and Management Considerations in School Environments: Elementary to Collegiate*. Missouri Recycling Association. Independence, MO. September 11-13, 2018.
 20. C. Costello*, S. Gautam, A. Landis, M. Algren, J. Devkota, and P. Eranki. *Same Problem, Different Resolution: Case studies in evaluating sustainability at different spatial and temporal resolutions*. International Symposium on Sustainable Systems and Technologies (ISSST). Buffalo, NY. June 26-29, 2018.
 21. Nguyen, H.*, C. Costello, K. Seo, P. Jaramillo. *Estimating future crop yield and water demand in the Southeast of America for multiple-purpose water planning under climate change*. American Society of Agricultural and Biological Engineers. July 29-August 1, 2018. Detroit Michigan.

22. Gautam, S.* , C. Costello, C. Baffaut, A. Thompson, and J. Sadler. *Multi-index Evaluation of Future Drought and Climate Extreme Occurrence in an Agricultural Watershed*. American Society of Agricultural and Biological Engineers. 2018 Annual International Meeting. Detroit, MI. July 29-August 1, 2018.
23. Algren, M.* , Landis, A., and C. Costello. *Demonstration of Enhanced Net Anthropogenic Nitrogen and Phosphorus Input Models for Estimating Commodity-specific and System-wide Agricultural Nitrogen and Phosphorus Flows*. International Conference on Environmental Science and Technology. Houston, Texas. June 25-29, 2018.
24. Gautam, S.* , C. Costello, C. Baffaut, A. Thompson, and J. Sadler. *Evaluation of Climate Change Impact on Drought Occurrence in an Agricultural Watershed*. American Society of Agricultural and Biological Engineers. July 16-19, 2017 Annual International Meeting. Spokane, Washington.
25. Gruen, I.* , C. Costello and R. Roth. *Sustainability efforts and education at the University of Missouri & "Waste Not Want Not" Undergraduate Interdisciplinary Research Experience: Exploring Sustainability through a Multi-faceted Exploration of Food Waste*. Education for Sustainability, International Greening Education Event. Innovating Education for the 21st Century. Karlsruhe, Germany. October 19-21, 2016.
26. Dunbar, B.* , C. Costello, R. McGarvey. *Robust Optimization Evaluation of Reliance on Locally Produce Foods*. International Symposium on Sustainable Systems and Technologies (ISSST). Phoenix, Arizona, May16-19, 2016.
27. Gautam, S.* , A. Thompson, B. Svoma, C. Baffaut, and C. Costello. *Assessing Long-term Hydrologic Impact of Climate Change on an Agricultural-Dominated Watershed using CMIP5 and SWAT Model*. Poster at ISSST. Phoenix, Arizona, May 2016. **(won 3rd place in the student poster competition)**
28. Phung, Q.* , A. Thompson, C. Baffaut, J. Sadler, C. Costello, A. Lupo, B. Svoma, S. Gautam. *Evaluation of the effect of climate and land use changes on hydrologic processes in the Salt River Basin*. ASABE. July 17-20, 2016. Orlando, Florida.
29. Gautam, S.* , C. Costello, C. Baffaut, Q.A. Phung, and B.M. Svoma. *Climate model biases and statistical downscaling for application in hydrologic model*. International SWAT Conference & Workshops, Purdue University, USA. October 12-16, 2015.
30. Phung, Q.* , A. Thompson, C. Baffaut, C. Costello, J. Sadler, A. Lupo, B.M. Svoma and S. Gautam. *Evaluation of climate and land use changes on hydrologic processes in the Salt River Basin, Missouri, United States*. International SWAT Conference & Workshops, Purdue University, West Lafayette, IN, USA. October 12-16, 2015.
31. Berardy, A.* , T. Seager and C. Costello. *Life Cycle Assessment of Soy Protein Isolate*. International Symposium on Sustainable Systems and Technologies (ISSST). Dearborne, MI. May 18-20, 2015.
32. Birisci, E.* , R. McGarvey and C. Costello. *Environmental Impacts of Overproduction Food Waste at Campus Dining Services*. ISSST. Dearborne, MI. May 18-20, 2015.
33. C. Costello*, S. Flanakin and B. Hellebusch. *Comparison and cluster analysis for the GHG-footprint of meals*. ISSST. Dearborne, MI. May 18-20, 2015.
34. C. Costello*. *Comparison of Bottom-up and Top-down Approaches to Estimating Environmental Metrics for Agricultural Commodities*. ISSST, Oakland, CA. May 2014.
35. C. Costello*. *Comparison of Bottom-up and Top-Down Approaches to Estimating Environmental Metrics for Agricultural Commodities*. InLCA XIII, Orlando, FL. Oct 2013.

36. C. Costello*, D.P. Swaney, B. Hong, and R.W. Howarth. *Regional analysis of watershed nitrogen management options for improving coastal estuarine health*. Coastal and Estuarine Research Federation, Daytona Beach, FL. Nov 2011.
37. C. Costello*, M.W. Griffin, C.L. Weber and H.S. Matthews. *Relating Land Use to Consumed Goods using Input-Output Life Cycle Assessment Methods*. IEEE International Symposium on Sustainable Systems and Technology. InLCA IX, Boston, MA. May 2011.

Invited Presentations: Local Meetings & Guest Lectures

1. *Food Waste Audits and Educational Opportunities*. Presented to the Boone County Retired Teachers Association. February 19, 2019. Columbia, MO
2. *Food Waste: A General Overview*. Presented to the City of Columbia, MO to support their Climate Action Plan. Co-prepared with Martha Dragich and Maria Rodriguez-Alcalá. September 26, 2018.
3. *Studying Sustainability: Same Problem, Different Resolution*. The Pennsylvania State University, Department of Agricultural and Biological Engineering. February, 21, 2018.
4. *Environmental Impacts of Food Waste*. Sociology of Food and Nutrition class. Rural Sociology Department, MU. Guest lecture. Spring 2015, 2016 & 2017.
5. *Life Cycle Assessment – Biorefinery Case Study*. Bioengineering, University of Missouri. Columbia, MO. March 2014.
6. *Evaluating the impact of biofuel crop production on the formation of hypoxia in the Gulf of Mexico and Nitrogen Costs of Diet Choice*. MU Department of Forestry Seminar. Feb 2014.
7. *Evaluating the Sustainability of Biofuels – Getting what we really want*. Science and Public Policy class. University of Missouri. Columbia, MO. March 2014.
8. *Introduction to Life Cycle Assessment Modeling*. Truman School of Public Policy. University of Missouri. March 2014.
9. *Tools for Evaluating the Environmental Sustainability of Bio-based Products*. Bioengineering, University of Missouri. Columbia MO, Nov 2013.
10. *Defining Environmental Sustainability in Agricultural and Food Systems*. Environmental Engineering Seminar. MU. Nov 2013.
11. *Defining and Quantifying the ‘Sustainability’ of Biofuels: Nitrogen Loading and the Formation of Hypoxia in the Gulf of Mexico*. 1st Plant Sciences and Bioengineering Colloquium, University of Missouri. Oct 2013
12. *Defining Environmental Sustainability in Agricultural and Food Systems*. Food for the Twenty-first Century Lecture Series, University of Missouri. Oct 2013.
13. *Healthier Diets Can Reduce Nitrogen Pollution, Greenhouse Gas Emissions and Land Use*. Community and International Nutrition Seminar Series, Ithaca, NY. March 2013.
14. *Life Cycle Assessment Workshop*. Crop and Soil Science, Cornell University. August 2012.
15. *Biochemistry and Life Cycle Assessment*. Biogeochemistry, Cornell University. Ithaca, NY. April 2012.
16. *Introduction to Environmental Input-Output Methods*. Biological Engineering, University of Minnesota. Sept. 2010.
17. *Introduction to Life Cycle Assessment*. Human Computer Interaction, Carnegie Mellon University, Pittsburgh PA.

Press

1. Thompson, Derek. *Crazy/Genius* podcast. "Will We Ever Stop Eating Animal Meat?" The Atlantic. September 20, 2018. <https://www.theatlantic.com/ideas/archive/2018/09/will-we-ever-stop-eating-animal-meat/570874/>
2. Jones, Daniel P. "Food Decisions Can Reduce Greenhouse Emissions, Study Says." UConn Today. June 7, 2018. <https://today.uconn.edu/2018/06/food-decisions-can-reduce-greenhouse-emissions-study-says/#>
3. Hans, Teddy, and Dru Berry. 2017. "MU's push for zero waste." *Missourian*. December 6, 2017. https://www.columbiamissourian.com/sports/mizzou_sports/mu-s-push-for-zero-waste/article_1215dfd6-a151-11e7-8024-8f5a7e16502f.html
4. Harrison, Anita N. "Waste Fighter: Christine Costello examines the high cost of uneaten food." *Illumination*. Fall/Winter 2015. <https://illumination.missouri.edu/f15/profile>

Graduate Student Research Supervised

Name	Degree	Graduation Date	Research subject
DeWaunis Kelly	M.S.	2025 (expected)	Agricultural & Biological Engineering, Penn State.
Divya Pant	PhD	2026 (expected)	Biorenewable Systems, Penn State. LCA of Duckweed. ECO-CBET.
Lucas de Lima Casseres dos Santos	PhD	2026 (expected)	Agricultural & Biological Engineering, Penn State. <i>Consortium for Cultivating Human and Naturally reGenerative Enterprises (C-CHANGE)</i>
Zia Chowdhury (chair)	PhD	2023 (expected)	Agricultural & Biological Engineering, Penn State. <i>Analysis of Nutrient Flow from Farm to Globe using Agricultural Soil Water Sustainability Evaluation (ASWAE) Framework</i>
Zeynab Oversi (committee)	PhD	2023	22. Industrial & Manufacturing Systems Engineering (IMSE), MU. <i>Robust optimization model for determining the feasibility of local and novel food production.</i> https://mospace.umsystem.edu/xmlui/handle/10355/96245
Hai Nguyen (chair)	PhD	2022	Agricultural & Biological Engineering, Penn State. <i>Energy-water-food nexus, focus on future climate impacts on crops and hydrology.</i>
Mikaela Algren (co-advise)	PhD	2021	Civil & Environmental Engineering. Colorado School of Mines. <i>Analysis of Nutrient Flow from</i>

Farm to Globe using Agricultural Soil Water Sustainability Evaluation (ASWAE) Framework.

Sagar Gautam (chair)	PhD	2018	Bioengineering, MU. <i>Dissertation title: Climate Change Impacts on Hydrologic Components and Occurrence of Drought in an Agricultural Watershed.</i>
Quang Phung (co-advise)	PhD	2018	Bioengineering, MU. <i>Climate and land use change and impacts on watershed hydrology.</i>
Joshua Brown (committee member)	M.S.	2018	Agricultural Engineering, Thesis title: <i>Evaluation of a Solid-Liquid Manure Separation Operation</i>
Tripti Bisen (committee member)	M.S.	2018	IMSE, MU. <i>An optimization model for the World Food Programme's "Protracted Relief and Recovery Operations" in Chad.</i>
Paula Grossi (committee member)	M.S.	2017	<i>Quantification of Wine Fault Markers and their Relation with Risk Factors.</i>
Esma Birisci (co-advised)	PhD	2016	Industrial and Manufacturing Systems Engineering. <i>Optimizing production and inventory decisions at all-you-care-to-eat facilities.</i>
Jianyuan Ni (chair)	M.S.	2016	Civil & Environmental Engineering, MU: <i>Anaerobic Co-digestion of Food Waste & Sewage Sludge.</i>
Andrew Berardy (co-advised)	PhD	2015	Sustainability, ASU. <i>Sustainable Consumption in Food and Agricultural Systems</i>
Weiming Hu (committee member)	M.S.	2013	Civil Engineering, MU. <i>Fabrication of TiO₂-embedded PVDF Membranes and their application in Algae Membrane Bioreactor Systems.</i>

Post-doctoral Researchers Supervised

Name	Degree	Time Period	Research subject
Maryam Shahri	PhD	2023 - present	Stakeholder engagement, survey, agricultural plastics.
Hari Nandimandalam	PhD	2022 - present	LCA of waste management systems. NSF DRM, PA Dept. of Ag, DOE-BETO
Justin Richter	PhD	2020 - 2021	Advanced Resources Efficiency Center projects. Social LCA, LCA of waste management.
Nasser Ayoub	PhD	2015 – 2016	Center for Agroforestry and Bioengineering. MU. <i>Bioenergy production potential in the Missouri/Mississippi River Corridors.</i>

Undergraduate Student Research Supervised

Name	Graduation	Research subject
Abigail Frank, Collin Campbell, Nicole Guzman, Dante Falcuci	2022	ABE, Penn State. Nutrient cycling in agricultural systems; waste management and LCA
Adira Nair	2022	Environmental Justice and the Flint, MI water crisis.
Maria Patino	2020	Bioengineering, MU. <i>Inclusion of urban agriculture in local food system.</i>
Mikaela O'Barr	2018	Civil & Environmental Engineering, MU. <i>Local foods contribution to local nutritional demand.</i>
Clare Bassi	2016	Bioengineering, MU. <i>Environmental impacts of agricultural commodities</i>
Brendan Hellebusch	2016	Civil & Environmental Engineering, MU. <i>Development of a Green Labeling Scheme for Campus Dining Meals.</i>
Benjamin Harmen, Andrew Prescott, Samantha Tellatin, Austin Davis, Clare Bassi, Jeremy Davis	2016	Bioengineering, MU. Anaerobic co-digestion of food waste and sewage sludge.
Shannon Flanakin	2015	Chemical Engineering, MU. <i>Development of a</i>

		<i>Green Labeling Scheme for CampusDining Meals.</i>
Jacob C. Henry	2014	Earth Systems Engineering, Cornell University. <i>Nitrogen metric development in input- output life cycle assessment model.</i>

Service to Professional Organizations, Scholarly Societies

- Perform manuscript reviews for: Environmental Science and Technology; Journal of Industrial Ecology; Environmental Research Letters; Journal of Cleaner Production; Computers and Electronics in Agriculture; Sustainability; Integrated Environmental Assessment and Management; Environmental Engineering Science; Journal of Agriculture, Food Systems and Community Development; Renewable Agriculture and Food Systems; Climate; Renewable and Sustainable Energy Reviews

Service in Workshops & National of International Committees

- Served on organizing committee for Agroecology Summit 2023. <https://www.uvm.edu/instituteforagroecology/us-agroecology-summit-2023>
- Lead co-chair of Conference, ISSST, 2022. <https://issst.net>
- Co-chair of Conference Program, ISSST, 2021.
- Justice, Diversity, Equity and Inclusion Committee member for American Center for Life Cycle Assessment, 2021.
- Reviewer for NIFA, USDA grant proposals. 2017.
- Student Co-Chair, Land Use Workshop, Boston MA Oct 2009.

Service to Penn State & MU

- Sustainability Council, College of Engineering, Penn State University (PSU), Member, 2020 –
 - Education Subcommittee Chair
- Equity and Inclusion Committee, ABE, PSU, Member, 2020 –
- Green Team, ABE, PSU, Chair, 2021 –
- Academic Standards Committee, CALS, PSU, Member 2020 -
- Diversity and Inclusion Committee, University of Missouri Member, 2017 – 2019.
- Energy Strategies Student Advisory Group, Faculty Advisor, 2016 –
- Women in Engineering Center Faculty Advisory Board, Member, 2016
- Life Sciences Speaker Series 2015-2016, topic: Confronting Climate Change – member of the organizing committee and Chair of the Committee to organize a panel discussion on Faith, Climate Change and the Anthropocene.
- Participant, Undergraduate Research Training project. “Waste not Want not.” Interdisciplinary undergraduate research experience. Spring 2015.
- Graduate Program Committee, Bioengineering. 2014 – 2015.
- Workshop Session Leader. Summer Engineering Camp, Bioengineering. July 2014.

Other Service and Outreach Activities

- Materials Science Institute Summer Teacher Training. 2022.
- Community Climate Forums. 2016 – 2017.
- Girl Scout Engineering Day. Society of Women Engineers. April 2014.
- Summer Engineering Camp. University of Missouri. July 2014
- Instructor. Ithaca Freeskool. Readings in Environmental Philosophy.
- Cornell New Student Reading Project. 2011 – 2012.
- Green Design Apprenticeship Volunteer. 2007 – 2010.
- Summer Engineering Experience for Girls. CMU. 2008 & 2009.