FEMEENA PANDARA VALAPPIL

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EDUCATION

Ph.D., Agricultural and Biological Engineering *Aug 2015-May 2019*
Purdue University, West Lafayette, Indiana, U.S.A
Dissertation: Improving nutrient transport simulation in SWAT by developing a reach-scale water quality model
CGPA: 4.0/4.0

M.S., Hydraulic and Water Resources Engineering *Aug 2011- Jul 2013*
Indian Institute of Technology Madras, Chennai, India
Dissertation: Spatial optimization of cropping pattern in an agricultural watershed for food and biofuel production with minimum downstream pollution
CGPA: 9.75/10.0

B.S., Civil Engineering *Jul 2007-Jun 2011*
Kerala University – College of Engineering Trivandrum, India
Thesis: Analysis of causes of flood in low-lying areas of Trivandrum city in Kerala
CGPA: 8.4/10.0

PROFESSIONAL EXPERIENCE

Assistant Professor *Sep 2024 - Present*
Department of Agricultural and Biological Engineering, Penn State University, University Park, PA.
- Working on stream water quality assessment and the use of agricultural and urban best management practices to address nutrient pollution issues

Assistant Research Professor *Jan 2024 – Aug 2024*
Earth and Environmental Systems Institute, The Pennsylvania State University, University Park, PA.
- Worked on large-scale hydrological model simulations in studying multi-sector dynamics within the Program on Coupled Human-Earth Systems (PCHES)

Assistant Research Professor *Jul 2022-Dec 2023*
Department of Civil and Environmental Engg., The Pennsylvania State University, University Park, PA.
- Modeled growth kinetics, nutrient flows, and climate resilience of sustainable nutrient management methods; Developed models for sustainability assessment and life cycle analysis of systems within the water-energy-food (WEF) nexus; Created a web-based platform showcasing WEF nexus resources and an interactive tool for nexus modeling.

Post-Doctoral Scholar *Jul 2020-Jun 2022*
Department of Civil and Environmental Engg., The Pennsylvania State University, University Park, PA.
- Worked on plant-based nutrient recovery methods for improving water quality; Developed spatial optimization frameworks to minimize nutrient pollution in agricultural watersheds through manure management practices.

Technical Consultant/Engineer in Training *May 2019-Jun 2020*
BAI Group LLC, State College, PA.

- Designed structural/non-structural best management practices and prepared environmental permits for post-construction stormwater runoff and erosion control

Graduate Research Assistant *Aug 2015- May 2019*
Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, IN.

- Worked on improving process representation in hydrological (SWAT) and water quality models; Assessed climate change and land use impacts on water quality

Intern *May 2018-Aug 2018*
BAI Group Inc., State College, PA.

- Designed and modelled stormwater management structures for post-construction runoff and erosion control; Prepared certification reports, drawings and pollutant discharge permit applications for multiple clients.

Consultant *Jul 2014-Mar 2015*
International Water Management Institute, New Delhi, India.

- Improved weather-based crop insurance schemes and climate-smart agricultural practices in India (for the research program on Climate Change, Agriculture and Food Security)

Graduate Engineer *Jul 2013-Jun 2014*
WS Atkins Private limited, Bengaluru, India

- Designed and assessed sewer network models and prepared drawings using Infoworks and MapInfo software for sewer network study

Intern *May 2012-Jul 2012*
Omega Analytics Private Limited, Bengaluru, India

- Checked for hydraulic safety of Indian Railway bridges in Karnataka and worked on optimal irrigation canal alignment for Upper Krishna Irrigation Project using ArcGIS

TEACHING/MENTORING EXPERIENCE

Guest Lecturer
Dept. of Envir. Systems Engg., The Pennsylvania State University, University Park, PA. *April 2023*

- Gave a guest lecture to EME597 course ("Co-design towards sustainability") on 'Sustainability assessment using dynamic systems modeling.'

Mentor *Jul 2020-Present*
Department of Civil and Environmental Engg., The Pennsylvania State University, University Park, PA.

- Mentored and trained two doctoral students, one masters student, and two undergraduate students in the research group on experimental procedures, laboratory protocols, life cycle assessment, and/or water-energy-food nexus modeling

Teaching Assistant *April 2018*
Department of Agricultural and Biological Engineering, Purdue University

- Developed a teaching module for water network models as part of the course 'Computer models in Environmental and Natural Resources Engineering' that involved two lectures and one lab demonstration.

Half Time Teaching Assistant *Aug 2011- Jun 2013*
Environmental and Water Resources Engineering, Department of Civil engineering, IIT Madras, India.

- Assisted in preparing and reviewing assignments and exams for two undergraduate courses

Mentor *Aug 2015- May 2019*

Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, IN.

- Mentored one undergraduate and three graduate students in ecohydrology research group

RESEARCH INTERESTS

Ecohydrological modeling and spatial optimization using simulation models
Geospatial analysis and impact assessment of climate change, land use, and land management in watersheds
Water quality and pollutant transport modeling
Crop growth modeling, nutrient uptake dynamics, and climate-resilient cropping practices
Nutrient management and biogeochemical cycling
Systems modeling of water-energy-food nexus
Web-based interface development for decision support tools
Life cycle assessment and techno-economic analysis in the circular bioeconomy

TECHNICAL AND SOFTWARE SKILLS

Working Knowledge:

- ArcGIS, MapInfo (mapping software), MATLAB and R (programming), SWAT and HydroCAD (hydrological models), Stella Architect (dynamic systems model), SPSS (regression modeling software), InfoCrop and AQUACROP (crop model), EPANET, InfoWorks (storm/sewer network models), SimaPro (life cycle assessment software), Microsoft Office, WordPress

Basic Knowledge:

- FORTRAN, Python (programming), WRF-Hydro (hydroclimatic model), AUTOCAD (drawing/design software), HecResSim (reservoir simulation model), CRAFT (crop model), HydroFlo (pipe network model)

RESEARCH PROJECTS

Hydrograph separation using diatom tracers *May-Jul 2015*
(Research stay at Kiel University sponsored by German Federal Ministry)
Optimal Irrigation Scheduling using AQUACROP Crop Growth Simulation Model
(Part of the Master's Course Work)
Irrigation Planning model using Linear Programming Model, LINGO
(Part of the Master's Course Work)

PUBLICATIONS

Total peer-reviewed articles: 15 (9 as lead author; 2 in review); Book Chapter: 1;

Conference Presentations: 14

Link to Google Scholar

Femeena, P. V.; and Brennan, R. A. (2023). Lemnaceae as a resilient crop to improve food security under climate extremes: global warming and post-catastrophic cooling scenarios. Agricultural and Forest Meteorology. In peer-review.

Fernandez Pulido, C.; **Femeena, P. V.**; and Brennan, R. A. (2024) . Nutrient cycling with duckweed for the biofertilization of root, fruit, leaf, and grain crops: impacts to plant-soil-leachate systems. Sustainable

Chemistry for Climate Action. Agriculture. 14(2): 188. https://doi.org/10.3390/agriculture14020188.

Femeena, P. V.; Costello, C.; and Brennan, R. A. (2023)**.** Spatial optimization of nutrient recovery from dairy farms to support economically viable load reductions in the Chesapeake Bay Watershed. Agricultural Systems. 207: 103640. https://doi.org/10.1016/j.agsy.2023.103640

Femeena, P. V.; Roman, B.; and Brennan, R. A. (2023)**.** Maximizing duckweed biomass production for food security at low light intensities: Experimental results and an enhanced predictive model. Environmental Challenges.11: 100709. https://doi.org/10.1016/j.envc.2023.100709

Doaemo, W.; Betasolo1, M; Montenegro, J. F.; Pizzigoni, S.; Kvashuk, A.; **Femeena, P. V.**; Mohan, M. (2023). Evaluating the impacts of environmental and anthropogenic factors on water quality in the Bumbu River Watershed, Papua New Guinea. Water, 15, 489. https://doi.org/10.3390/w15030489.

Femeena, P. V., House, G. R.; and Brennan, R. A. (2022). Creating a circular nitrogen bioeconomy in agricultural systems through nutrient recovery and upcycling by microalgae and duckweed: past efforts and future trends. Transactions of the American Society of Agricultural and Biological Engineers (ASABE) Special Collection: Circular Food and Agricultural Systems, 65 (2): 327-346. Recipient of the **ASABE 2023 Superior Paper Award.**

Femeena, P. V., Karki, R., Cibin, R., Sudheer, K. P. (2021). Reconceptualizing HRU threshold definition in the Soil and Water Assessment Tool. Journal of Water Resources Association. Journal of the American Water Resources Association. Technical Note. https://doi.org/10.1111/1752-1688.13000

Calicioglu, O.; Sengul, M. Y., **Femeena, P.V.,** and Brennan, R. A. (2021). Duckweed growth model for large-scale applications: optimizing harvesting regime and intrinsic growth rate via machine learning to maximize biomass yields. Journal of Cleaner Production, 324, 15: 129120. DOI: 10.1016/j.jclepro.2021.129120

Arenas, M. A., **Femeena, P.V.**, and Brennan, R. A. (2021) "The Water-Energy-Food Nexus Discovery Map: linking geographic information systems, academic collaboration, and large-scale data visualization." Sustainability, 13: 5220.

Cherkauer, K. A. Bowling, L., Chaubey, I., Chin, N., Ficklin, D., Kines, S., Lee, C., Pignotti, G., Rahman, S., Singh, S., **Femeena, P.V.**, Williamson, T. (2021). Climate Change Impacts and Strategies for Adaptation for Water Resource Management in Indiana. Climatic Change 165, 21. https://doi.org/10.1007/s10584-021-02979-4.

Calicioglu, O.; **Femeena, P.V.,** Mutel, C.; Sills, D. L.; Richard, T. L.; and Brennan, R. A. (2021) Techno-economic analysis and life cycle assessment of an integrated wastewater-derived duckweed pond and biorefinery. ACS Sustainable Chemistry & Engineering, 9: 9395 – 9408. https://doi.org/10.1021/acssuschemeng.1c02539

Femeena, P V., Chaubey, I., Aubeneau, A., McMillan, S., Wagner, P. D., Fohrer, N. (2020). An improved process‐based representation of stream solute transport in the soil and water assessment tools. Hydrological Processes. https://doi.org/10.1002/hyp.13751

Femeena, P V., Chaubey, I., Aubeneau, A., McMillan, S., Wagner, P. D., Fohrer, N. (2020). Developing an improved user interface for a physically-based stream solute transport model. Environmental Modelling & Software, 129, 104715. https://doi.org/10.1016/j.envsoft.2020.104715

Femeena, P.V., Chaubey, I., Aubeneau, A., McMillan, S., Wagner, P.D., Fohrer, N. (2019). Simple regression models can act as calibration-substitute to approximate transient storage parameters in streams. Adv. Water Resour. 123, 201–209. https://doi.org/10.1016/j.advwatres.2018.11.010

Ale, S., **Femeena, P V.**, Mehan., S., Cibin, R. (2018). Environmental impacts of bioenergy crop production and benefits of multifunctional bioenergy systems. Bioenergy with Carbon Capture and Storage: Using Natural Resources for Sustainable Development (pp. 195-217)

Femeena, P V., Sudheer, K. P., Cibin R., Chaubey, I. (2018). Spatial optimization of cropping pattern for sustainable food and biofuel production with minimal downstream pollution. J Environ Manage.

212:198-209. https://doi.org/10.1016/j.jenvman.2018.01.060

CONFERENCE PRESENTATIONS

Femeena, P. V., Costello, C., and Brennan, R. A. (2022). Identifying optimal locations for advancing the circular bioeconomy on dairy farms using manure-grown duckweed: A case study of the Chesapeake Bay Watershed. Presented at the American Society of Agricultural and Biological Engineers Annual International Meeting, Houston, TX, USA. (July 19, 2022).

Femeena, P. V., Roman, B., and Brennan, R. A. (2022). The effect of light intensity on duckweed growth: Improving an intrinsic growth model using new experimental data. Presented at the American Society of Agricultural & Biological Engineers Annual International Meeting, Houston, TX, USA. (July 19, 2022).

Femeena, P. V., Costello, C., and Brennan, R. A. (2022). A spatial optimization framework to identify hotspot counties to implement dairy manure-based duckweed farming for reduced eutrophication in the Chesapeake Bay. Presented at the International Symposium on Sustainable Systems and Technologies, Pittsburgh, PA, USA. (June 21-23, 2022).

Calicioglu, O., Sengul, M. Y., **Femeena, P. V.**, and Brennan, R. A. (2021). Incorporating harvesting regime into a duckweed growth model to predict optimal biomass production. Presented at American Society of Agricultural and Biological Engineers Annual International Meeting- Virtual Conference. (July 15, 2021).

Roman, B., **Femeena, P.V.**, Brennan, R. A. (2021). Economic and life cycle impacts of creating a circular nitrogen bioeconomy at dairy farms: nutrient recovery and protein-rich feed production by duckweed. Presented at International Symposium on Sustainable Systems and Technology- Virtual Conference. (June 23, 2021).

Femeena, P.V., Chaubey, I., Aubeneau, A., McMillan, S., Wagner, P.D., Fohrer, N. (2018). Process-based solute transport model to improve in-stream nutrient uptake prediction. Presented at ASABE Global Water Security Conference for Agricultural and Natural Resources, Hyderabad, India. (Oct 3-7, 2018).

Femeena, P.V., Chaubey, I., Aubeneau, A., McMillan, S., Wagner, P.D., Fohrer, N. (2018). Predicting nutrient uptake in streams using an enhanced physically-based solute transport model. Presented at 17th Biennial Conference ERB (Euromediterranean Network of Experimental and Representative Basins) in Darmstadt, Germany. (Sep 11-14, 2018).

Femeena, P.V., Chaubey, I., Aubeneau, A., McMillan, S., Wagner, P.D., Fohrer, N. (2018). Regression models for predicting calibration parameters in transient storage models. Presented at 8th International Symposium on Environmental Hydraulics, Notre Dame, USA. (Jun 4-7, 2018).

Chaubey, I., Pignotti, G., **Femeena, P.V.**, Cherkauer, K., Crawford, M.,Fohrer, N., Wagner, P.D. (2018). Developmental efforts in soil hydrology and instream water quality. Presented at International Soil and Water Assessment Tool Conference, Chennai, India (Jan 8-12, 2018)

Femeena, P.V., Chaubey, I., Fohrer, N., Wagner, P.D. (2017). Improved physical representation of in-stream processes for water quality models using tracer studies. Presented at American Society of Agricultural and Biological Engineers Annual International Meeting, Spokane, Washington USA (Jul 16-19, 2017).

Pignotti, G., Singh, S., **Femeena, P.V.**, Chaubey, I., Cherkauer, K. (2017) Climate change impacts on Indiana Water Quality. Poster presented at Annual Indiana Water Resources Association Symposium (Jun 28-30, 2017).

Femeena, P V., Chaubey, I., Fohrer, N. (2015) Developing an in-stream water quality model for improved simulation of nutrient dynamics in SWAT. Poster presented at International Soil and Water Assessment Tool Conference, Purdue University, IN, USA (Oct 14-16, 2015).

Femeena, P V., Sudheer, K. P., Cibin R., Chaubey, I., Her, Y. (2014). Environmentally sustainable second-

generation biofuel production through optimal land use planning. Poster presented at American Geophysical Union Science Policy Conference, Washington, USA (Jun 16-18, 2014) - **Awarded AGU Berkner Fellowship.**

Femeena, P V., Sudheer, K. P., Cibin R., Chaubey, I., Her, Y. (2013). Spatial optimization of cropping pattern in an agricultural watershed for food and biofuel production with minimum downstream pollution. Poster presented at American Geophysical Union Meeting of the Americas, Cancun, Mexico (Ma 14-17, 2013).

INVITED TALKS/ PANEL DISCUSSIONS

Invited as a speaker for the **Water Speaker Series** in the upper division hydrology course of California State University Channel Islands (Feb 2021). Title: "Improving nutrient transport simulation in SWAT by developing a reach-scale water quality model".

Invited to present in the Civil and Environmental Engineering **Graduate Seminar Series** at The Pennsylvania State University (Sep 9, 2020). Title: "Improving nutrient transport simulation in SWAT by developing a reach-scale water quality model".

Invited as one of the speakers for the **'Clean Water and Sanitation' Workshop** at Green Talents Alumni Conference, Berlin, Germany (Oct 26, 2016). Title: "Need for sustainable farming practices: Protecting water from agricultural pollution". **Travel sponsored by German Federal Ministry**

Panel member for **Grad School 101 Panel** at American Society of Agricultural and Biological Engineering Annual International Meeting, Spokane, Washington USA (Jul 16-19, 2017).

AWARDED PROPOSALS

- Penn State Institute of Energy and Environment Seed Grant 2021-2022 ($30,000) as co-PI. Title: A one-stop online platform for water-energy-food nexus research: Integrating systems modeling and deep learning-based literature mining.

AWARDED GRANTS/ FELLOWSHIPS

- All-expense paid **3-month research stay in Germany** in 2015 as part of Green Talents Awards
- "**Lloyd V. Berkner Travel Fellowship" in 2013 and 2014** for attending AGU Science Policy Conference (All expenses paid)
- **Purdue Graduate Student Government travel grant** to attend ASABE Global Water Security Conference for Agricultural and Natural Resources ($750)
- **Travel grant** to attend 2016 ASABE Annual International Meeting as a winner of Ethics Video Competition (All expenses paid)
- **Purdue Women in Engineering Travel Grant** to attend National Conference for College Women Student Leaders, Maryland (May 31-June 3, 2017) (All expenses paid)
- **Purdue Women in Engineering Travel Grant** to attend 2017 ASABE Annual Meeting ($800)
- **CUAHSI Travel Grant** to attend Training Workshop on WRF-Hydro Model ($500)

HONORS AND AWARDS

- Recipient of the **ASABE 2023 Superior Paper Award**
- Co-winner of the **2023 'ASABEStory Video Competition'**
- Selected as one among 25 researchers worldwide for **Green Talents Award 2014** sponsored by German Ministry for High Potentials in Sustainable Development
- Selected as one of the 1000 **UNLEASH Innovation Lab 2019 Talents** to work on the "United Nations Sustainable Development Goal: Clean Water and Sanitation" at Shenzhen, China

- Awarded 2019 Purdue **College of Engineering Outstanding Graduate Student Research** Award
- Named one among six honorees selected to Class of 2019 "**New Faces of ASABE-Professionals**"
- Placed second in **ASABE 2019 Boyd-Scott Graduate Student Paper Competition**
- Won **ASABE Ethics Video Competition 2016** and received travel grant to attend ASABE Annual International Meeting
- Awarded 2nd place in ASABE-AABFEIO **Graduate Student Research Paper Competition** 2018
- Received Merit prize for the **best academic record in M. Tech Civil Engineering**
- Secured **253rd rank** in the country for GATE 2011 Entrance Exam for post-graduate studies
- Secured **16th rank** in the country for Junior Math Olympiad 2004-05

WORKSHOPS/TRAININGS ATTENDED

- "CUAHSI Training Workshop: The Community WRF-Hydro Modeling System in Boulder, CO (May 2-4, 2017)
- Advanced SWAT (SWAT-CUP) workshop at Purdue University, IN, USA (October 12-13, 2015)
- Climate Change Impact Assessment on Water Resources using Soil and Water Assessment Tool at
- Indian Institute of Technology, Madras, India (Dec 20-22, 2012)
- Online course on "Effective Life Cycle Assessment with SimaPro Desktop" conducted by PRé Sustainability (March 17-24, 2022)

CERTIFICATES/PROFESSIONAL MEMBERSHIPS

Professional Engineer, Maryland Board	*2023-Present*
Engineer-In-Training, Maryland Board	*2019-Present*
American Society of Agricultural and Biological Engineers	*2016-Present*
American Association for the Advancement of Science	*2016-2019*
Alpha Epsilon Honor Society	*2017-2019*
American Society of Engineering Education, Purdue University Chapter	*2017-2019*
American Geophysical Union	*2013-2014*

ACADEMIC SERVICE

- **Elected representative** of American Society of Agricultural and Biological Engineers (ASABE) - Natural Resources and Environmental Systems (NRES) – 03 Standards Committee (2023- present)
- **Secretary** of ASABE P-128 "Ethics Committee" (2017-2019)
- Member-at-large for ASABE Young Professionals Community (2023-present)
- Board member of Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) Informatics Standing Committee (2022-Present)
- Member of Penn State **College of Engineering Green Team** (2022- present)
- **Manuscript Reviewer** for Environmental and Modelling Software, Sustainability, Advances in Geosciences, Groundwater, Pure and Applied Geophysics, and Water Journals
- **Proposal Reviewer** for National Science Foundation
- Member of Penn State Postdoctoral Society Executive Council (Awards Committee, 2021)
- Recruitment chair of Graduate Student Association (2016-2017): Hosted 8 prospective graduate students on campus and arranged meetings with faculty and students
- Organizing committee member of Purdue ABE Symposium (2017, 2018)
- Professional Development Committee member of Alpha Epsilon honor society-Purdue Chapter
- Facilitator for Purdue ABE Graduate Student Panel Discussion
- Judge for Purdue ABE Senior Capstone Projects in 2017 and 2018
- Organizing committee member for DAAD (German Academic Exchange Service) Summer School at IIT Madras, India (Aug 2012)

OUTREACH AND COMMUNITY SERVICE

- Volunteered to introduce ABE department during
    - Purdue Women in Engineering “Introduce a girl to Engineering” day (02/25/2017)
    - Spring Fest 2016 and 2017 (involving local communities)
- Participated in Wabash Sampling Blitz 2016 (local project to collect water quality samples)
- Judged Lafayette Regional Science and Engineering Fair for grades 5-12 in 2015, 2016 and 2017
- Board member of Purdue Indian Dance Club (2016-2017)
    - Conducted dance workshops to demonstrate Indian culture and dance styles to various communities including minority groups such as ‘Women in Engineering’
- Safety Officer of Purdue Karate Club (2017-2018)
    - Facilitated Self Defense Classes for women and other clubs on campus