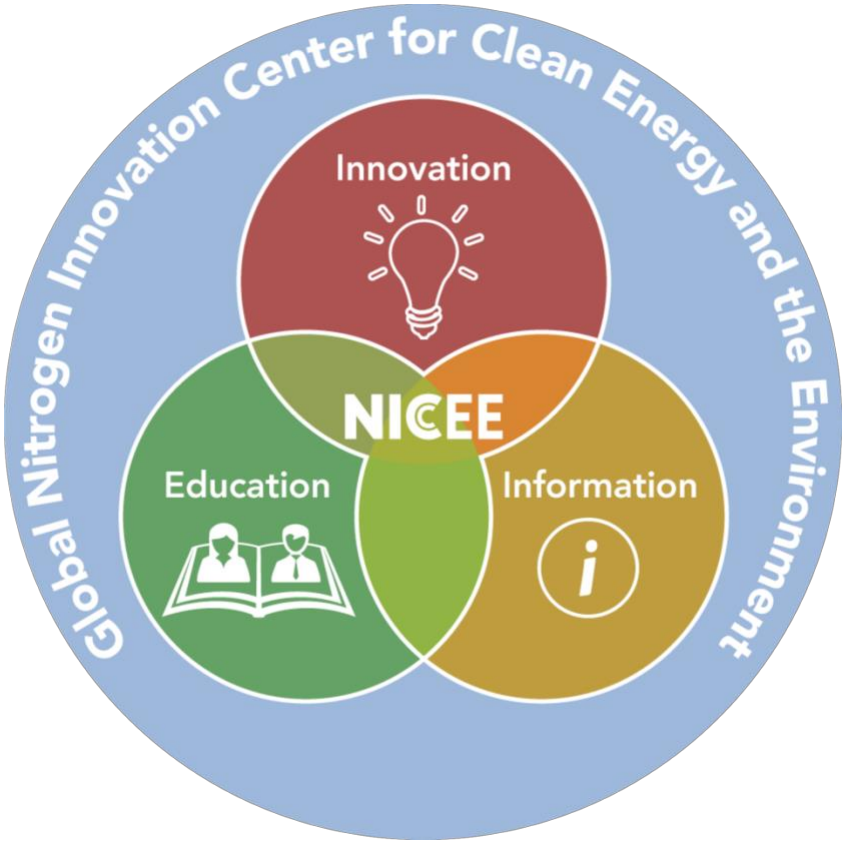
GLOBAL NITROGEN INNOVATION CENTER FOR CLEAN ENERGY AND THE ENVIRONMENT
(NICCEE)

Nitrogen Summer Institute 2024



June 13 - 14, 2024

Institute of Marine and Environmental Technology (IMET)
Rita Rossi Colwell Center
701 E Pratt St, Baltimore, Maryland 21202

niccee.org

UKRI Engineering and Physical Sciences Research Council

NSF

NSERC CRSNG

About NICCEE

The Global Nitrogen Innovation Center for Clean Energy and the Environment (NICCEE) is a transdisciplinary and transnational network dedicated to advancing sustainable and climate-smart nitrogen management through socioeconomic and technological innovation. NICCEE leverages use-inspired and data-driven approaches to address the emerging opportunities and challenges presented by green ammonia to provide clean energy and support food production while mitigating climate change.

Spearheaded by University of Maryland Center for Environmental Science (UMCES) with key partners in the (New York University and University of Massachusetts Amherst), Canada (University of Guelph), and the U.K. (Rothamsted Research), Morocco (UM6P) and beyond, NICCEE is working to support sustainable nitrogen management across the globe. The NICCEE global center is jointly funded by the U.S. National Science Foundation, U.K. Research and Innovation and Natural Sciences and Engineering Research Council of Canada. NICCEE involves collaborators from eight countries, make connections across academia, NGOs, international organizations, government agencies, and private companies. These partnerships not only offer complementary expertise, but also present a diverse portfolio of opportunities to investigate the emerging challenges and possibilities of green ammonia and other nitrogen management technologies.

NICCEE will serve as an information hub with state-of-the-art cyberinfrastructure to monitor the lifecycle and effects of nitrogen in agriculture-food-energy systems, an innovation platform to facilitate the co-development of technological and socioeconomic solutions with a broad spectrum of stakeholders, and an education center to nurture the next generation of scientists and innovators championing sustainable and climate-smart nitrogen management.

Thank you for joining us for the inaugural Nitrogen Summer Institute 2024!

NICCEE Community Guidelines

The Global Nitrogen Innovation Center for Clean Energy and the Environment (NICCEE) is committed to providing **a safe and brave space for individuals, groups and communities to collaborate, innovate, and respond to the challenges and opportunities of green ammonia and other nitrogen management technologies.**

Please respect the diversity of our community and be generous of others' views. We do not tolerate personal attacks, harassment of any kind, intimidation, violence, or disruptive behavior. NICCEE is dedicated to fostering a welcoming and inclusive environment that promotes collaboration, constructive dialogue, and intellectual integrity.

See *Appendix* for the complete NICCEE Principles of Conduct.

Schedule at-a-glance

Wednesday, June 12, 2024 (*Optional field trip; register to attend*)

9:00 AM - 11:30 PM **Tour Harborview Farms**

1:45 PM - 4:00 PM **Boat and kayak excursion**

Thursday, June 13, 2024

9:00 AM - 10:00 AM **Opening remarks & welcome to NICCEE**

10:00 AM - 10:10 AM **Community expectations**

10:30 AM - 12:30 PM **Session 1: The State of Green Ammonia Technology: Opportunities and Challenges Around the World**
Panel followed by breakout session.

Discussion of the current state of green ammonia technology, sharing perspectives from green ammonia production efforts around the world.

1:30 PM - 3:30 PM **Session 2: Addressing Concerns and Advancing Green Ammonia Technology Through Modeling and Data Curation**
Panel followed by breakout session.

Discussion of what data and models can support stakeholders and how data translates into decisions and policy making. Session is reflective of NICCEE Information team

4:00 PM - 5:00 PM **Plenary discussion**
Role of NICCEE in Green Ammonia innovation

5:00 PM - 6:30 PM **Nitrogen Research Spotlight & NICCEE Mixer**
Poster session and light happy hour.

7:00 PM **Welcome dinner**

Friday, June 14, 2024

8:30 AM - 8:45 AM Opening remarks

8:45 AM - 9:45 AM Working group meetings

10:00 AM - 12:00 PM Session 3: Opportunities and Challenges for Nitrogen Innovation
Panel followed by breakout session.

Comprehensive, broad discussion about nitrogen innovation beyond green ammonia.

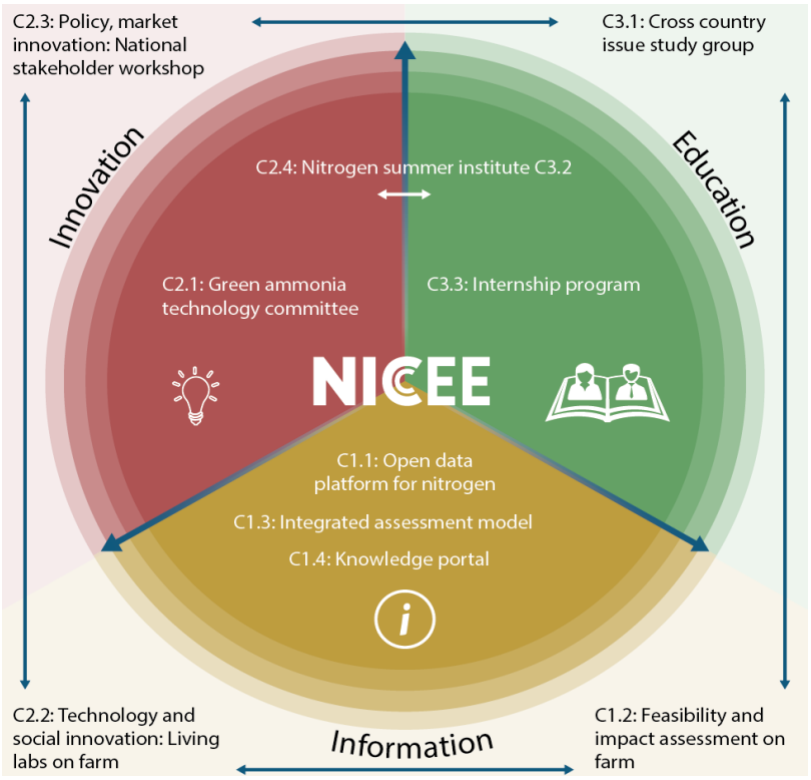
1:00 PM - 1:30 PM **Community expectations, a review**

1:30 PM - 2:00 PM **Large group feedback from working group meetings**

2:00 PM - 3:15 PM **Session 4: Next Steps: Green Ammonia, NICCEE and Beyond**
Panel followed by breakout session.

Reflections from Canada, UK, US, and Morocco. Future opportunities for nitrogen management; future opportunities for NICCEE.

3:15 PM - 3:30 PM **Concluding remarks**



Meeting Schedule

Wednesday, June 12, 2024 (*Optional field trip; register to attend*)

(breakfast on your own)

Please be prepared to bring water and shoes that can get wet, as well as hats, sunglasses, sunscreen, and snacks.

6:55 AM	Meet at van pickup location in front of the Renaissance Baltimore Harborplace Hotel, 202 E Pratt St, Baltimore, MD 21202
7:00 AM - 9:00 AM	Drive to Harborview Farms
9:00 AM - 11:30 PM	**Tour Harborview Farms**
11:30 - 12:30 PM	Drive to lunch near boat launch location
12:30 PM - 1:30 PM	Lunch
1:30 PM - 1:45 PM	Drive to boat launch location at Chesapeake Bay Environmental Center for kayaking and boating
1:45 PM - 4:00 PM	**Boat and kayak excursion**
4:00 PM - 5:00 PM	Return drive to Baltimore

Thursday, June 13, 2024

Auditorium, IMET, Rita Rossi Colwell Center
701 E Pratt St, Baltimore, Maryland 21202

8:00 AM - 8:30 AM	Guest arrival and check-in
8:30 AM - 9:00 AM	Kick-off ice breaker Scan the QR code when it is time to play.

9:00 AM - 10:00 AM Opening remarks & welcome to NICCEE

9:00 AM - 9:30 AM *Welcome:*

Russell Hill, Executive Director and Professor, Institute of Marine & Environmental Technology, University of Maryland Center for Environmental Science

Michele Masucci, Vice Chancellor for Research and Economic Development, University System of Maryland

Invited speaker:

Kevin M. Atticks, DCD, Maryland Secretary of Agriculture

9:30 AM - 9:55 AM *NICCEE overview:*

Xin Zhang, Associate Professor, University of Maryland Center for Environmental Science, Appalachian Laboratory

Claudia Wagner-Riddle, Professor, University of Guelph

Adrian Collins, Professor, Rothamsted Research

9:55 AM - 10:00 AM *General announcements*

Sarah Garvey, Program Manager, NICCEE; University of Maryland Center for Environmental Science, Appalachian Laboratory

10:00 AM - 10:10 AM Community expectations

Lora Harris, Professor and Associate Director of Research, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

10:10 AM - 10:20 AM Group photo

10:20 AM - 10:30 AM Coffee break

10:30 AM - 12:30 PM Session 1: The State of Green Ammonia Technology: Opportunities and Challenges Around the World
Panel followed by breakout session.

Session description: Discussion of the current state of green ammonia technology, sharing perspectives from green ammonia production efforts around the world.

10:30 AM - 11:15 AM *Panel discussion:*

What is green ammonia (first and second generation of technology)?
Zhenhuan (Bruce) Zhao, Senior Research Scientist, University of Massachusetts Amherst

Green ammonia in shipping and energy
David Layzell, Professor Emeritus, University of Calgary

Lucy Gilliam, Senior Shipping Policy Officer, Seas at Risk; Co-Founder, eXXpedition

Global green ammonia production
Ian Clifford, CEO and Co-Founder, FuelPositive Corporation

Bruno Gerard, Professor, Mohammed VI Polytechnic University (*remote*)

Vahid Monadjem, Head of Africa, Talus Renewables (*remote*)

Nicolas Caceres*,* Co-Founder, Chordis

Deepak Yadav, Programme Lead, Council on Energy, Environment and Water (*remote*)

Discussant: **Corey Park**, Rutherford Farms Ltd.

Moderator: **Matt Houser**, Senior Social Scientist, The Nature Conservancy; University of Maryland Center for Environmental Science

11:15 AM - 12:10 PM *Breakout discussion:*

- *Groups 1 & 2:* Economic and Environmental Opportunities and Challenges for On-Farm Use

  Moderator: **Tongzhe Li**, Associate Professor, University of Guelph

  Moderator: **Alison Carswell**, Research Scientist, Rothamsted Research

- *Groups 3 & 4:* Opportunities and Challenges in the Energy Sector, Shipping, and Beyond

  Moderator: **Srishti Vishwakarma**, Postdoctoral Research Associate, Pacific Northwest National Laboratory

  Moderator: **Chris Clark**, Senior Scientist, Environmental Protection Agency

- *Group 5:* Competition between agriculture, energy, shipping and other sectors

  Moderator:

12:10 PM - 12:30 PM *Large group feedback:*
Interconnections and synergy across uses & sectors

Moderator: **Matt Houser**, Senior Social Scientist, The Nature Conservancy; University of Maryland Center for Environmental Science

12:30 PM - 1:30 PM Lunch *(provided)*

1:30 PM - 3:30 PM **Session 2: Addressing Concerns and Advancing Green Ammonia Technology Through Modeling and Data Curation**
Panel followed by breakout session.

Session description: Discussion of what data and models can support stakeholders and how data translates into decisions and policy making. Session is reflective of NICCEE Information team

1:30 PM - 2:15 PM *Panel discussion:*
Page Kyle, Research Scientist, Pacific Northwest National Lab

Xuejun Liu, Professor, China Agricultural University

Lorenzo Rosa, Principal Investigator, Carnegie Science; Assistant Professor (By courtesy), Stanford University

Adrian Collins, Professor, Rothamsted Research

Dong Liang, Associate Research Professor, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

Beth Trask, Vice President of Global Energy Transition, Environmental Defense Fund

Discussant & Moderator: **Claudia Wagner-Riddle**, Professor, University of Guelph

2:15 PM - 3:10 PM *Breakout discussion:*

What modeling and data gathering is helpful for stakeholders (from farm to national to global scale)?
What data and tools are needed to address challenges and opportunities offered by green ammonia for each of the following:

- *Group 1:* Needs from a farming/agriculture perspective

  Moderator: **Kate Congreves**, Associate Professor, University of Saskatchewan

- *Group 2:* Needs from a policymaking perspective

  Moderator: **Lora Harris**, Professor and Associate Director of Research, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

- *Group 3:* Needs from an industry/production sector perspective

  Moderator: **Tan Zou**, Assistant Research Scientist**,** University of Maryland Center for Environmental Science Appalachian Laboratory

- *Group 4:* Needs from an academic research perspective (*e.g.*, integrated assessment modeling)

  Moderator: **Andrew Elmore**, Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

3:10 PM - 3:30 PM *Large group feedback*:
Interconnections and synergy across uses & sectors

Moderator: **Claudia Wagner-Riddle**, Professor, University of Guelph

3:30 PM - 4:00 PM Coffee break

4:00 PM - 5:00 PM **Plenary discussion**
Role of NICCEE in Green Ammonia innovation

Moderators:

Xin Zhang, Associate Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

Eric Davidson, Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

5:00 PM - 6:30 PM **Nitrogen Research Spotlight & NICCEE Mixer**

Elevator pitch (2 min) & poster session featuring:

Laura Cardenas	Meghna Mathews
Alison Carswell	Mario Tenuta
Kate Congreves	Claudia Wagner-Riddle
Tongzhe Li	& Chi Vi
Dong Liang & Yamin Guo	Yanyu Wang
Graham MacDonald	

Light happy hour.

5:00 PM - 6:30 PM Green Ammonia Technology Advisory Committee *(closed door meeting)*

7:00 PM **Welcome dinner**

Amicci's
231 S High St, Baltimore, MD 21202

Friday, June 14, 2024

Auditorium, IMET, Rita Rossi Colwell Center
701 E Pratt St, Baltimore, Maryland 21202

8:30 AM - 8:45 AM **Opening remarks**

8:30 AM – 8:35 AM *Welcome:*

Sarah Garvey, Program Manager, NICCEE; University of Maryland Center for Environmental Science Appalachian Laboratory

8:35 AM – 8:45 AM *Day 1 reflection*

8:45 AM - 9:45 AM **Working group meetings**

- Green Ammonia Technology Advisory Committee: A 30-year roadmap for green ammonia technology
- Innovation platform: plan for 2024-2025; plan upcoming national and international workshops
- Farm- to regional- to global-scale data/modeling: plan for 2024-2025
- Education team: plan for 2024-2025

9:45 AM - 10:00 AM Coffee Break

10:00 AM - 12:00 PM **Session 3: Opportunities and Challenges for Nitrogen Innovation**
Panel followed by breakout session.

Session description: Comprehensive, broad discussion about nitrogen innovation beyond green ammonia.

10:00 AM - 10:45 PM *Panel discussion:*

Eric Davidson, Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

Luis Lassaletta, Associate Professor, CEIGRAM/Dept. Agricultural Production, Universidad Politécnica de Madrid

Sheri Spiegal, Rangeland Management Specialist, USDA-Agricultural Research Service Jornada Experimental Range (*remote*)

Pamela Joosse, Sr. Soil and Nutrient Specialist, Agriculture and Agri-Food Canada (*remote*)

Matt Houser, Senior Social Scientist, The Nature Conservancy; University of Maryland Center for Environmental Science

Discussant: **Kate Congreves**, Associate Professor, University of Saskatchewan

Moderator: **Tom Bruulsema**, Chief Scientist, Plant Nutrition Canada

10:45 AM - 11:40 PM *Breakout discussion:*

What are the next steps for nitrogen innovation and management? What are future priorities and pathways for the next year? The next five years (and beyond)?

- *Group 1:* Technological innovations, opportunities & challenges

  Moderator: **David Kanter**, Associate Professor, New York University; International Nitrogen Initiative

- *Group 2:* Socioeconomic innovations, opportunities & challenges

  Moderator: **Edin Thornton**, Operations Manager, International Nitrogen Initiative

- *Group 3:* Farm-scale innovations, opportunities & challenges

  Moderator: **Saskia Appelo**, Research Associate, International Nitrogen Initiative & Wageningen University & Research, Wageningen Centre of Sustainability Governance in the Netherlands

- *Group 4:* Regional-scale innovations, opportunities & challenges

  Moderator:

11:40 AM - 12:00 PM *Large group feedback*: next steps for nitrogen innovation and management

Moderator: **Tom Bruulsema**, Chief Scientist, Plant Nutrition Canada

12:00 PM - 1:00 PM Lunch *(provided*)

1:00 PM - 1:30 PM **Community expectations, a review**

Lora Harris, Professor and Associate Director of Research, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

1:30 PM - 2:00 PM **Large group feedback from working group meetings**

2:00 PM - 3:15 PM **Session 4: Next Steps: Green Ammonia, NICCEE and Beyond**
Panel followed by breakout session.

Session description: Reflections from Canada, UK, US, and Morocco. Future opportunities for nitrogen management; future opportunities for NICCEE.

2:00 PM - 2:30 PM *Panel discussion:*
Claudia Wagner-Riddle, Professor, University of Guelph

Laura Cardenas, Senior Research Scientist, Rothamsted Research

Bruno Gerard, Professor, Mohammed VI Polytechnic University (*remote*)

Xin Zhang, Associate Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

Discussant: **Samuel Njoroge**, Scientist, African Plant Nutrition Institute

Moderator: **Sarah Garvey**, Program Manager, NICCEE; University of Maryland Center for Environmental Science Appalachian Laboratory

2:30 PM - 3:00 PM *Breakout discussion:* open ended discussion

- *Group 1:* What kinds of working groups are needed to support the first generation of NICCEE products (*e.g.,* papers, experiments, communication materials, policy briefs)?

  Moderator: **David Kanter**, Associate Professor, New York University; International Nitrogen Initiative

- *Group 2:* What is needed for NICCEE in the long-term (*e.g.,* funding, collaborations/communication/outreach, center development)?

  Moderator: **Xin Zhang**, Associate Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

- *Groups 3 & 4:* What big questions about green ammonia do you feel were answered during the Summer Institute? What big questions about green ammonia remain?

  Moderator: **Claudia Wagner-Riddle**, Professor, University of Guelph

  Moderator: **Sarah Garvey**, Program Manager, NICCEE; University of Maryland Center for Environmental Science Appalachian Laboratory

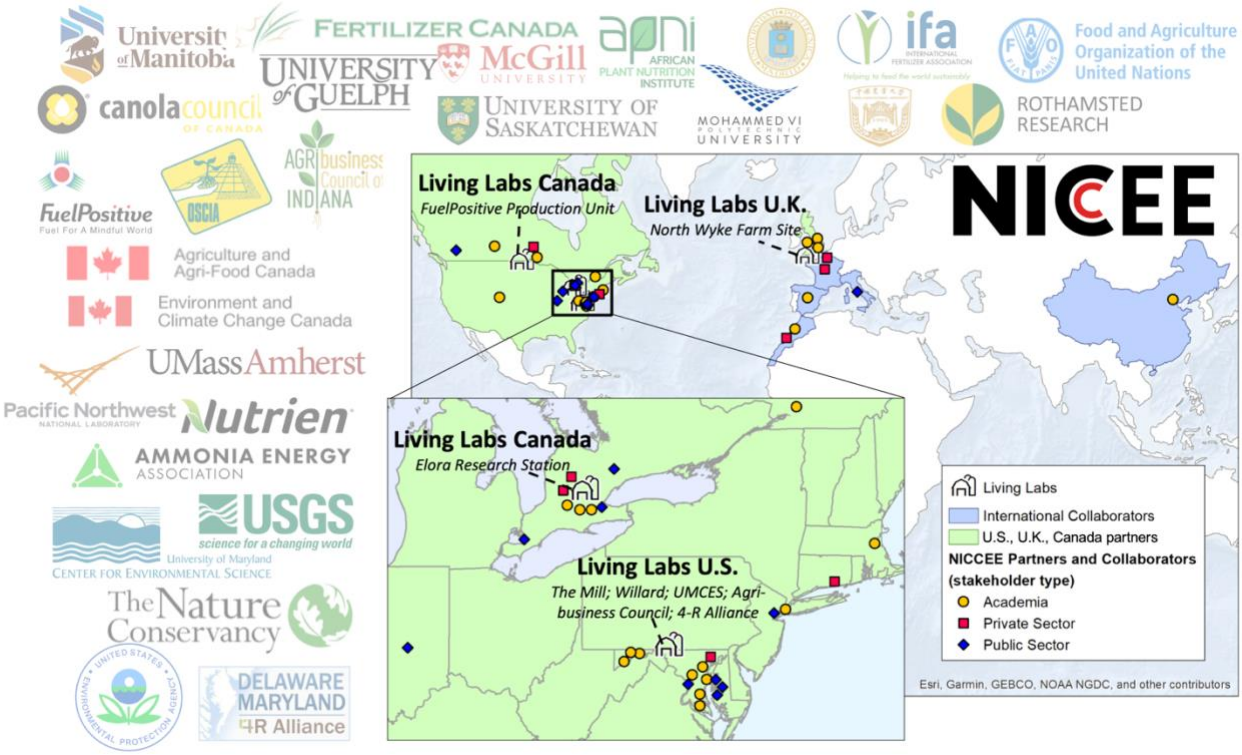
3:00 PM - 3:15 PM *Large group feedback*

Moderator: **Sarah Garvey**, Program Manager, NICCEE; University of Maryland Center for Environmental Science Appalachian Laboratory

3:15 PM - 3:30 PM **Concluding remarks**

Xin Zhang, Associate Professor, University of Maryland Center for Environmental Science Appalachian Laboratory

5:00 PM Dinner (*optional*)



Participants

Saskia Appelo

Research Associate, International Nitrogen Initiative & Wageningen University & Research, Wageningen Centre of Sustainability Governance in the Netherlands

MSc student in a program called "Governance of Sustainability Transformations", where I study the design, functioning and implications of sustainability governance arrangements in the domains of food, nature and environment. In this program I have studied ways of inclusive environmental policy-making, decision-making under uncertainty of technological and social developments and the weaknesses and opportunities of transnational environmental laws and regulations.

Kevin M. Atticks, DCD

Maryland Secretary of Agriculture

Kevin Atticks was appointed Acting Secretary of Agriculture on Jan. 18, 2023 and sworn in as Secretary on March 2, 2023. Prior to his appointment, Atticks was CEO (and founder) of Grow & Fortify, a company supporting value-added agricultural organizations and the businesses they represent. Grow & Fortify published the first assessment of the state's value-added agricultural industry, illustrating the expansive impact generated by this sector, which includes wineries, creameries, meat processing, agritourism, equine and dozens of other industry segments.

Atticks was also the Executive Director of the Maryland Wineries Association, Brewers Association of Maryland and the Maryland Distillers Guild, and served as the President of the Maryland Agricultural Resource Council, and the Chair of the WineAmerica State & Regional Associations Advisory Council.

Atticks formerly served on the University of Maryland College of Agriculture & Global Leadership Council, the board of Future Harvest and the board of the Maryland Tourism Coalition.

Originally from Bowie, Maryland, Atticks graduated with a journalism degree from Loyola University Maryland. Shortly thereafter, Atticks received a master's degree from the University of Colorado in Boulder, CO. He later earned his doctorate in communications design from University of Baltimore. He holds a faculty position at Loyola University Maryland.

Thomas Bruulsema

Chief Scientist, Plant Nutrition Canada

Tom is Chief Scientist with Plant Nutrition Canada, providing science-based support to industry organizations in advancing nutrient stewardship. He has worked in agronomy and soil science for over 38 years, contributing to knowledge on the interactions of crop nutrition with health-functional foods, greenhouse gas emissions, air quality, and eutrophication in Lake Erie. He has supported nutrient stewardship certification programs in the United States and Canada and international initiatives in the sustainable management of nitrogen and phosphorus. His experience includes research in precision farming (University of Minnesota, 1994), subtropical cropping systems (Mennonite Central Committee Bangladesh, 1986-1990), and maize physiology (University of

Guelph, 1985-1986). Tom received his PhD in Soil Science from Cornell University and his MSc in Crop Science from the University of Guelph. He has been recognized as a Fellow by the American Society of Agronomy, the Soil Science Society of America, and the Canadian Society of Agronomy.

Jun Suk Byun

Graduate Research Assistant, University of Maryland Center for Environmental Science, Appalachian Laboratory

- Environmental assessment of livestock production through life cycle assessment
- Livestock nutrition
- Agricultural nutrient use and water quality

Nicolas Caceres

Purdue University Industrial Engineering

I am an undergraduate student studying at Purdue who has been involved with ammonia since high school through a green ammonia plant establishment project in South America.

Laura Cardenas

Senior Research Scientist, Rothamsted Research Sustainable Soils and Grassland Systems Department

I have measured the emissions of volatile nitrogen and carbon compounds from agriculture since 1989. I built and deployed an instrument to measure formaldehyde in remote field sites (e.g. Mace Head, Weybourne) and on board a Hercules C-130. I also measured DMS emissions from the sea on board a research vessel. On joining IGER (now RRes) in 1999 and recently, I have developed 2 automated state-of-the-art laboratory systems to explore the controls of N-gases emitted from soils and plants and have studied factors controlling emissions. I have carried out and led projects to measure emissions in the field. I also use models to estimate N losses from agricultural systems and am a key contributor to the Defra inventory of greenhouse gas emissions, contributor to the compilation and submission to the UNFCCC of the UK agricultural GHG inventory. I am also qualified to conduct international inventory reviews for the UNFCCC. I currently lead the Atmospheric Emissions Section at Rothamsted.

Alison Carswell

Research Scientist: Greenhouse gas emissions and air quality, Net-zero and resilient farming, Rothamsted Research

Alison's research area is nitrogen cycling in agricultural systems. Alison works at the soil-plant-atmosphere interface, applying laboratory and field scale approaches to her research. She has been involved in with national and international research projects, including Demonstration Test Catchments, the Virtual Joint Centre for Improved Nitrogen Agronomy (UK and China) and Sustainable Agriculture for Africa. More recently Alison joined the UK greenhouse gas and air pollutants from agriculture inventory team, focusing on air pollutants, particularly ammonia.

Feng Chen

Professor, University of Maryland Center for Environmental Science, Institute of Marine & Environmental Technology

Chris Clark

Senior Scientist, Environmental Protection Agency

I lead or contribute to several projects related to N management at the EPA: (1) development of critical loads for atmospheric deposition, (2) the Enhanced Efficiency Fertilizer Challenge, (3) development of N and P inventories for the U.S., (4) biofuels and agricultural sustainability.

Ian Clifford

Co-Founder and CEO, FuelPositive Corporation

Luna Clifford

Co-founder and Chief Impact Officer, FuelPositive Corporation

Adie Collins

Professor, Net Zero and Resilient Farming, Rothamsted Research

Science Director for Net Zero and Resilient Farming at Rothamsted Research. Some of my research focuses on understanding the current environmental footprints of farm systems and how those might change under both climate change and revised best management plans. I work at the intersection of sustainability and resilience.

Kate Congreves

Associate Professor, University of Saskatchewan

Nitrogen cycling in agroecosystems. My research program is focused on understanding nitrogen flows, cycling, and losses in crop production systems. The long-term vision is widespread implementation of sustainable nitrogen management, and the creation of regenerative agroecosystems that do not pose reactive-nitrogen threats to our environment. We study a diversity of cropping systems, including field crops, specialty crops, and horticultural crops.

Eric Davidson

Professor, University of Maryland Center for Environmental Science, Appalachian Laboratory

Biogeochemistry. Eric A. Davidson is Professor at the Appalachian Laboratory of the University of Maryland Center for Environmental Science in Frostburg, MD. He served as Director from 2015 to 2021. Previously, he was a Senior Scientist and served a term as President and Executive Director at the Woods Hole Research Center, Woods Hole, MA. His research in biogeochemistry includes the exchange of plant nutrients from the land to streams and groundwater and the exchange of greenhouse gases between the soil and the atmosphere. He works in a variety of ecosystems, including forests and

agricultural lands in North and South America. Davidson holds a Ph.D. in forestry from North Carolina State University and held post-doctoral positions in soil microbiology and biogeochemistry at the UC-Berkeley and the NASA Ames Research Center. He is a Fellow of the American Association for the Advancement of Science and he is Fellow and Past-President of the American Geophysical Union (AGU). He is the AGU Ethics Chair and a senior editor of AGU Advances. In addition to his earlier book, You Can't Eat GNP, which explores the links between economics and ecology for students and laypersons, Davidson has published a new book in 2022, Science for a Green New Deal: Connecting Climate, Economics, and Social Justice. He completed a Jefferson Science Fellowship from the National Academies of Sciences, for which he worked as a science advisor to the Office of Environmental Quality at the U.S. Department of State.

Cathlyn (Cat) Davis

Tenured Research Faculty, University of Maryland Center for Environmental Science, Appalachian Laboratory

Cathlyn (Cat) Davis (Ph.D.) is a tenured researcher at the University of Maryland Center for Environmental Science. She is also the Editor-in-Chief of the Citizen Science: Theory and Practice journal. She has over 20 years of experience designing, studying, and evaluating public engagement with science. This includes participatory science design and assessment, educator/scientist professional development, and integrating science practices and technology into various informal and formal learning environments.

Andrew Elmore

Professor, University of Maryland Center for Environmental Science, Appalachian Laboratory

My research and teaching focuses on the use of remote sensing for mapping of ecosystem functions. This work includes studies of land use and land cover change and impact of changes in atmospheric chemistry on ecosystem functioning.

Anikka Fife

Environmental Science Communications Scholar, University of Maryland Center for Environmental Science, Integration and Application Network

Incoming grad student on the NICCEE's Innovation team starting in Fall 2024.

Sarah Garvey

Program Manager, NICCEE; University of Maryland Center for Environmental Science, Appalachian Laboratory

Sarah Garvey (she/her) is the Program Manager for the Global Nitrogen Innovation Center for Clean Energy and the Environment (NICCEE). She is an interdisciplinary scientist interested in biogeochemistry, climate science, and coupled human-natural systems.

Sarah received her B.A. from the University of Pennsylvania and earned her Ph.D. with the Hutyra Terrestrial Carbon Lab at Boston University. Her previous research combined lab, field and analytical work to investigate the effects of urbanization and forest fragmentation on soils and the carbon cycle. Prior to her graduate work, she studied

rangeland soil carbon storage with the MacArthur Agro-Ecology Research Center at Archbold Biological Station.

Bruno Gerard

Professor and Agrobiosciences lead, Mohammed VI Polytechnic University

Lucy Gilliam

Senior Shipping Policy Officer, Seas at Risk; Co-Founder, eXXpedition

Yamin Guo

Research Intern, University of Maryland Center for Environmental Science

My research focuses on synthesizing existing nitrogen (N) budget data to provide an optimal estimate and uncertainty range for the N budget. Currently, I am primarily comparing and analyzing N fertilizer use rate data from different sources within the agricultural systems of the United States. I am also exploring the data discrepancies caused by variations in the definitions of cropland.

Tom Hamann

Professor, Michigan State University

Chemistry professor with research interests in renewable energy and fuels. Relevant research focus is electrocatalytic ammonia oxidation.

Lora Harris

Professor and Associate Director of Research, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

Oceanographer and coastal ecologist with sustained work on social justice in the geosciences

Russell Hill

Executive Director and Professor, University of Maryland Center for Environmental Science, Institute of Marine & Environmental Technology

Dr. Hill is a marine microbiologist who has received numerous academic awards, including the University System of Maryland Board of Regents Faculty Award for Excellence in Mentoring 2015-2016, and he is one of 50 Maryland leaders to graduate from Leadership Maryland's 23rd class in 2015. He was elected to Fellowship in the American Academy of Microbiology, the honorific leadership group within the American Society for Microbiology, in 2015 in recognition of excellence, originality, and leadership in the microbiological sciences. He was elected as a Fellow of the Society for Industrial Microbiology and Biotechnology in 2003. Dr. Hill has served on the board of the International Marine Biotechnology Association since 2007 and was President of IMBA from 2016 to 2019.

Frances Houle

Senior Scientist, Lawrence Berkeley National Laboratory, Chemical Sciences and Molecular Biophysics and Integrated Bioimaging Divisions, Liquid Sunlight Alliance Fuels from Sunlight Energy Innovation Hub

BA (Chemistry) UC Irvine, PhD (Chemistry) Caltech. Scientific interests are in the areas of coupled reaction-transport processes in solar energy conversion systems and their components, and chemical modification of polymer, nanoparticle, semiconductor, and metal interfaces, surfaces and films using novel experimental and computational techniques

Matt Houser

Senior Social Scientist, The Nature Conservancy; University of Maryland Center for Environmental Science

Environmental Sociologist who studies farmer decision-making, especially regarding nitrogen management

Pamela Joosse

Sr. Soil and Nutrient Management Specialist, Agriculture and Agri-Food Canada

I am currently a co-lead of the Living Lab-Ontario project which is seeking to improve and accelerate the adoption of management practices to reduce greenhouse gas emissions and sequester soil carbon through a collaborative research process. I also work on projects related to phosphorus and water quality, remote sensing of residue and cover crops, and agri-environmental indicators. I get to integrate and synthesize production and environmental knowledge for policy and agriculture sector support when I represent Agriculture and Agri-Food Canada on the Binational Nutrient Annex Committee for the Great Lakes Water Quality Agreement and the Integrative Research Group of the Global Research Alliance on Agricultural Greenhouse gases. I graduated with my doctorate in Land Management from the University of Guelph and have worked as an environmental consultant, and in provincial/federal governments. I have had a lifelong passion for soil and water conservation and sustainable production.

David Kanter

Associate Professor, New York University; International Nitrogen Initiative

Nitrogen science (Earth System Modeling of N2O and technical ana;ysis of N2O abatement opportunities) and governance (creative policy design)

Robert Knotts

Research Intern, University of Maryland Center for Environmental Science, Appalachian Laboratory

Computer Science, software engineering.

Page Kyle

Research Scientist, Joint Global Change Research Institute, Pacific Northwest National Laboratory

Nina Lamba

Assistant Director, IMET, IMET/University of Maryland

Dr. Nina Lamba and supports entrepreneurship and economic development at the University of Maryland Institute of Marine and Environmental Technology (IMET). She directs mentoring at the Harbor Launch business incubator, and leads the REEF Program, a non-credit course for graduate students that teaches basic entrepreneurship, innovation, and business skills to commercialize science.

Nina holds a B.Sc. (Hons) in Applied Chemistry (Aston University, England) and a Ph.D. in Bioengineering (U. Strathclyde, Scotland). She post-doc-ed at the University of Delaware. She co-founded a startup focused on antimicrobial technology, which she ran for 11 years. Prior to joining IMET, Dr. Lamba was a subject matter expert on the Biohealth and Life Sciences team at Maryland Department of Commerce, the State's Economic Development Agency. The team was responsible for liaising with Maryland's life science industry, research facilities, and education and workforce development groups across the state.

Luis Lassaletta

Associate Professor, CEIGRAM/Dept. Agricultural Production - Universidad Politécnica de Madrid

I am interested in the study of the nutrient cycles alteration (N and P) and in the relationships existing between agricultural practices, productivity, pollution, and environmental policy. I am currently modeling the agro-food system including the nutrient use efficiencies of cropping and livestock systems, agronomic performance, international trade, human diet, and their effect on GHG emissions and nutrient surpluses globally and also in the Mediterranean region, including past trends and future scenarios.

David Layzell

Emeritus Professor, UCalgary; Energy Systems Architect, Transition Accelerator, CESAR, UCalgary & The Transition Accelerator

- PhD in Plant Physiology
- 1981-2008: Professor of Biology, Queens Univ, (Canada) where I developed and used gas analysis technologies to study the regulation of energy and material flows through plants, with particular attention on biological nitrogen fixation in legumes.
  -1995: cofounded QUBIT Systems Inc, a biological instrumentation company, specializing in gas analysis technologies (esp. CO2, O2, H2) and photonics.
- 1998-2008: Founded and ran the BIOCAP Canada Foundation, a national NGO/research organization focused on biological solutions to climate change
- 2008-12: Exec Director, Inst for Sust Energy, Env. & Econ (ISEEE) at UCalgary
- 2013-present: founder & Director, Canadian Energy Systems Analysis Research (CESAR), UCalgary; a research group that focuses on techno-economic analysis and energy systems modeling
- 2019- present: cofounded The Transition Accelerator, a pan-Canadian NGO charity to speed the transition to net-zero greenhouse gas emission

Tongzhe Li

Professor and Arrell Family Chair in Behavioural and Experimental Economics, University of Guelph

I combine economic theory and behavioral approaches, such as field or laboratory experiments, to understand the economic and political context of a problem. My current projects focus on environmental and recourse economics, innovation adoption, consumer behavior, and food policy. In addition, I am deeply interested in studying social comparison and discrimination issues.

Yantao Li

Associate Professor, University of Maryland Center for Environmental Science, Institute of Marine & Environmental Technology

Dong Liang

Associate Research Professor, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

My education background is in statistics, with a focus on applied statistics in geographical and epidemiological research. My training and research projects are usually conducted in an interdisciplinary setting and conducted with an emphasis on big data and statistical computing. My interests include open data principles and applications to cyberinfrastructure development and environmental solutions.

Xuejun Liu

Professor, China Agricultural University, College of Resources and Environmental Sciences (CAU-CRES)

I have long been engaged in research work on nitrogen cycling and management in agroecosystems and its environmental impacts, including atmospheric deposition, quantification of soil acidification and control of agricultural non-point source pollution. I am also listed as “Clarivate Analytics Highly Cited Researcher 2023”.

Graham MacDonald

Associate Professor, Department of Geography, McGill University

I study regional- to global-scale dimensions of agricultural land use and management. A core focus of my research has been to examine nitrogen and phosphorus as bridging elements that connect interdisciplinary themes around agriculture, food, and the environment. My broader work on food systems is typically at the intersection between the biophysical and farm management context that underlies agricultural production and the socioeconomic factors that influence food consumption. Drawing on both quantitative and qualitative techniques, my collaborative work increasingly explores themes of urbanization and agroecosystem diversification. A goal in these areas is to better understand how the demand for food in cities links consumers to diverse types of farming systems and agricultural landscapes at different scales, including the implications of these configurations for nutrient use and other aspects of sustainability.

Michele Masucci

Vice Chancellor for Research and Economic Development, University System of Maryland

Dr. Michele Masucci was appointed as the vice chancellor for research and economic development by Chancellor Jay A. Perman in September 2022. In this role she works to focus the University System of Maryland's expertise, programs, and resources in economic development to promote technology commercialization, workforce development, entrepreneurship, and partnerships among USM institutions and both private- and public-sector organizations..

The USM's strategic research capability is a major component of Dr. Masucci's profile as vice chancellor, which includes building and encouraging research and business partnerships among the USM campuses, state and federal government laboratories and agencies, corporations and industry, and other public and private higher education institutions. A major focus of these efforts is areas of science and technology that impact the economic and workforce development of Maryland, such as life sciences, clean energy, "big data," cybersecurity, and advanced manufacturing.

Dr. Masucci previously served as the Vice President for Research at Temple University, Director of the Information Technology and Society Research Group and Professor and Chair of the Department of Geography and Urban Studies. At Temple University, she led the research enterprise for 10 years, overseeing its rise as the 4th fastest growing research enterprise in the U.S. based on FY 2021 reported research expenditures. She also leads the Federal Demonstration Partnership as the Faculty Co-Chair and President of the Federal Demonstration Partnership Foundation and is a member of the board of directors for Oak Ridge Associated Universities and the University City Science Center.

Dr. Masucci earned her bachelor's degree in geography and regional planning from Salisbury University (SU), before receiving her master's and doctorate—both in geography—from Clark University. In addition to her vice chancellor position, Dr. Masucci also holds an appointment as professor of Geography and Environmental Systems at the University of Maryland, Baltimore County (UMBC).

Meghna Mathews

Graduate Research Assistant, University of Maryland Center for Environmental Science, Appalachian Laboratory

Graduate research assistant in Dr. Xin Zhang's lab, working on understanding stakeholder perspectives of nitrogen pollution and management in the Chesapeake Bay. My background from undergrad is in Environmental Science and Policy: Environmental Economics. My background for my masters is Environment and Society--environmental/social justice (food insecurity and how urban ag can be used as a method to address it).

Teague McCormack

Ursinus Environmental Studies Student, Ursinus, Environmental Studies, Whittaker Environmental Research Station

I am a student at Ursinus College studying Environmental Studies with a minor in Biology. I am specifically interested in food systems completing an agroecology fellowship where I led the growing season on the Ursinus Campus Farm. I am also a leader at the Ursinus College Food Forest at the Whittaker Environmental Research

Station. Both sites are committed to fostering student led research as well as growing food sustainably: environmentally, socially, and economically for the local community.

Vahid Monadjem

Head of Africa, Talus Renewables

Vahid Monadjem is a seasoned entrepreneur and engineer with expertise in design, consulting, and new ventures. He graduated with a degree in electromechanical engineering, transitioning from industrial design and then to consulting. At McKinsey&Company he specialised in new product development and launch in emerging markets. Later, as the founder of fintech company Nomanini, he enabled financial services for thousands of small shops across six countries, overseeing a platform that processed over 100 million transactions.

Vahid currently spearheads African operations for Talus Renewables, focusing on catalysing the transition to green ammonia in agriculture, mining and industry. Additionally, in his spare time he guides ventures and innovation as a Non-Executive Director for First National Bank of Eswatini and Inclusivity Solutions. He is also a passionate alumnus of United World Colleges movement and services on its Nominating Committee.

Samuel Njoroge

Scientist, African Plant Nutrition Institute

I work as a scientist at the African Plant Nutrition Institute in the Nairobi Kenya office. I have a background in plant production systems. Most of my research has centered on understanding and explaining variations in crop yield responses to nutrient applications. I also coordinate our program on 4R Nutrient Stewardship and have developed a number of decision support tools for improving nutrient use efficiency through application of the 4R principles of nutrient management.

Katelyn O'Dell

AAAS Fellow, Department of Energy

I have a PhD in Atmospheric Science where I studied air pollution and health impacts of wildfires in the United States. I have been a fellow at DOE in the Office of Clean Energy Demonstrations for nearly one year where work on market and energy analysis for clean energy technologies.

Corey Park

General Manager, Rutherford Farms Ltd

Lorenzo Rosa

Principal Investigator, Carnegie Science

Dr. Rosa's research focuses on enhancing agricultural productivity and promoting sustainability in agriculture, energy, and water systems. He addresses the challenges posed by climate change to agriculture and explores strategies to minimize the environmental impacts of farming. Dr. Rosa's impactful research informs sustainable

development policies and investments, contributing to agricultural and water sustainability. His work also assesses the potential benefits, and unintended consequences, of innovations designed to meet global demands for energy, water, and food.

Keyu Ren

Visiting Scientist, University of Maryland Center for Environmental Science, Appalachian Laboratory

Amanda Schwark

PhD student, University of Maryland Center for Environmental Science

PhD student at the Horn Point Lab (UMCES). Studying microbial ecology and the effects of prescribed fire in a restored wetland. Specifically focused on changes in fungal community and carbon cycling. In my free time, I head the HPL garden and am interested in green ammonia for future work in agriculture.

Sheri Spiegal

Rangeland Management Specialist, USDA-Agricultural Research Service Jornada Experimental Range

Dr. Spiegal is a Rangeland Management Specialist with the USDA Agricultural Service at the Jornada Experimental Range. She investigates strategies for transitions to sustainable agricultural systems. Current strategies include circular economies, recycling manure in "manuresheds", ranching with local heritage cattle genetics and precision ranching technologies, and building adaptive value chains from desert pasture to dinner plate. Sheri also leads a multidisciplinary effort to develop and widely apply indicators of sustainability and resilience on farms and ranches with the Long-Term Agroecosystem Research Network, so tradeoffs of any agricultural management strategy can be understood.

Mario Tenuta

Senior Industrial Research Chair in 4R Nutrient Management and Professor, University of Manitoba

Dr. Mario Tenuta is a full professor in the Department of Soil Sciences and heads the Applied Soil Ecology Lab. His training includes a B.Sc. in Botany and Physical Geography, an M.Sc. in Soil Science, a Ph.D. in Plant Sciences, and Post-Doctoral research in Nematology. From 2006 to 2017 he served as the Canada Research Chair in Applied Soil Ecology. Mario is one of nine leading researchers in the Canadian 4R Research Network (supported by Fertilizer Canada and Agriculture & Agri-Food Canada's (AAFC) Agri-Innovation Program). Most recently, Mario was named the Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair (IRC) in 4R Nutrient Stewardship.

Edin Thornton

Operations Manager, International Nitrogen Initiative

Beth Trask

Vice President, Energy Transition, Environmental Defense Fund

Climate, energy and air quality policy, in the US and internationally

Francesco Tubiello

Senior Statistician, Team Leader, Environment Statistics; Statistics Division; Food and Agriculture Organization of the United Nations

Srishti Vishwakarma

Postdoctoral Research Associate, Pacific Northwest National Laboratory - Joint Global Change Research Institute

Srishti Vishwakarma is currently working as a Postdoctoral Research Associate at Joint Global Change Research Institute (JGCRI) within the Pacific Northwest National Laboratory (PNNL). Her research interests stem around challenges associated with developing and implementation of advanced data science methods for modeling global socio-environmental processes and addressing the interdisciplinary problems of global food security, sustainability, and climate change impacts. Srishti obtained her doctoral degree at the University of Maryland College Park and University of Maryland Center for Environmental Science Appalachian Laboratory. Before joining PhD, she received a Master of Science degree in Hydraulics and Water Resources from the University of Iowa, Iowa. Prior to coming to the USA, she earned a Master of Technology (M.Tech) degree in Hydrology from Indian Institute of Technology (IIT) Roorkee, India.

Claudia Wagner-Riddle

Professor, School of Environmental Sciences, University of Guelph

Claudia grew up in Brazil and developed an interest in soil and climate after a frost destroyed many of the coffee plantations in her region. The plantations were replaced with annual crops such as soybeans and corn, and that brought with it a lot of soil erosion. Her first summer job as a student working with a researcher on no-till and cover crops furthered her interest in soil and ways of managing it. The experience also sparked an interest in agriculture. After completing her bachelor's degree, she took a research position in Germany looking at soil erosion, which inspired her to eventually pursue graduate research. Today, she is a world-renowned environmental science researcher focusing on the mitigation of greenhouse gases emitted by agricultural production systems.

Yanyu Wang

PhD student, University of Maryland Center for Environmental Science, Appalachian Laboratory

Yanyu Wang is a Ph.D. student at the University of Maryland Center for Environmental Science (UMCES) Appalachian Laboratory supervised by Professor Xin Zhang. Her current research focuses on quantifying nitrogen budget across different systems in the U.S. using Coupled Human And Natural Systems (CHANS) model. She is also investigating strategies to achieve regional and international sustainable nitrogen management through improved practices in nutrient recycling and international trade with nitrogen budget approach.

Nianqiang (Nick) Wu

Professor, University of Massachusetts Amherst

expertise and experience in green ammonia technology

Deepak Yadav

Programme Lead, Council on Energy, Environment and Water

Xin Zhang

Associate Professor, University of Maryland Center for Environmental Science, Appalachian Laboratory

Xin Zhang is an environmental scientist using data-driven and transdisciplinary approaches to address emerging sustainability challenges. The goal of Xin's current research is to evaluate how socioeconomic and biogeochemical processes affect the global nutrient cycle and the sustainability of agricultural production and, in turn, provide policy input on mitigating nutrient pollution while meeting global food and biofuel demands.

Yusheng Zhang

Researcher, Rothamsted Research

Zhenhuan (Bruce) Zhao

University of Massachusetts Amherst

Green ammonia synthesis by photocatalysis and electrochemistry using sunlight, air and water.

Tan Zou

Assistant Research Scientist, University of Maryland Center for Environmental Science, Appalachian Laboratory

Dr. Tan Zou is a postdoctoral researcher at the University of Maryland Center for Environmental Science Appalachian Laboratory. She is currently working on a global nutrient monitoring project funded by the International Fertilizer Association. Dr. Zou's research interests and experience encompass sustainability, sustainable agriculture, nutrient budgeting, nitrogen and phosphorus management, water pollution, and water quality.

Contact us

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Visit us online at niccee.org.

Have comments or questions about NICCEE and the Nitrogen Summer Institute? Scan the QR code.

Appendix A: NICCEE Principles of Conduct

The Global Nitrogen Innovation Center for Clean Energy and the Environment (NICCEE) is committed to providing **a safe and brave space for individuals, groups and communities to collaborate, innovate, and respond to the challenges and opportunities of green ammonia and other nitrogen management technologies**. NICCEE does not tolerate discrimination, harassment, or intimidation of any person or group on any basis, including race, ethnicity, religion, age, sex, sexual orientation, gender identity or expression, disability, national origin, citizenship status, socioeconomic background, position or title, political affiliation, caretaker status, or other characteristics. All members of the NICCEE community should expect to be held to the following code of conduct:

1. **Treat all members of the NICCEE community with respect, fairness, and courtesy at all times**. Actively cultivate a work environment that is respectful, supportive, friendly, and free from harassment and intimidation. The NICCEE community comprises people first and foremost. Physical and mental health, safety, and well-being are always top priorities.
    a. Respect differing opinions, perspectives, and identities.
    b. Respect the privacy and confidentiality of colleagues and their work.
    c. Respect intellectual property rights and give credit where it is due.
2. **Foster a culture of inclusivity and collaboration across disciplines, backgrounds and identities**. Recognize the value and unique contributions of everyone within the NICCEE community.
    a. Be mindful to avoid talking down to others based on their expertise. Discourage disciplinary pride that may hinder interdisciplinary collaboration.
3. **Critique output, not individuals**. Give constructive feedback with kindness and respect, and receive constructive feedback with an open mind.
4. **Practice open science and communication**. Share data sets, methodologies, computer code, and data visualizations openly and transparently. Thoroughly document research processes and results for reproducibility. Publish data sets and your findings whenever possible.
    a. **To foster trust and respect in the NICCEE community**, maintain the confidentiality of sensitive information, including personal disclosures and proprietary research data. Respect the intellectual property rights of others. Being open to sharing information that could benefit the research community is encouraged.
    b. **Communicate openly and honestly** within NICCEE, with outside colleagues and collaborators, and with the public.
5. **Strive to be interdisciplinary. Communicate complex ideas and jargon in language that is clear and understandable**.
6. **Respect one another's cultural identities and life experiences**. Recognize that cultural diversity enriches our understanding and approach to innovation in green ammonia and other nitrogen management technologies.

NICCEE is committed to providing a working and learning environment free from sexual harassment through training, education, prevention programs, and policies and procedures that promote prompt reporting, prohibit retaliation, and promote timely, fair, and impartial investigation and resolution in a manner that eliminates the sexual harassment, prevents its recurrence, and addresses its effects. All members of the NICCEE community, as well as third parties and subcontractors, are subject to this policy. All NICCEE program participants will be

expected to complete the UMCES training on “Sexual Harassment Prevention”, or equivalent training in their home institution.

Incident Reporting

NICCEE will follow Title IX guidelines to recommend reporting of any harassment or discrimination, including instances of bullying, in a trauma-informed context that also provides additional support. The UMCES Title IX Coordinator is Lisa Ross, Assistant Vice President of Human Resources (titleix@umces.edu or lross@umces.edu).

Subcontractors will be required to demonstrate that they have established policies and procedures that comply with Title IX and that their program members are provided with contact information for the subcontractor’s Title IX coordinator, or equivalent. UMCES requires that any agreement with a subcontractor acknowledges that the parties will promptly share any reports of harassment or discrimination occurring in off-campus settings and that they agree to cooperate in any investigation involving their participants.

When disagreements arise, NICCEE recommends:

1. Whenever possible, engage in honest and civil dialogue between parties involved as a first step toward resolving disputes.
2. If needed, individuals may seek support from the UMCES Title IX Office

Resources

UMCES Code of Conduct
UMCES Policy on Sexual Harassment
UMCES Policy on Professional Conduct & Workplace Bullying
UMCES Policy on Non-Discrimination & Equal Opportunity

University of Guelph Human Rights Policy
University of Guelph Sexual Violence Policy

NSF Office of Equity and Civil Rights
NSF Office of Inspector General Hotline
NSF Awardee Civil Rights Compliance Program

** The NICCEE Code of Conduct is adapted from the UMCES code of conduct and UMCES policies on Sexual Misconduct, Professional Conduct & Workplace Bullying, and Non-Discrimination & Equal Opportunity.*