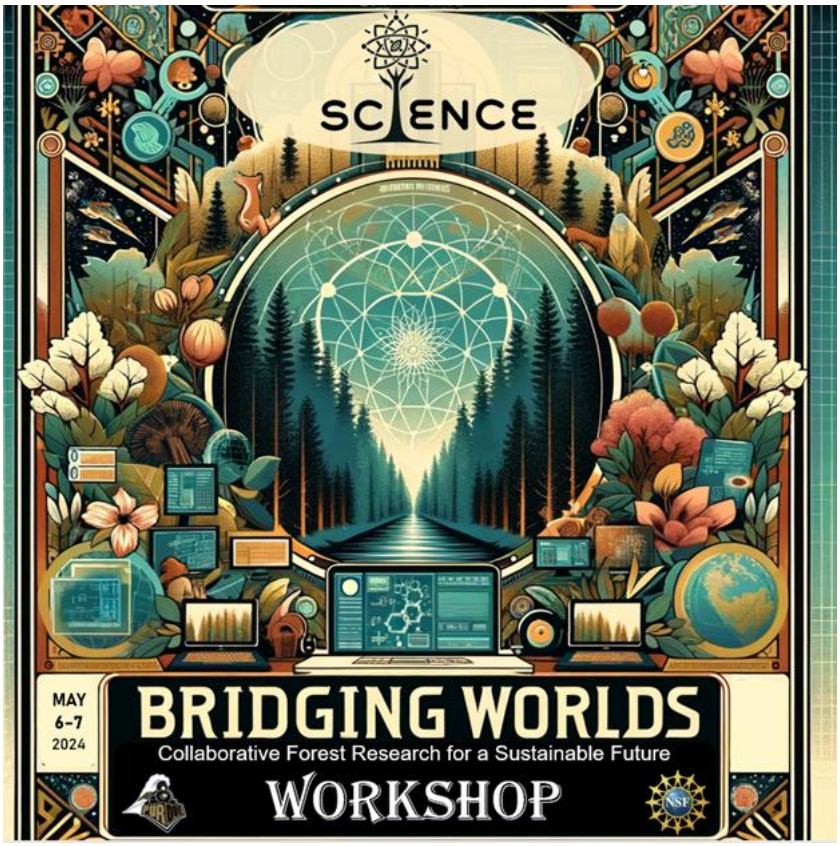
SCIENCE



Workshop Venues

In-person:
Purdue Hall for Discovery and Learning Research (page 21)

Online:
https://purdue-edu.zoom.us/j/92131530182?pwd=aEJDZ04yRUpVTWpETlhwa2dMTUpjUT09

Website:
https://science-i.org/bridging-worlds-2024/

Agenda

Sunday, May 5th, 2024

6:00 PM - 8:45 PM

Location: PMU Hail Purdue Room.

The shuttle will wait outside the hotel entrance from 5:20pm to 5:40pm.

Ice-Breaking Reception

Featuring gourmet refreshments and live music by the West Lafayette Trio

Monday, May 6th, 2024

8:00 AM - 9:00 AM

Location: Atrium, Purdue Hall for Discovery and Learning Research (DLR).

The shuttle will wait outside the hotel entrance from 7:20am to 7:40am.

Continental Breakfast

9:00 AM - 9:45 AM

Location: DLR131

Welcome and Overview

- Jingjing Liang, Purdue University
- Javier Gamarra, FAO (online presentation)

9:45 AM – 11:00 AM

Location: DLR131

Invited Talks

- Science Innovation from the Perspective of a Journalist - Liz Kimbrough, Mongabay
- From Ideas to Publications - Meredith Bastian, PNAS (online presentation)

11:00 AM - 11:15 AM

Location: DLR131

Break and Refreshments

11:15 AM - 12:30 PM

Location: DLR131

Invited Talks

- The Economic Way of Thinking for Ecologists and Conservationists - Mo Zhou, Purdue University, USA
- The promise and pitfalls of 'nature-based solutions' to our climate crisis – Peter Reich, University of Michigan & University of Minnesota, USA

12:30 PM - 1:30 PM

Location: Atrium

Luncheon and networking

1:30 PM - 3:00 PM

Location: DLR131

Research Talks (20 minutes talk each + 10 minutes Q&A)

- ZetaForests: Unravelling Global Forests Turnover and Co-Occurrence - SandraMacFadyen, Stellenbosch University, South Africa
- Adapting Trees: Ecological Strategies in a Changing Climate - Gabriel Yan Rosa, FURB, Universidade Regional de Blumenau, Brazil
- Forestry Remote Sensing Data Analysis using Quantum Edge Detection - Vivian Sattler, Leibniz University Hannover, Germany

3:00 PM - 3:30 PM

Location: DLR131

Break and Refreshments

3:30 PM - 5:00 PM

Location: DLR131

Panel Discussion

- Introduction to *Science-i* Data Resources - FACAI Lab, Purdue University, USA
- Introduction to *Science-i* Cyberinfrastructure - Rajesh Kalyanam, Purdue University, USA

5:30 PM - 7:00 PM

Location: Atrium

Themed Dinner with live music *by the West Lafayette Trio*

Tuesday, May 7th, 2024

8:00 AM - 9:00 AM

Location: Atrium

The shuttle will wait outside the hotel entrance from 7:20am to 7:40am.

Continental Breakfast

9:00 AM - 10:30 AM

Location: DLR131

Invited Talks

- Nature-Based Solutions on Indigenous Land - Bryan Van Stippen, National Indian Carbon Coalition, USA (online)
- Biodiversity Partitioning of a Forest with Mathematics - Cang Hui, Stellenbosch University, South Africa
- Biodiversity Conservation in Africa - Florence Palla, Central African Forest Observatory, Cameroon

10:30 AM - 10:45 AM

Location: DLR131

Break and Refreshments

10:45 AM - 12:15 PM

Location: DLR131

Research Talks (20 minutes talk each + 10 minutes Q&A)

- Automating Large-Scale Site-Specific Solar Resource Maps - Yaguang Zhang, Purdue University, USA
- Improving Estimation of Belowground Tree Biomass Across Temperate and TropicalVegetation Types - Sylvanus Mensah, University of Freiburg, Germany
- Resolution Effects on Modelling Net Primary Production in Global Terrestrial Ecosystems - Xiaolu Tang, Chengdu University of Technology, China (online)

12:15 PM - 1:30 PM

Location: Atrium

Luncheon with Topic Tables

1:30 PM - 3:00 PM

Location: DLR131

Workshop Wrap-Up and Forward Look

- Summary of Key Insights
- Discussion on Collaborative Opportunities and Next Steps

3:30 PM - 5:00 PM (Optional)

Purdue Campus Tour

Talks

1. Science Innovation from the Perspective of a Journalist - Liz Kimbrough, Mongabay
   9:45 AM - 10:25AM, Monday, May 6th, 2024
   Summary: Science communication is an important part of the scientific process, but how do we move beyond the silo of academia and get our ideas to the public? What kinds of stories do journalists pick up? How do new ideas or innovations fit into this landscape? This talk provides some tips for where, when and how to pitch your story to the media.

2. From Ideas to Publications - Meredith Bastian, PNAS
   10:25 AM - 11:00 AM, **Monday, May 6th, 2024**
   Summary: Various avenues and strategies for turning ideas into publications will be discussed, the PNAS review process will be explained, and other ways to become active with the journal will be noted. An overview of how PNAS has recently increased its engagement with early-career researchers will be provided, along with a review of the recruited Special Feature collections and other major recruited paper types. Various ways that PNAS is actively working to help authors overcome common barriers to publication will be explained. Finally, some information about PNAS Nexus will be provided, and differences between the sibling journals will be noted to help prospective authors consider which might be the best fit for their research.

3. The Economic Way of Thinking for Ecologists and Conservationists - Mo Zhou, Purdue
   11:15 AM - 11:55PM, Monday, May 6th, 2024
   Summary: In this talk, "The Economic Way of Thinking for Ecologists and Conservationists," Mo Zhou, an expert in Forest Economics and Management at Purdue University, will bridge the gap between ecological stewardship and economic reasoning. Drawing from her extensive research in forest management and environmental economics, Zhou will elucidate how economic tools and concepts can be employed to address conservation challenges. Participants will learn to apply cost-benefit analysis, understand market mechanisms influencing conservation efforts, and consider the economic implications of ecological decisions. Through a synthesis of theory and case studies, the presentation aims to equip ecologists and conservationists with the economic acumen necessary for making informed, sustainable management choices in a rapidly changing environmental landscape.

4. The promise and pitfalls of ’nature-based solutions’ to our climate crisis - Peter Reich, University of Michigan & University of Minnesota
   11:55 AM - 12:30 PM, Monday, May 6th, 2024
   Summary: Terrestrial plants and soils house more than three times as much carbon as is found in the atmosphere, and at least 250x as much carbon as is released each year in fossil fuel burning. Moreover, terrestrial ecosystems – i.e. forests, savannas and grasslands (but mostly forests)- have already absorbed more than 25% of all the CO2 pollution we’ve put into the atmosphere over recent centuries, and along with similar pollutant removal (i.e. “CO2 scrubbing”) by the oceans, have slowed climate warming by more than half. That is

an ecosystem service by nature, likely in the quadrillions of dollars category, and is the reason forest carbon sequestration is among a handful of key mechanisms considered collectively as part of a strategy we can deploy to slow and stop climate change.
So it is no surprise that scientists, policy-makers, entrepreneurs, and the public all hope that by modifying how and where we manage vegetation and soils, we can encourage nature to absorb a lot more atmospheric carbon and hold on to it in plants and soils. A wide variety of nature-based solutions that might enhance carbon storage in forests, grasslands or agricultural systems have been proposed - some even have social justice and biodiversity benefits too. Although the devil is always in the details, it is true that there is substantial capacity for nature to 'hold' more carbon. For example, as I will present during my talk, forests alone (and excluding forests converted to urban or agricultural use) could house additional carbon equivalent to half of the amount of carbon we will emit in fossil fuel burning in the next four to five decades. Savannas, grasslands, and agricultural lands could also house yet additional carbon. However, figuring out how to make substantial use of these natural 'tools' will be an enormous challenge, given myriad political, economic, ecological, climate, social, and cultural barriers. Ignoring such hurdles means attempts to do so will be far less effective than they might otherwise be. And recognizing such hurdles does not diminish our need to deploy nature as a climate-change fighting tool. Instead, by facing the reality of our challenges we could potentially make good use of nature's capacities to clean up after us yet again. If we combine the increased acquisition and storage of carbon on land with decarbonization via increased energy efficiency, reliance on renewable energy, and electrification, we can slow and stop climate change by mid-century.

5. ZetaForests: Unravelling Global Forests Turnover and Co-Occurrence - Sandra MacFadyen, Stellenbosch University
1:30 PM – 2:00 PM, Monday, May 6th, 2024
Summary: "zetaForests" leverages advanced Multisite Generalized Dissimilarity Modelling (MS-GDM) and Zeta diversity to elucidate higher-order compositional, structural, and functional turnover and co-occurrence of global forest biodiversity. Zeta diversity is a unifying metric for incidence-based biodiversity patterns, including how species are distributed across locations. That is, it measures the number of species shared by multiple sites, providing a multi-site generalization of species turnover. This allows for a deeper analysis of biodiversity that accounts for both rare and widespread species, capturing the complexity of ecological community composition and the nuances of species interactions. In summary, zetaForests aims to understand global forest species turnover and identify the factors influencing patterns of diversity, from rare to widespread species, providing insights into both ecological community composition and the continuous change in composition across scales.

6. Adapting Trees: Ecological Strategies in a Changing Climate - Gabriel Yan Rosa, FURB Universidade Regional de Blumenau
2:00 PM – 2:30 PM, Monday, May 6th, 2024
Summary: "Adapting Trees" utilizes Joint Species Distribution Modelling (JSDM) through the Hierarchical Modelling of Species Communities (HMSC) algorithm to integrate occurrence and climate data, with functional attributes, phylogenies, and species

co-occurrence data. This enables the creation of more precise models for the potential distribution of species in the present and provides better estimates for future scenario projections. Furthermore, it allows not only the assessment of changes in the potential distribution of specific species but also changes in entire communities. With functional attributes already measured, it becomes possible to calculate the ecological strategies of current and future communities, identifying potential losses of ecological strategies in future scenarios. The aim of "Adapting Trees" is to evaluate these changes in ecological strategies within tree communities in the state of Santa Catarina, considering the impact of climate change in the future. This leads to a better understanding of the ecology of these ecosystems, facilitating the implementation of mitigation measures, estimations of changes in ecosystem services, and more precise estimates of carbon stocks for future scenarios.

7. Forestry Remote Sensing Data Analysis using Quantum Edge Detection - Vivian Sattler, Leibniz University Hannover
   2:30 PM – 3:00 PM, Monday, May 6th, 2024
   Summary: Quantum Computing has recently emerged as a captivating frontier in research, drawing significant interest. Based on the laws of quantum physics, quantum computers are believed to hold the potential to outperform their classical counterparts in the future. This research project lies at the crossroads of quantum computing and forestry, exploring quantum image processing methods applied to forestry data. Given the computationally intensive nature of visual data analysis, existing quantum algorithms like Quantum Hadamard Edge Detection are promising candidates to enable up to exponential speedups in image processing. Its successful application to remote sensing images paves the way for the impact of quantum computing to forestry research in the times ahead.

8. Introduction to Science-i Cyberinfrastructure - Rajesh Kalyanam, Purdue University
   4:30 PM - 5:00 PM, Monday, May 6th, 2024
   Summary: The Science-I cyberinfrastructure platform will be described in this talk, including how researchers will be able to seamlessly request access to relevant datasets and perform analysis and computation on them, all from a web-based platform. An overview of the broader cyberinfrastructure resources available at Purdue University will also be provided, including the Anvil supercomputer that can be used to perform resource-intensive computations as well as machine learning workflows.

9. Nature-Based Solutions on Indigenous Land - Bryan Van Stippen, National Indian Carbon Coalition
   9:00 AM – 9:30 AM, Tuesday, May 7th, 2024
   Summary: Historically, the pressure for tribal nations and tribal member landowners to develop income from their land took the form of natural resource extraction such as minerals, oil, natural gas, timber, pastures, and water. These activities primarily benefited corporations off the reservation and often conflicted with the tribal nation’s ability to retain a healthy environment as well as decision-making control over their land.
   As new economic opportunities emerge in response to climate change, tribal land which may have been underutilized has become more valuable. It is critical that tribal nations not let their natural resource assets benefit others before it benefits their communities.Formed

by the Indian Land Tenure Foundation (ILTF) and the Intertribal Agriculture Council (IAC), NICC is a tribally led non-profit program that helps tribal nations and indigenous communities take advantage of nature-based solutions to enter into environmental commodities markets through the development of carbon sequestration projects.NICC views these projects as economic development opportunities that preserve tribal nation and tribal member land ownership while returning profits to reservation economies and communities. NICC's mission is to preserve tribal land ownership and reduce the effects of climate change by conserving the natural resources of tribal lands to minimize human-caused greenhouse gas emissions.

10. Biodiversity Partitioning of a Forest with Mathematics - Cang Hui, Stellenbosch University
9:30 AM – 10:00 AM, Tuesday, May 7th, 2024
Summary: Biodiversity is a complex and multi-dimensional concept, with its components varying across scales and sampling efforts. Set theory provides a mathematical framework to elucidate the relationships among the scale-dependent diversity partitions. While the standard scheme of biodiversity partitioning focuses on alpha and beta components, it is insufficient to provide a complete picture of biodiversity. Instead, zeta diversity is a powerful tool that can explain patterns of biodiversity components such as turnover, occupancy frequency, endemism, distance decay, and accumulation. Zeta diversity of order n simply describes the number of species common to n sites and declines along its orders. The regression of zeta diversity components against candidate assembly processes can help tease apart drivers of species turnover and accumulation and differentiate those contributed largely by rare versus increasingly common species. Let's walk through a forest and decipher its structure and dynamics with the lens of zeta mathematics.

11. Biodiversity Conservation in Africa - Florence Palla, Central African Forest Observatory
10:00 AM – 10:30 AM, Tuesday, May 7th, 2024
Summary: Protected areas in Central Africa are one of the world's most important networks for protecting biodiversity and combating climate change. Central Africa is a land of diversity: diversity of climates, diversity of soils, diversity of landscapes, diversity of ecosystems, diversity of flora and fauna. It's also a land of extremes, with the Congo Basin, the world's second-largest continuous expanse of tropical rainforest, which also contains the largest areas of swamp forest and peat bogs. But this land, which has fed generations of Africans, is under increasing pressure.
The countries of Central Africa are experiencing increasing degradation of their ecosystems as a result of ever-increasing anthropogenic pressure, influenced in particular by demographic growth and the demands of international markets. Natural ecosystems are subject to poaching, the expansion of transhumant livestock farming, the expansion of mining permits, industrial agriculture and family farming, timber exploitation (timber, fuelwood) and land conflicts. In this constantly changing context, where international and local issues are closely intertwined, protected areas are one of the most effective management tools for halting the degradation of biodiversity, reducing the impact of global change on biodiversity and helping ecosystems and human communities to adapt to these changes.

In fact, the opportunistic superimposition of industrial exploitation permits on known areas that are shared with protected areas runs counter to the application of national and international commitments relating to the preservation of biodiversity. With increasing population pressure and associated consumption of natural resources, there are few places in the world where investment in effective governance and management is not required to address threats and maintain the integrity of ecosystems.

12. Automating Large-Scale Site-Specific Solar Resource Maps - Yaguang Zhang, Purdue
10:45 AM - 11:15 PM, Tuesday, May 7th, 2024
Summary: The presentation details the development and application of a large-scale Sun-Shadow Simulator, a tool designed to generate dynamic prescription maps for winter road treatment by simulating sun-shadow effects. Utilizing 2016-2020 Indiana Statewide LiDAR data provided by Purdue, the simulator can identify high-risk road segments based on tree/terrain shadows and aid in reducing financial and environmental costs associated with chemical application in winter road maintenance. The simulator's accuracy is validated through comparisons with satellite images and on-site photos. Additionally, the tool supports large-scale simulations over both area and time, and thus has potential applications in forestry, such as assessing the impact of sun shadows on plant growth and health, which could inform environmental management practices.

13. Improving Estimation of Belowground Tree Biomass Across Temperate and Tropical Vegetation Types - Sylvanus Mensah, University of Freiburg
11:15 AM – 11:45 AM, Tuesday, May 7th, 2024
Summary: Accurate quantification of terrestrial biomass and carbon stock in both the above- and belowground tree parts, is a pre-requisite for successful implementation of climate-related policies. Unlike the aboveground tree part, the belowground tree compartments cannot be observed from space or airborne sensors. In addition, belowground tree biomass data are even more costly to collect, labor intensive and time consuming. With this research, we aim to compile and extract (by means of WebplotDigitizer) worldwide dataset on belowground biomass of individual trees from published articles to develop pantropical belowground biomass model as well as regional models that consider both the availability of the predictors, but also biogeographical changes including environmental (soil, climate) and vegetation types.

14. Resolution Effects on Modelling Net Primary Production in Global Terrestrial Ecosystems - Xiaolu Tang, Chengdu University of Technology
2:00 PM – 2:30 PM, Tuesday, May 7th, 2024
Summary: Net primary production (NPP) is an important parameter to quantify carbon balance in global terrestrial ecosystems. Although large efforts have been made, large variabilities up to several folds still exist, thus, an accurate estimate of NPP is still challenging in terrestrial ecosystems. Whether the spatial resolution affects NPP has not been reported. Therefore, in this study, we modelled NPP using three resolution (0.05, 0.25 and 0.25 degree) with the same environmental variables. Results showed that random forest could satisfactorily model NPP and can explain more than 53% variations of NPP. Spatial resolution had not effects on spatial and temporal patterns of NPP, however, spatial

resolution significantly affect total NPP that global NPP varied from 57.3±3.07 for 0.05°, 61.46±3.27 for 0.25°, and 66.5±3.42 Pg C yr^{-1} for 0.5°. Such differences may be associated with the resolution transformation of the input variables when resampling from finer to coarser resolution, which significantly increased the spatial and temporal variation characteristics, particularly in regions within the southern hemisphere such as Africa, South America, and Australia. Therefore, our study introduces a new concept emphasizing the importance of selecting an appropriate spatial resolution when modeling carbon fluxes, with potential applications in establishing benchmarks for global biogeochemical models.

Speakers
(in alphabetical order)

Meredith Bastian

Dr. Meredith L. Bastian is a Recruiting Editor at the Proceedings of the National Academy of Sciences (PNAS) and the research advisor to the Orangutan SSP (Species Survival Plan). She earned her PhD in 2008 from Duke University in Biological Anthropology and Anatomy and has worked with numerous species of nonhuman primates in various capacities over the past 25 years, including 8 years of fieldwork with wild Bornean orangutans and gibbons in Southeast Asia and 11 years as a zoo primate curator. Meredith has over 30 publications in PNAS, Nature, and various disciplinary journals and remains active in the orangutan research and conservation communities. She has been at PNAS since early 2021 and in her role as a Recruiting Editor and current chair of the journal's Committee on DEI (Diversity, Equity, and Inclusion), Meredith works closely with NAS member scientists and other subject matter experts throughout the biological, social, and physical sciences to recruit papers with a focus on increasing opportunities and exposure for underrepresented areas and authors.
Talk: From Ideas to Publications

Javier G. P. Gamarra

Dr. Javier Gamarra is an International Consultant in Forest Statistics at Food and Agriculture Organization of the United Nations (FAO). Gamarra is a seasoned academic with a deep specialization in Theoretical Ecology and Epidemiology, as well as expertise in spatial scaling and complex systems. Originating from Spain, Javier has cultivated an extensive career in academia, holding positions at notable institutions such as Aberystwyth University in the UK. He has a rich background in environmental systems, contributing to research that integrates field data with numerical models to better understand ecological and hydrobiological processes. His academic journey is marked by a Ph.D. in Nonlinear Dynamics and Control in Ecosystems from the University of Lleida and Polytechnic University of Catalonia, reinforcing his strong foundation in forest science and ecosystem dynamics. Javier's research has not only advanced theoretical frameworks in ecology but also practical applications in environmental management and conservation.

Cang Hui

Dr. Cang Hui is a professor of mathematical biology and holds the South African Research Chair in Mathematical and Theoretical Physical Biosciences at Stellenbosch University. He is a trustee of the International Initiative for Theoretical Ecology. He has published widely on biological invasions and ecological networks, including three authored books, Invasion Dynamics (Oxford University Press), Ecological and Evolutionary Modelling (Springer), and Invading Ecological Networks (Cambridge University Press).

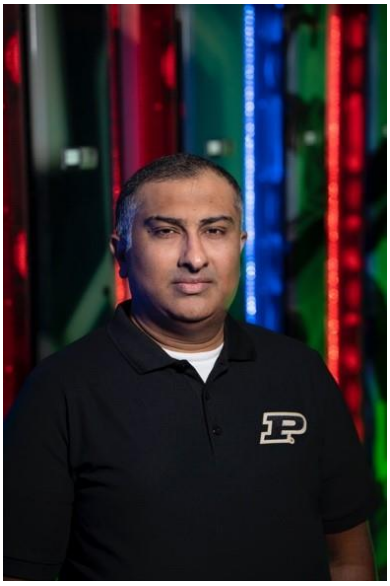
Talk: Biodiversity Partitioning of a Forest with Mathematics

Liz Kimbrough

Liz Kimbrough is a staff journalist for the non-profit conservation news site Mongabay. She has written about science and environmental issues for over a decade and holds a Ph.D. in Ecology and Evolutionary Biology from Tulane University where she studied the microbiomes of trees.

Talk: Science Innovation from the Perspective of a Journalist

Rajesh Kalyanam



Dr. Rajesh Kalyanam is a Senior Research Scientist in the Rosen Center for Advanced Computing at Purdue University. He leads and works on federally funded projects at the intersection of advanced computing and science and engineering. He has over 15 years of experience as a full stack application developer and has worked on science gateway projects in cybersecurity, geosciences, anthropology, and communications. He is currently the Co-PI of the National Science Foundation funded Anvil supercomputer deployed at Purdue University and the Co-PI of the Science-I project, responsible for the cyberinfrastructure design.

Talk: Introduction to Cyberinfrastructure Support

Jingjing Liang

Dr. Jingjing Liang is an esteemed scholar in the field of Quantitative Forest Ecology. Dr. Liang's dedication to advancing forest science is further demonstrated through his founding of Science-i, a pioneering research metaverse, and his leadership as the Leading Coordinator of the Global Forest Biodiversity Initiative. Dr. Liang has a remarkable record of scholarly publications, including contributions to high-impact journals like Nature and Science. A recipient of numerous accolades, Dr. Liang has been recognized for his contributions to forest ecology and his innovative approach to integrating AI and big data in environmental research. His leadership in professional organizations and editorial contributions to esteemed journals underscore his standing as a thought leader and advocate for sustainable forest management practices worldwide.

Talk: General Introduction and Summary

Sylvanus Mensah

Dr. Sylvanus Mensah (Beninese) is currently a research fellow in the Chair of Forest Growth and Dendroecology at Albert-Ludwigs-Universität Freiburg, Germany. He is also a research associate in the Laboratory of Biomathematics and Forest Estimation at the University of Abomey Calavi, Benin. He obtained his doctorate degree in Forestry from Stellenbosch University (South Africa), and has 10 years of research experience in the fields of forest ecology and biometry. His research spans various scales, from individual to community levels, with specific focus on tree growth and biomass modelling as well as biodiversity and ecosystem functioning. He makes use of observational data from local, regional and global scales to explain how forest ecosystem functioning responds to environmental variations and human interactions. In the last five years, Sylvanus has developed a particular interest in ecological mechanisms underlying forest ecosystem functioning in changing climate.

Talk: Improving Estimation of Belowground Tree Biomass Across Temperate and Tropical Vegetation Types

Sandra MacFadyen

Dr. Sandra MacFadyen is a post-doctoral research fellow at Stellenbosch University's Mathematical Biosciences Lab (BioMath) within the Department of Mathematical Sciences. With over 25 years of experience in protected areas research, gained from more than 15 years of service at South African National Parks, Sandra brings valuable insights to the BioMath team. Sandra's research primarily focuses on macroscale ecosystem dynamics, with a special emphasis on applied spatiotemporal statistics for biodiversity monitoring. She is intrigued by the intricate interactions between environmental drivers and responders, striving to understand how these dynamics shape and sustain landscape patterns and ecological processes. Sandra believes that this understanding is crucial for the longevity of protected ecosystems, guiding her work towards creating effective, efficient, and economical tools for tracking macroscale biodiversity patterns and trends, especially in large, protected areas.

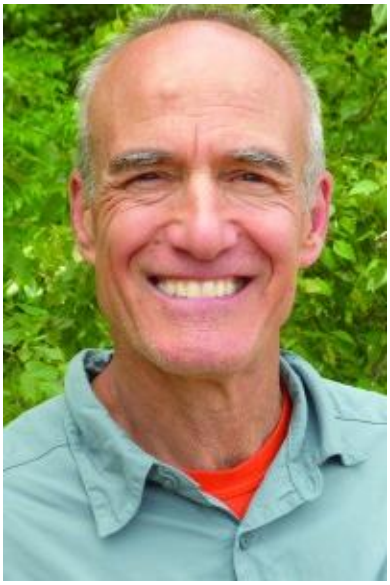
Talk: ZetaForests: Unravelling Global Forests Turnover and Co-Occurrence

Florence Palla

Dr. Florence Palla studied botany, then the environment, and specialized in nature conservation when she started working in the field in the Dja Biosphere Reserve in Cameroon. She holds a PhD in ecology from the University Pierre et Marie Curie (Paris VI). She contributed to the establishment and management of the Central African Protected Areas Network (RAPAC) by acquiring regional and international skills to support institutions and services in charge of protected areas. Since 2015, she has been coordinating the activities of the technical unit of the regional project (RIOFAC) supporting the Central African Forest Observatory (OFAC), including the observation of national and transboundary protected areas. She joined IUCN in 2014 as a member of the World Commission on Protected Areas (WCPA) and worked with different thematic groups to contribute to the realisation of IUCN's global vision to adapt it to the context of the Central and West Africa region.

Topic: Biodiversity Conservation in Africa

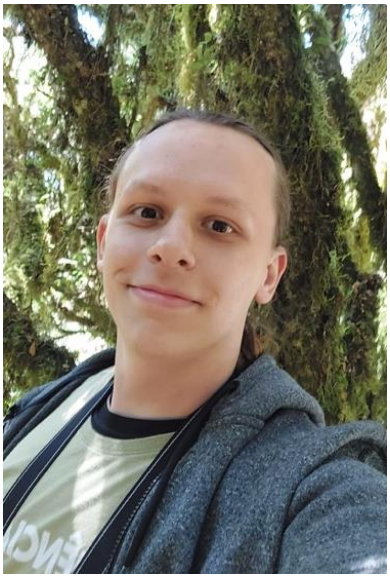
Peter B. Reich



Dr. Peter Reich, a renowned expert in forest ecology, has been named Director of the Institute for Global Change Biology (IGCB) at University of Michigan. Reich, who has conducted global change research on plants, soils, and ecosystems across a range of scales, will maintain a joint affiliation at the University of Minnesota (UMN), where he is a Regents Professor, Distinguished McKnight University Professor, and the F.B. Hubacheck Sr. Chair in Forest Ecology and Tree Physiology. In addition to his work at UMN, Reich was the Chief Scientist at the Hawkesbury Institute for the Environment at Western Sydney University in Australia from 2011 to 2021. He is a member of the National Academy of Sciences of the United States and the American Academy of Arts and Sciences, a fellow of the Ecological Society of America, and a BBVA Prize Laureate (BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology). He also helped launch the science education channel, MinuteEarth, which has more than 400 million views on YouTube and other platforms.

Talk: The promise and pitfalls of ’nature-based solutions’ to our climate crisis

Gabriel Yan Rosa



Gabriel Yan Rosa is a biologist graduated from the Universidade Regional de Blumenau (FURB) in Biological Sciences. Currently, he is pursuing a master's degree in Biodiversity at the Universidade Regional de Blumenau (PPGBio FURB), being a master's scholarship recipient from the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). Gabriel is part of the team at the Dr. Roberto Miguel Klein Herbarium at FURB, assisting with laboratory demands. In his master's project, he studies the ecological strategies of tree species and communities and how they can be affected by climate change, aiming to generate models to assess changes in communities in the future. To achieve this, he collaborates with the FlorestaSC project, utilizing the database of measurements cycles conducted over the last 17 years. In previous projects, he worked with ecology and species distribution modeling. Gabriel has interests in the field of plant ecology, especially in tree communities, aiming to study the effects of climate change on these communities.

Talk: Adapting Trees: Ecological Strategies in a Changing Climate

Vivian Sattler

Vivian Sattler is a master's student of physics at the Leibniz University Hannover, Germany. Within the scope of her bachelor's degree, her research focused on the theoretical analysis of quantum algorithms. She is currently enrolled at Purdue University as an international exchange student and has been introduced to forestry by participating in Professor Liang's class on Big Data analysis in forestry. Vivian is passionate about building bridges between research fields and strongly believes that interdisciplinary work is crucial for groundbreaking scientific developments. Hence, she is looking forward to presenting her work which started out as a class project and has evolved into an intriguing collaborative research endeavor at the intersection of quantum computation and forestry.

Talk: Forestry Remote Sensing Data Analysis using Quantum Edge Detection

Xiaolu Tang

Dr. Xiaolu Tang is a professor at Chengdu University of Technology. He got the PhD degree in Gottingen University majoring forest ecology in 2015, then he continued to his postdoc research in Max-Planck Institute of Biogeochemistry in Jena, Germany. Now he mainly works on carbon cycling using field measurements, data-driven and global vegetation dynamic models, with a special focus on soil carbon cycling. With more than 10 years experiences, he intrigued by the interactions between soil carbon fluxes and environmental drivers, striving understand how climate change and human activities affect soil carbon fluxes, and how temporal and spatial scales affect vegetation production at global scales.

Talk: Resolution Effects on Modelling Net Primary Production in Global Terrestrial Ecosystems

Bryan Van Stippen

Dr. Bryan Van Stippen is Program Director for National Indian Carbon Coalition, an initiative of the Indian Land Tenure Foundation (ILTF) that provides education, training, and technical assistance to American Indian tribes, Alaska Native Villages & Corporations, Native Hawaiian organizations and First Nations in Canada on the development of carbon credit and renewable energy projects on tribal land. A member of the Oneida Nation of Wisconsin, Van Stippen previously served for seven years as Tribal Attorney for the Ho-Chunk Nation Department of Justice in Wisconsin where he was responsible for land acquisition and other land-related issues. He earned a Bachelors Degree in Business Administration and a Masters in Computer Information Systems from Tarleton State University in Texas. Van Stippen is a graduate of the University of North Dakota School of Law (J.D.); the University of Tulsa College of Law (LL.M. in American Indian and Indigenous Law); and the University of Arizona James E. Rogers College of Law (S.J.D in Indigenous Peoples Law & Policy). He lives with his wife and two children in Green Bay, Wisconsin.

Talk: Nature-Based Solutions on Indigenous Land

Yaguang Zhang

Dr. Yaguang Zhang is a Clinical Assistant Professor at Purdue University in the Department of Agricultural & Biological Engineering (ABE) and the Department of Agricultural Sciences Education & Communication (ASEC). He earned his Ph.D. and M.Sc. degrees in Electrical and Computer Engineering from Purdue University in 2021 and 2015, respectively, and his B.Eng. degree in Communication Engineering from Tianjin University in 2013. He recently completed a postdoctoral research position in the School of Electrical and Computer Engineering at Purdue University from 2021 to 2023.

Talk: Automating Large-Scale Site-Specific Solar Resource Maps

Mo Zhou, Purdue University

Dr. Zhou's primary research interests at present are 1) integrating economic theory and data science to value nonmarket goods in forests and derive landowners' preferences and their interactions; 2) optimal decision making in forest management under risk and uncertainty induced by climate change; 3) economics of forest biodiversity at large scale; 4) dynamics of timber market and trade of forest products. Dr. Zhou was previously an Assistant Professor of Forest Economics at West Virginia University and before that an Assistant Professor of Economics at the University of Alaska Fairbanks. She has a B.S. in Information Sciences in Forestry from Beijing Forestry University, a M.S. in Forestry from the Technical University of Munich, and a Ph.D. from the University of Wisconsin – Madison. Dr. Mo Zhou is the co-director of the Forest Advanced Computing & Artificial Intelligence (FACAI) Lab.

Talk: The Economic Way of Thinking for Ecologists and Conservationists

The Forest Advanced Computing and Artificial Intelligence (FACAI) Laboratory

FACAI employs the paradigm of Artificial Intelligence (AI) encompassing different state-of-the-art machine learning and statistical methods to study global, regional, and local forest resource management and biodiversity conservation. FACAI stands at the forefront of integrating advanced computing and AI techniques into forest ecosystem studies. This lab is distinguished not only by its prowess in technology but also by its robust global partnerships, which enhance both data collection and research outcomes. FACAI operates with a unique asset—a comprehensive in situ forest inventory database spanning multiple continents. This allows them to back Science-i, a pioneering global research metaverse aimed at facilitating scientific innovation across disciplines. By striving for research outcomes that are both globally consistent and locally relevant, FACAI makes a significant contribution to the field of forestry and environmental science.

FACAI has significantly contributed to forest ecosystem studies, particularly through its connection with the Global Forest Biodiversity Initiative (GFBI). A key achievement includes collaborating on a groundbreaking project to estimate the total number of tree species worldwide, which identified approximately 73,300 species, highlighting the critical role of global tree diversity in ecosystem health and stability. This research underscored the threats to rare species from changes in land use and climate. FACAI's integration of global data sets and advanced computing significantly advances our understanding of global forest biodiversity.

West Lafayette Trio (WLT)

WLT consists of Alpen Liang, Finnan White, and Marco Tindel. Alpen Liang has played piano for a decade, the majority of which under the guidance of Dr. Ellen Bulow. He has participated in competitions such as the Hoosier State Auditions and the Sonata/Sonatina Festival, and volunteers at the Westminster Center and Universal Unitarian Church. Finnan White has played oboe for five years. He currently plays for the Wabash Youth Symphony, Indiana State Orchestra, and the Wind Ensemble at WLHS. Marco Tindel has played Cello for many years. He currently plays for the Wabash Youth Symphony, Indiana State Orchestra, and the Orchestra at WLHS.

Information for Travel

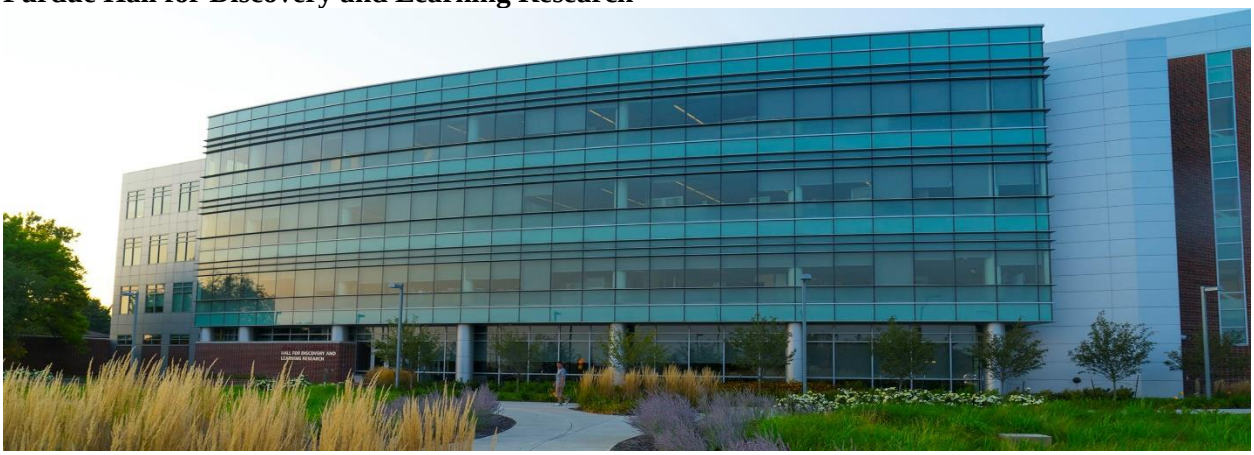
Airports:

1. Indianapolis International Airport: The Indianapolis International Airport is about 1 hour from the West Lafayette Campus. The airport offers shuttle services to the West Lafayette campus through the Lafayette Limo https://www.lafayettelimo.com/services/90-shuttle-services or through Reindeer Shuttle https://www.reindeershuttle.com/. Please check the shuttle websites to check their schedules to ensure you will arrive or departure times. 2.
2. Chicago O'Hare Airport:
   The Chicago O'Hare Airport is approximately 3 ½ hours from the West Lafayette campus. Please note, Chicago, IL is on Central Time and West Lafayette is on Eastern Standard time. Please plan accordingly to ensure you have enough time. The airport offers shuttle services to the West Lafayette campus through the Lafayette Limo https://www.lafayettelimo.com/services/90-shuttle-services or through Reindeer Shuttle https://www.reindeershuttle.com/. Please check the shuttle websites to check their schedules to ensure you will arrive or departure times.

Shuttle Services:

Both the Lafayette Limo and the Reindeer Shuttle offer direct transportation to the West Lafayette Campus. You will need to take an Uber or Taxi from the Campus drop-off location to the Hilton Garden Inn which is approximately ½ mile away.
Rental Cars are available to rent at both the Indianapolis International Airport and the Chicago O'Hare Airport.

Purdue Hall for Discovery and Learning Research



Address
Hall for Discovery Learning and Research
207 S. Martin Jischke Drive
West Lafayette, IN 47907

We will provide complimentary shuttle service between the hotel (Hilton Garden Inn, 356 E State St., West Lafayette, IN 47906 located in the Wabash Landing Shopping Center) and Purdue Hall for Discovery and Learning Research. Please refer to the Program for details.

Sponsors

National Science Foundation (award# 2311762),
Purdue Institute for a Sustainable Future,
Purdue Rosen Center for Advanced Computing,
Purdue Department of Forestry and Natural Resources,
Science-i

Contact:

For more information on this workshop, please contact us at Jingjing Liang jjliang@purdue.edu.
For assistance with travel and accommodations, please contact Jennifer L Spitznagle jlspitzn@purdue.edu.