



**INTERNATIONAL CONFERENCE ON  
SUSTAINABLE INNOVATION IN  
AGRICULTURE, FOOD, ENVIRONMENT,  
CLIMATE, AND DEVELOPMENT – 1.0**

*Conference Booklet*

MP Hall  
College of Natural Resources  
Royal University of Bhutan

24-26 March 2026



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# Welcome Note from the President



It gives me great pleasure to welcome you to the International Conference on Transforming Asia: Sustainable Innovation in Agriculture, Food, Environment, Climate, and Development – 1.0. I am happy to note that scholars, practitioners, policymakers, and development partners from across the region and beyond will gather in this conference to deliberate on innovative and sustainable pathways for addressing some of the most pressing challenges facing Asia today.

Asia stands at a critical juncture where the pressures of climate change, environmental degradation, food insecurity, and rapid socio-economic transformation demand new thinking and collective action. The interconnected nature of agriculture, food systems, environmental sustainability, and climate resilience calls for collaborative approaches and interdisciplinary solutions. Platforms such as this conference provide valuable opportunities to exchange knowledge, showcase cutting-edge research, and foster partnerships that can contribute to meaningful and lasting transformation across the region.

The College of Natural Resources, under the Royal University of Bhutan, has long been committed to advancing knowledge, research, and innovation in the areas of sustainable agriculture, natural resource management, and environmental stewardship. Hosting this conference reflects our continued commitment to promoting dialogue, strengthening regional cooperation, and supporting evidence-based solutions that contribute to sustainable development. I am optimistic that the discussions and exchanges during this conference will inspire new ideas, strengthen collaborations, and generate practical insights that can help shape resilient and sustainable futures for our communities and ecosystems.

On behalf of the Centre for Sustainable Mountain Agriculture and College of Natural Resources, I extend a warm welcome to all participants and sincerely thank you for your engagement and contributions. I wish you fruitful discussions, productive networking, and a pleasant and memorable stay in Bhutan.

Tashi Delak.

## Welcome Note from the DRIL



It is my pleasure to welcome you to the International Conference on Transforming Asia: Sustainable Innovation in Agriculture, Food, Environment, Climate, and Development – 1.0. Thank you for choosing to come and participate in this important event.

This conference serves as a platform for researchers, academics, and practitioners to share insights, present new research findings, and explore collaborative solutions to address the complex sustainability challenges facing our region.

The conference reflects the growing importance of innovation and interdisciplinary collaboration in advancing resilient agri-livestock systems, sustainable food production, environmental stewardship, and climate action. I am confident that the presentations, discussions, and networking opportunities during the conference will stimulate new ideas and strengthen partnerships among institutions and scholars working toward sustainable development.

On behalf of the organising team, I warmly welcome all participants and wish you a productive and enriching conference experience.

Tashi Delak!

Sonam Tashi (PhD)  
Dean of Research and Industrial Linkages  
College of Natural Resources  
Royal University of Bhutan



## About the Conference

The International Conference on Sustainable Innovation in Agriculture, Food, Environment, Climate and Development – 1.0 provides a platform for interdisciplinary dialogue on sustainable and innovative solutions to contemporary development challenges in Bhutan and the region.

The conference brings together researchers, policymakers, practitioners, and community stakeholders to share knowledge, exchange best practices, and explore actionable strategies.

Grounded in Bhutan's philosophy of Gross National Happiness (GNH), the conference highlights approaches that integrate environmental conservation, socio-economic development, and human well-being. Key thematic areas include climate-smart agriculture, climate resilience, food and nutrition security, natural resource management, biodiversity conservation, sustainable livelihoods, and One Health approaches.

Hosted at the College of Natural Resources in the scenic Punakha Valley, the conference offers a unique opportunity to engage with Bhutan's carbon-negative development model while fostering collaboration, innovation, and future partnerships.

# Conference Programme

## *Opening session*

Time	Activity
08:15 – 08:45	Registration
08:45 – 09:00	Guests and Participants to be seated
09:00 – 09:05	Arrival of the Chief guest
09:05 – 09:15	Offering Butter lamp and Marchang Ceremony
09:15 – 09:25	Welcome address
09:25 – 9:45	Keynote Address by Chief Guest
09:50 – 10:25	Photo session followed by Tea Break

## *Technical Session I: Sustainable Agriculture & Agri-Innovation*

Time	Activity
10:25– 10:45	Jerald Stuart Feitelson, PhD, CEO and Co-Founder, Agrivita LLC. Topic: Sustainable Crop Longevity Through Precision Genome Editing: Lessons from AgriVita for Bhutan and Beyond.
10:45– 11:05	Professor Michael George Kepler Jones, Agricultural Biotechnology, Murdoch University. Topic: Gene editing of crop plants: the science, benefits, its regulation, and the potential for international trade

DAY  
01

# Conference Programme

## *Technical Session I: Sustainable Agriculture & Agri-Innovation*

Time	Activity
11:05 – 11:25	Mr. Kinzang Thinley, Senior Agriculture Officer, Agriculture Research and Development Centre, Wengkhar. Topic: Performance of Climate-Resilient Wengkhar Hybrid Maize-1 under Farmer Field Conditions.
11:25 – 11:50	Combined Q&A (25 Mins) Moderator: Mahesh Ghimiray, Senior lecturer, specialist, Department of Agriculture, CNR, RUB.
11:50 – 12:55	Lunch   Networking

## *Technical Session II: Climate Resilience, Ecosystems & Nature-Based Solutions*

Time	Activity
13:00 – 13:15	<b>Keynote Address:</b> Associate Professor Phurpa Wangchuk, James Cook University. Topic: Biotechnology for Climate Resilience, Biotherapeutics and Bioprospecting.

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# Conference Programme

## *Technical Session II: Climate Resilience, Ecosystems & Nature-Based Solutions*

DAY  
01

Time	Activity
13:15 – 13:30	Gerald Paul Turpin, Senior Ethnobotanist, Queensland Herbarium & Biodiversity Science. Topic: Bush medicine of the Mbabaram Aboriginal community in Far North Queensland demonstrates strong antioxidant and anti-inflammatory activities.
13:30 – 13:45	Dr. Thambiliya GS Lahiru Prakash, Wildlife and Nature Protection Society of Sri Lanka. Topic: Behaviorally Informed Light-Repel System: A Scalable, Non-Invasive Solution for Reducing Human–Elephant Conflict in Sri Lanka.
13:45 – 14:00	Mr. Jigme Thinley, M.Sc. Student, College of Natural Resources, Royal University of Bhutan. Topic: Prey Occupancy and Functional Connectivity in Biological Corridor Seven, Bhutan.

# Conference Programme

## *Technical Session II: Climate Resilience, Ecosystems & Nature-Based Solutions*

DAY  
01

Time	Activity
14:00 – 14:15	Shamika Shantaram Sawant, ICAR - Central Institute of Fisheries Education, India. Topic: Performance evaluation of functionally modified adsorbents for remediation of aquaculture effluent.
14:15 – 14:30	Professor Vishwambhar Prasad Sati, Mizoram University. Topic: Ecosystem Services Valuation and Payment for Livelihood Sustainability in the Indian Central Himalayan Region.
14:30 – 15:00	Combined Q&A (30 Mins) Moderator: Dr Om Katel, College of Natural Resources, Royal University of Bhutan.
15:00 – 15:30	Coffee Break

# Conference Programme

## *Technical Session III: Livestock, One Health.*

Time	Activity
15:30 - 15:45	Dr. Marcy Jan Souza, Associate Dean and Professor, University of Tennessee College of Veterinary Medicine, USA. Topic: A One Health Approach to Food Safety, Conservation, and Agriculture.
15:45 – 16:00	Professor Jyoti B Dutta, Department of Veterinary Epidemiology & Preventive Medicine, Assam Veterinary & Fishery University. Topic: Transboundary challenges of animal rabies control: Indo-Bhutan perspectives.
16:00 – 16:15	Dr. Rinchen Tshering, Veterinarian, Royal Civil Service, Bhutan. Topic: The Decline of Indigenous Siri Cattle of Bhutan – Implications for Sustainable Agriculture and Climate Resilience.
16:15 – 16:30	Dr. Tenzin Wangchuk, National Veterinary Hospital, Ministry of Agriculture and Livestock, Bhutan. Topic: Antimicrobial Use in Bhutan's Veterinary Services: A Baseline Analysis from the Veterinary Information System in Paro District.

DAY  
01

# Conference Programme

## *Technical Session III: Livestock, One Health.*

Time	Activity
16:30 – 16:50	Combined Q&A (20 Mins) Moderator: Dr. Penjor, Associate Professor, Department of Animal Science, CNR, RUB.
16:50 – 17:50	Panel Session 1: Biotechnology for Bhutan's Future: Innovation, Regulation, and Pathways for Development.

***Networking Dinner Program***  
*Theme: Connecting Cultures and Building Collaborations*  
*Date: 24th March 2026*  
*Duration: 18:30 – 21:00*  
*Venue: RKPO*

Time	Activity
18:30 - 19:00	Arrival & Welcome Drinks
19:00 – 19:05	Opening Announcement (MC)
19:05 – 19:45	Cultural Programme and Networking and Dinner.
20:55 – 21:00	Closing Remarks (MC)

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01

# Conference Programme

## *Technical Session IV: Sustainable Food Systems*

DAY  
02

Time	Activity
09:00 – 09:15	<p>Keynote Address: Professor Peter Groot Koerkamp, Wageningen University and Research, Agricultural Biosystems Engineering group.</p> <p>Topic: Can ecology-based farming, biodiversity preservation and technological management go hand in hand?</p>
09:15 – 09:30	<p>Professor Jelle J P Wouters, Director of Research &amp; Development, Royal Thimphu College.</p> <p>Topic: A Microbiosocial Approach to Food Systems: Contributing to Health and Well-being in GNH and GMC</p>
09:30 – 09:45	<p>Professor Ujang Tinggi and Catherine Jane Burns, Griffith University, Australia.</p> <p>Topic: Essential micronutrients (trace elements) in foods and their analysis for assessment of dietary intakes, bioavailability and health status.</p>
09:45 – 10:00	<p>Mr. Thinley Gyeltshen, Deputy Chief Agriculture Officer, Agriculture Research and Development Centre.</p> <p>Topic: Economic Impact of Climate Control Systems on Oyster Mushroom Production in Bhutan: A Net Present Value Approach.</p>

# Conference Programme

## *Technical Session IV: Sustainable Food Systems*

Time	Activity
10:05 – 10:25	Combined Q&A (20 Mins) Moderator: Dr. Sonam Tashi, Associate Professor and Dean of Research & Industrial Linkages, CNR,RUB.
10:25 – 11:05	Coffee Break

## *Technical Session V: Environmental Hazards and Adaptation*

Time	Activity
11:05 – 11:20	Dr. Graham Ambridge, Operations Manager - Designer/Project Developer, YACHATDAC, Australia. Topic: Indigenous-led on-country carbon and ecosystem rehabilitation initiatives
11:20 – 11:35	Mr. Sonam Dorji, Assistant Environment Officer, Department of Water, Ministry of Energy and Natural Resources, Bhutan. Topic: Hazard Assessment of Chubda GLOF using Scenario-Based Simulation in Chamkhar River Basin

DAY  
02

# Conference Programme

## *Technical Session V: Environmental Hazards and Adaptation*

DAY  
02

Time	Activity
11:35 – 11:50	Dr. MD Shiyam Sadik, Lecturer, North South University, Bangladesh. Topic: Environmental Determinants of Urban Air Pollution and Health Outcomes in Bangladesh: A Scoping Review.
11:50 – 12:05	Mr. Sailesh Bhandari, Entrepreneur and founder of Yoering-ma Topic: A Comparative Study on the Growth and Reproductive Capacity of Two Exotic Earthworm Species in Three Bhutanese Feedstock Types
12:05 – 12:35	Combined Q&A (30 Mins) Moderator: Dr. Ugyen Thinley, Assistant professor, Department of Environment and Climate Studies, CNR, RUB.
12:35 – 13:35	Lunch Break

# Conference Programme

## *Technical Session VI: Livelihoods, Rural Innovation & Inclusive Development*

DAY  
02

Time	Activity
13:35 – 13:50	<p>Dr.Nguyen Thi Phan Thu, Lecturer, University of Economics and Business-Vietnam National University.</p> <p>Topic: Assessing the Dual Impact of Artificial Intelligence (AI) on Sustainable Development in Vietnam: Opportunities and Challenges</p>
13:50 – 14:05	<p>Professor Mohammad Taj Udin, Department of Agricultural Economics, Bangladesh Agricultural University.</p> <p>Topic: Adoption Dynamics of Combine Harvesters and Contribution to Increased Agricultural Productivity in Wetland Areas of Bangladesh</p>
14:05 – 14:20	<p>Professor Sunanda Bharti, Professor of Law, Faculty of Law, University of Delhi.</p> <p>Topic: Harnessing Traditional Wisdom: Exploring the Intersection of Indian Millets, Agriculture, and Intellectual Property Rights.</p>
14:20 – 14:35	<p>Professor Velan Nirmala, Department of Economics, Pondicherry University.</p> <p>Topic: Organic Rice Cultivation for Environment Regulation in Nagaland, India: A Case Study</p>

# Conference Programme

## *Technical Session VI: Livelihoods, Rural Innovation & Inclusive Development*

DAY  
02

Time	Activity
14:35 – 14:50	<p>Mr. Sangay Thinley, Chief Economic Development and Marketing Officer, Department of Agricultural Marketing and Cooperatives.</p> <p>Topic: Aggregator Network as Drivers of Agricultural Marketing: A Process Innovation in Bhutan.</p>
14:50 – 15:05	<p>Assistant Profressor Mohit Sharma, Dr. Rajendra Prasad Central Agricultural University (RP-CAU) India.</p> <p><b>Topic:</b> Connecting Sustainability with Spirituality for Reimagining New Food Systaems.</p>
15:05 – 15:25	<p>Combined Q&amp;A (30 Mins)</p> <p>Moderator: Dr. Rekha Chettri, Assistant Professor, Department of Sustainable Development, CNR, RUB.</p>
15:25 – 15:45	Coffee Break
15:45 – 16:45	<p>Panel Session 2: Making Agrifood Profitable in Bhutan: Markets, Institutions and Youth at the Centre.</p>
16:50 – 17:05	Closing Remarks and Conference End.

# Conference Programme

## *One-Day Cultural Excursion for International Delegates*

### *Group A: Early Departure*

DAY  
03

Time	Activity	Brief Description
07:30 – 8:30	Breakfast	A relaxed breakfast to start the day comfortably and prepare for the cultural excursions ahead
08:30–10:30	Punakha Dzong	One of Bhutan’s most magnificent Dzongs, located at the confluence of two rivers and renowned for its historical and architectural importance
10:30–12:00	Chimi Lhakhang	A sacred fertility temple associated with Lama Drukpa Kunley, set amidst picturesque rice fields. Chimi Lhakhang: Fertility Temple in Bhutan (Punakha, Bhutan)
12:00–13:30	Lunch	A cultural dining experience
After lunch	Travel to Paro International Airport	Timely transfer for international departures

# Conference Programme

## *One-Day Cultural Excursion for International Delegates*

### *Group B: Early Departure*

DAY  
03

Time	Activity	Brief Description
07:30 – 8:30	Breakfast	A relaxed breakfast to start the day comfortably and prepare for the cultural excursions ahead
08:30–10:30	Punakha Dzong	One of Bhutan’s most magnificent Dzongs, located at the confluence of two rivers and renowned for its historical and architectural importance
10:30–12:00	Khamsum Yulley Namgyal Chorten (Hike)	A short scenic hike to a hilltop chorten offering panoramic views of the Punakha Valley and Mo Chhu River
12:00–14:00	Lunch	A cultural dining experience
14:00 – 16:00	Chimi Lhakhang	A sacred fertility temple associated with Lama Drukpa Kunley, set amidst picturesque rice fields. Chimi Lhakhang; Fertility Temple in Bhutan
16:30	Drop to respective hotel	

# SPEAKERS

## DAY-01

### Technical Session I: Sustainable Agriculture & Agri-Innovation.

## Topic: Sustainable Crop Longevity Through Precision Genome Editing: Lessons from AgriVitae for Bhutan and Beyond.



Jerry Feitelson, Ph.D. is CEO and Co-Founder of AgriVitae LLC, a California-based agricultural biotechnology company commercialising a novel, patent-pending genome-editing target designed to improve crop shelf life, increase yields, and enhance tolerance to abiotic stress. He previously served as CEO and Co-Founder of Agribody Technologies, Inc., where he partnered with innovative seed and farming companies. He has held senior leadership roles, including Chief Scientific Officer at GCEH and Sustainable Oils; Manager of Business Development, Intellectual Property, and Alliances at Beckman Coulter; Vice President of Technology and Business Development at GenWay Biotech; and Research Director at Akkadix. During his tenure at Mycogen, his research group discovered the majority of the currently known *Bacillus thuringiensis* toxin genes. Earlier in his career, he was a Senior Research Microbiologist at American Cyanamid and served as an Adjunct Professor at Rutgers University. Dr. Feitelson is an inventor on 16 U.S. patents and the author of more than 40 scientific publications. He earned a B.S. in Life Sciences from Massachusetts Institute of Technology, completed his Ph.D. in Genetics at Stanford University School of Medicine under Nobel Laureate Joshua Lederberg, and conducted NIH-funded postdoctoral research at the John Innes Institute in Norwich, focusing on *Streptomyces* molecular genetics. There, he cloned the first gene involved in antibiotic biosynthesis with a known biochemical function.

### Abstract

AgriVitae LLC advances sustainable food security by deploying genome-editing innovations that substantially extend the shelf life of highly perishable crops—including fruits, vegetables, and ornamentals. Our patent-protected technology targets a rigorously validated early-acting regulatory switch that slows plant senescence. By delaying ageing at its biological origin, this intervention not only prolongs post-harvest quality but also enhances crop resilience to major biotic and abiotic stresses, including disease pressure, drought, heat, cold, salinity, low nutrient availability, and high planting density. These combined benefits have the potential to reduce food waste, stabilise yields under climate variability, and support more efficient value chains across Asia. In addition, I will share insights from my entrepreneurial trajectory—from laboratory discovery to commercial translation—that may have practical relevance for Bhutan's emerging efforts in agricultural innovation, rural development, and climate-adapted crop production.

### Keywords

Climate-resilient crops, Food security, Genome editing, post-harvest shelf life, Sustainable agriculture

# Topic: Gene editing of crop plants: the science, benefits, its regulation, and the potential for international trade



Michael G K Jones holds a PhD in Plant Biochemistry from the University of Cambridge. He is an internationally recognised leader in agricultural biotechnology and a frequently invited speaker at major international meetings. He is a Professor of Agricultural Biotechnology at Murdoch University and the Foundation Director of the WA State Agricultural Biotechnology Centre. He has played a key role in establishing new research centres, including the Centre for Crop and Food Innovation. Professor Jones was a founder member of Life Sciences WA, served as President of the Royal Society of WA, and was a member of the Australian Biotechnology Advisory Council, which advised government ministers on national biotechnology policy. His current work focuses on New Breeding Technologies and translating research into commercial outcomes. Most recently, he organised a symposium at the Australian Academy of Sciences on gene editing, addressing the science, applications, and implications for international trade.

## Abstract

Genomics and gene editing are revolutionising crop improvement by leveraging advanced biotechnological techniques to enhance yield, quality, and stress tolerance. Recent advances in sequencing technologies are enhancing our understanding of crop genomes, enabling the identification of single-nucleotide polymorphisms (SNPs) and structural variations. The concept of the pan-genome is providing insights into genetic diversity and helping accelerate the development of high-yielding and resilient crop varieties via genomic selection. Genetic manipulation, which began with the transfer of genes between organisms, led to the emergence of genetically modified (GM) crops in the mid-1990s. Despite contributing significantly to global food production, public acceptance issues have limited their expansion. In contrast, gene editing (GEd) technologies, particularly CRISPR/Cas systems, have advanced rapidly since the early 2010s, allowing precise modifications at specific genomic loci. These tools promise to facilitate introducing or modifying beneficial traits more efficiently than traditional breeding methods. Gene editing is now being applied to many crops, including rice, wheat, maize, soybean, potato, sugarcane, and tomato, improving traits such as shelf life, allergenicity, consumer benefits, and nutritional profiles. Gene editing is now being applied to complex polyploid crops such as sugarcane, in which CRISPR/Cas9 has shown promise in reducing lignin content, enhancing disease resistance, increasing biomass for biofuel production, and improving abiotic stress tolerance. Regulatory hurdles and public perception have impeded the wider adoption of GM crops, but GEd crops offer an opportunity to overcome these challenges. International regulatory regimes are evolving to differentiate between GM and GEd crops, with many countries approving the commercial growth and consumption of GEd crops. The future of crop improvement using GEd technologies lies in the harmonisation or alignment of global policies and regulations, which will support trade of agricultural produce and so ensure that growers and consumers can gain the benefits from GEd technology.

Keywords : Crop improvement, Gene editing, New breeding technologies, Regulations, Trade

## Topic: Performance of Climate-Resilient Wengkhhar Hybrid Maize-1 under Farmer Field Conditions.



Mr. Kinzang Thinley, currently serving as Senior Agriculture Officer at the Agriculture Research and Development Centre, Wengkhhar, under the Ministry of Agriculture and Livestock. Mr. Thinley holds a bachelor's degree in Agricultural Science from the College of Natural Resources and a master's degree in international Innovative Agricultural Science from Tokyo University of Agriculture and Technology, Japan. Mr. Thinley leads the field crop research and development initiatives at the centre, especially maize agronomy, varietal evaluation, and sustainable crop management practices. Those initiatives strengthened several research trials and extension initiatives that enhanced the food security of smallholder farmers.

### Abstract

Heat and drought stress are two major factors limiting maize yield of smallholder farmers in Bhutan. These climate-related stresses are projected to increase in the coming years. About 37% of variability in maize production is influenced by temperature fluctuations. This study assessed the performance of Wengkhhar Hybrid Maize-1 (WHM-1), the first climate-resilient hybrid maize developed in Bhutan under the Heat Tolerant Maize for Asia (HTMA) initiative to mitigate increasing heat and drought stress. The field trials were carried out in the dry subtropical climate in eastern Bhutan under the management of farmer and involved 40 households in Udzorong village. A total of 13 households were randomly selected to assess growth and yield attributes and farmers' perceptions. Thus, WHM-1 significantly outperformed local varieties, producing 29% higher grain yield ( $4.11 \text{ MT ac}^{-1}$ ) than local maize ( $3.19 \text{ MT ac}^{-1}$ ) and exhibiting 39.4% lower plant mortality, indicating better tolerance to heat, drought, and fall armyworm infestation. WHM-1 also produced heavier cobs, more kernels per ear and observed moderate plant and ear height, which aids in reducing the risk of lodging. Farmers' observations aligned closely with measured results, with more than 70% rating WHM-1 as superior in vigour, uniformity, tolerance to stress, pests, and diseases. These results suggest that WHM-1 has strong potential to enhance productivity and climate resilience in rainfed farming systems. However, strengthening seed systems remains crucial to ensure timely access to quality seeds and support wider adoption of climate-resilient hybrid maize.

### Key Words

Climate-resilient; Drought; Grain yield; Heat; Hybrid maize; Landraces

# Topic: Comparative Analysis of Growth Parameters of Wheat (*Triticum aestivum* L.) and Groundnut (*Arachis hypogaea* L.) under Organic and Conventional Farming Systems.



Dr. Shailaja Bhagwanrao Bhosale is a researcher with a PhD in Organic Farming. She currently works as an Assistant Professor in the Department of Botany. Her work focuses on advancing organic farming practices and spreading organic principles nationwide through scientific research. She has published eight research papers in reputed journals and has recently authored a book titled Organic Farming. With a strong belief that agriculture is transitioning from chemical-based practices to organic systems through innovation and awareness, her work emphasises the development of fully organic farming methods that are environmentally sustainable and beneficial for the globe

## Abstract

Conventional agricultural practices may render a larger landmass in India unfit for agriculture in about three decades. But organic practices don't offer yield in competition with conventional farming. There is a dire need to find a golden mid to conjugate organic and conventional farming. Using RBD, this study examined the effects of various fertilisation and spray treatment (conventional, organic, combination of organic and conventional, zero intervention) strategies on plant growth, development, and physiological responses. Significant variations were observed across different treatments, with the tallest plants recorded in T1 (100% conventional fertilisers), attributed to the immediate nutrient availability typical of conventional methods. In contrast, the combination treatment T5 (25% organic + 75% conventional) resulted in the highest leaf count and canopy cover, suggesting an optimal balance of nutrient supply and sustained growth. Root health was notably enhanced in T2 (100% organic), which demonstrated a higher root nodule count and weight, emphasising the benefits of organic fertilisers in supporting symbiotic relationships. While conventional fertilisers led to increased yields due to better nutrient availability and photosynthetic efficiency, organic farming produced higher-quality seeds. The study highlights a trade-off between quantity and quality in agricultural practices, advocating for a blended approach to fertilisation that maximises both growth and root development. Future research is encouraged to optimise the organic-to-conventional fertilizer ratio to enhance sustainability across diverse crop systems.

## Key Words

Combination Treatment, Conventional farming, Groundnut, Organic Farming, Yield

# SPEAKERS

## DAY-01

### Technical Session II: Climate Resilience, Ecosystems & Nature- Based Solutions

## Key Note : Biotechnology for Climate Resilience, Biotherapeutics and Bioprospecting.



Associate Professor Phurpa Wangchuk (PhD-Drug Discovery; GradDip-Health Research; M.Sc. Medicinal Chemistry; B.Sc. Biology/Chemistry) is a Team Leader and Head of the Nature-Inspired Drug Discovery Program at the College of Science and Engineering, James Cook University, Australia. He also serves as an Adjunct Senior Research Fellow at the Australian Institute of Tropical Health and Medicine. He leads nationally funded research focused on discovering nature-inspired therapeutics for inflammatory bowel disease, diabetes, cancer, malaria, and microbial infections. With over 26 years of experience in medicinal chemistry, pharmacology, immunology, and omics sciences, he has published more than 150 scholarly works and is ranked among the top 0.5% of researchers globally in medicinal plants research. His research integrates traditional medicinal knowledge with modern drug discovery approaches, aiming to develop innovative therapies that address global health challenges, particularly in tropical and infectious diseases.

### Abstract

Biotechnology integrates ecosystem biology with advanced technological platforms to deliver solutions across agriculture, healthcare, food systems, and industrial bioprocessing. Tools such as genomics/genome editing, proteomics, and metabolomics are accelerating the development of drought-tolerant and pest-resistant crops, climate-resilient production systems, and engineered biofactories for scalable biopharmaceutical manufacturing. Research on extremophiles from alpine and hypersaline ecosystems is expanding the discovery of novel enzymes and functional genes with applications in vaccines, food biotechnology, and industrial catalysis. Bioprospecting of stress-induced biomarker compounds further provides promising leads for therapeutic and nutraceutical innovation. Countries that combine strong biotechnology infrastructure with rich biodiversity are best positioned to benefit from these integrative advances. Bhutan offers a distinctive case: it possesses exceptional biodiversity and deep ethnobiological knowledge but is still developing advanced biotechnology platforms. This creates significant opportunities for strategic capacity building and equitable international collaboration. Ethically grounded bioprospecting that integrates traditional medicinal knowledge with AI-powered molecular profiling and bioassay-guided screening can enable the discovery of novel bioactive compounds for biopharmaceuticals, superfoods, and cosmeceuticals, while ensuring biodiversity conservation and fair benefit-sharing. This keynote will highlight existing biotechnology platforms with case studies on biopharmaceutical discovery from medicinal plants, pathogenic parasites, and climate-affected flora, and will outline collaborative pathways to responsibly harness biodiversity for climate resilience, health innovation, and sustainable bioeconomic development.

## Topic: Bush medicine of the Mbabaram Aboriginal community in Far North Queensland demonstrates strong antioxidant and anti-inflammatory activities



Gerald Paul Turpin is a Senior Ethnobotanist at Queensland Herbarium & Biodiversity Science. Gerald is an Mbabaram Traditional Custodian of north Queensland, Australia. Gerry has a BSc/Botany and has recently completed a Master of Philosophy (Medical and Molecular Sciences). Gerald manages the Tropical Indigenous Ethnobotany Centre (TIEC) at the Australian Tropical Herbarium (ATH), James Cook University, Cairns. Gerry's current work as a Senior Ethnobotanist entails travelling to Indigenous communities to engage and foster relationships, and to record and document traditional plant knowledge. Gerry also acts as a bridge between Indigenous Biocultural Knowledge and Western Science to bring researchers and other organisations to partner with traditional owner groups in collaborative research. Gerry is also actively mentoring the next generation of indigenous ethnobotanists through the Tropical Indigenous Ethnobotany Centre at the Australian Tropical Herbarium.

# Topic: Behaviorally Informed Light-Repel System: A Scalable, Non-Invasive Solution for Reducing Human–Elephant Conflict in Sri Lanka.



Thambiliya Godage Supun Lahiru is a Co-opted Member of the Human–Elephant Coexistence Sub-committee of the Wildlife and Nature Protection Society of Sri Lanka (WNPS) recognised as the third-oldest non-governmental organisation of its kind in the world. He has a Bachelor of Business Administration in Agribusiness Management and a Master of Science in Forestry and Environmental Management. He has been actively engaged as a volunteer environmental activist and freelance environmental journalist. His work has received both national and international recognition, including the United Nations Climate Change: Learn Champions of 2020, an honour awarded by the United Nations Institute for Training and Research (UNITAR). His research interests encompass wildlife conservation and management, human–wildlife conflict, and nature-based tourism. He is currently a PhD candidate at the College of Forestry, Guangxi University, China.

## Abstract

Human–elephant conflict (HEC) poses a major ecological and socio-economic challenge across South and Southeast Asia, where expanding agriculture and habitat fragmentation intensify interactions between people and elephants. Sri Lanka represents the global epicentre of HEC, experiencing the highest elephant deaths and second-highest human fatality rates worldwide. Existing mitigation tools—such as electric fences, trenches, and translocations—are maintenance-intensive and prone to failure as elephants habituate. We tested the Light-Repel System (LRS), a novel fence equipped with pulsing LED lights that exploit elephants’ sensitivity to sudden visual stimuli, across nine conflict-prone villages in Sri Lanka. Sixteen LRS-equipped households and matched controls were monitored for ~18 months, complemented by two community surveys evaluating perceived conflict severity and system performance. Using generalised linear mixed-effects models and difference-in-differences analyses, we assessed treatment, time, and environmental effects on elephant incursions. A total of 894 incursions were recorded—97% at control sites and only 3% at LRS properties—indicating a 95% reduction in conflict. Despite higher baseline risk, LRS sites showed near-complete cessation of incursions, while conflicts at control properties quadrupled. Surveys revealed strong community acceptance, with over two-thirds reporting total elimination of crop raids. Surveys revealed strong community acceptance, with over two-thirds reporting total elimination of crop raids. These results provide the first empirical evidence that an autonomous, behaviorally informed light-deterrent can deliver durable and scalable conflict mitigation. The LRS offers a community-supported alternative to conventional methods, highlighting how technology grounded in animal behavior can foster coexistence between conflict parties across dynamic rural landscapes

Key Words : Human–Elephant Conflict, Light-Repel System, Elephant Deterrence.

## Topic: Prey Occupancy and Functional Connectivity in Biological Corridor Seven, Bhutan.



Mr Jigme Thinley is a Senior Forestry Officer with the Department of Forests and Park Services and an M.Sc. candidate in Conservation Biology at the College of Natural Resources (2024–2026), Royal University of Bhutan. He is currently with the Mongar Forest Division (2020–present). His thesis investigates mammal use of Biological Corridor Seven, facing infrastructure and climate challenges, integrating camera traps, sign surveys, environmental DNA (eDNA) and human–wildlife conflict surveys. The current study is a part of his thesis. His interests include wildlife, modelling and connectivity studies.

### Abstract

Biological corridors with a healthy prey base support predator dispersal, yet studies that combine occupancy and connectivity remain limited. This study evaluated six ungulate prey species in Biological Corridor Seven, Bhutan. Thirty-one paired camera traps were deployed on a  $3 \times 3$  km grid from January to July 2025, yielding 5,144 trap days and 822 independent events. A hierarchical Bayesian multi-species occupancy model was fitted in PyMC (v5) to estimate occupancy ( $\psi$ ) and detection probability ( $p$ ) across winter, spring, and summer. Predicted occupancy was mapped onto a  $500 \times 500$  m grid ( $N = 1,689$  cells) and analysed with random-walk connectivity to identify movement routes and pinch points. Generalists showed high and widespread occupancy ( $\psi = 0.933\text{--}0.981$ ), with peak detectability in winter ( $p = 0.185\text{--}0.320$ ). In contrast, specialists were concentrated in narrow upper-elevation areas ( $\psi = 0.639\text{--}0.877$ ), peaking in spring ( $p = 0.085\text{--}0.164$ ). Connectivity analysis isolated seven macro pinch points and numerous conflict segments  $< 500$  m long where linear infrastructure is likely to restrict movement. Priority mitigation includes vegetated overpasses on dry slopes and bridge-style underpasses or culverts at riparian conflicts. A tiger *Panthera tigris* was recorded at two locations, indicating the use of the corridor by large predators. However, further studies on predator occupancy employing telemetry or genetics are recommended. Nonetheless, this integrated occupancy–connectivity framework may serve as a reproducible basis for prioritising mitigation and guiding adaptive corridor management under growing infrastructure development and climate pressure.

Key Words : Biological corridor, climate, connectivity, occupancy, prey, tiger

## Topic: Performance evaluation of functionally modified adsorbents for remediation of aquaculture effluent



Ms. Shamika Shantaram Sawant is a Ph.D. Scholar in the Aquatic Environment and Health Management Division at ICAR–Central Institute of Fisheries Education, Mumbai, India. She holds M.F.Sc. and B.F.Sc. degrees and has published in reputed national and international journals. She is a recipient of a competitive research grant from the Marine Biological Association of India under Dr. E.G. Silas Small Grants Programme. Her awards include the Dr. C.V. Kulkarni International Travel Award and Prof. H.P.C. Shetty Award. She qualified ICAR-SRF (AIR 3), ICAR-JRF, UGC-NET, ASRB-NET, and GATE, and focuses on aquatic biodiversity and climate change.

### Abstract

Globally, the fisheries sector, encompassing both capture fisheries and aquaculture, is looked upon to meet the nutritional demands of the rising human population, as fish is the most affordable source of high quality protein. However, due to the stagnating capture fisheries production, there is a focus on the intensification of the culture systems, which brings along with it the problem of aquaculture effluent and environmental pollution. Hence, there is a need for an efficient wastewater treatment solution. The present study aims to develop a novel wastewater treatment system and evaluate the nutrient removal potential of different functionally modified adsorbents in both batch and column studies in spiked distilled water and real aquaculture wastewater matrices. 1% alginic acid-coated zeolite pellets and 2% KOH-enriched sugarcane bagasse biochar for ammonia and MgCl<sub>2</sub>-coated alumina beads for phosphate and nitrite removal have been found to be effective. Reaction kinetics and isotherm modeling studies have also been conducted to decipher the mechanism of nutrient removal. Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM) results reveal that ion exchange, electrostatic interactions and pore filling might be the primary removal mechanisms. This study identifies potential application for the development of a novel water filtration system for the treatment of aquaculture effluent.

Key Words : Aquaculture wastewater; Nutrient removal; Modified adsorbents; Ammonia and phosphate removal; Adsorption kinetics and isotherms

# Topic: Ecosystem Services Valuation and Payment for Livelihood Sustainability in the Indian Central Himalayan Region.



Dr. Vishwambhar Prasad Sati holds both Doctor of Letters (D.Litt.) and PhD degrees and is currently serving as Senior Professor of Geography and Resource Management and Dean of the School of Earth Sciences and Natural Resources Management at Mizoram University, Central University located in Aizawl. With more than three decades of teaching and research experience, he has made significant contributions to higher education institutions in India and abroad. He has successfully supervised over 15 PhD scholars, published over 170 research papers, authored 40 books, and presented in more than 55 countries. Professor Sati has received numerous national and international awards and fellowships from reputed scientific organisations, including PIFI Fellow, TWAS–CAS Fellow, INSA Visiting Scientist, ICSSR General Fellow, and Visiting Professor.

## Abstract

This article examines the valuation and payment for ecosystem services to support livelihood sustainability in the Indian Central Himalayan Region (ICHR). Data was gathered from both primary and secondary sources on biodiversity resources, tangible (goods) and intangible (services), as the Himalaya is a repository of these resources, also called ecosystem services. The ecosystem services are interlinked with the highlands (providers) and the lowlands (beneficiaries), providing livelihoods to the large populations. Water resources are abundant, as about 42% of the national water need is met by the Ganga River and its tributaries, which originate and flow through the region. The hydroelectricity generating capacity is about 30000 MW. The environmental sustainability index is high due to the clean and pollution-free environment. Agro-biodiversity is substantially high and therefore, several crop races/cultivars grow here, although arable land is only 18%. However, the people of the highlands are unable to use these biodiversity resources optimally because of the rugged terrain, remoteness, and adverse conditions. As a result, the people of the highlands are poor, facing acute malnutrition and food scarcity problems. Valuation of both tangible and intangible ecosystem services can be done, and payment can be made. Taxes can be levied on the intangible resources mainly used by the downstream people, and green bonuses can be paid to the upstream people.

## Key Words

Ecosystem services, Livelihood sustainability; ICHR, Valuation and payment

# SPEAKERS

## DAY-01

### Technical Session III: Livestock, One Health.

# Topic: A One Health Approach to Food Safety, Conservation, and Agriculture



Dr. Souza earned a bachelor's degree from the University of Maryland and completed her veterinary degree at North Carolina State University. Following graduation, she practised in a small animal and exotic pet private practice before joining the University of Tennessee, where she completed a residency in Avian and Zoological Medicine along with a Master of Public Health. Since 2008, Dr. Souza has served as an assistant professor with a focus on public health, including overseeing the veterinary concentration of the MPH program and serving on numerous public health-related committees. In 2022, Dr. Souza moved into the role of Associate Dean for Outreach and Global Engagement. In this role, she has developed international collaborations and study abroad programs, organised continuing education for veterinarians and veterinary technicians, and oversaw Human Animal Bond in Tennessee (HABIT) and Veterinary Social Work (VSW), both outreach programs of the college.

## Abstract

Similar to Bhutan, hunting wildlife is illegal in Uganda. However, hunting, sale, and consumption of wildlife (bushmeat) occur regularly. Misrepresentation of bushmeat species at market has also been reported. This project combined social science with molecular techniques to explore the attitudes and practices of individuals surrounding Murchison Falls National Park and determined which species were sold at market. We also determined what portion of purchased bushmeat was misidentified at market; misidentification can lead to an unrecognised increased risk of foodborne illness. Following surveys of male hunters and female cooks, we determined that: both cooks and hunters considered chicken to be the most delicious meat; both groups were aware that numerous zoonoses could be contracted from bushmeat and identified bats and primates as the highest risk species; approximately  $\frac{1}{4}$  of cooks took precautions to prevent foodborne illness while essentially no hunters took precautions; and cooks believed bushmeat was sometimes to never misrepresented while hunters said it was usually misrepresented. Many wildlife and domestic species were sold at market as bushmeat with 29% of the samples sold as the incorrect species based on genetic sequencing. Bacterial sequencing of swabs from the surface of bushmeat samples showed *Escherichia*, *Enterobacter*, *Clostridium* and others that could potentially cause foodborne illness in consumers. By combining social science and molecular tools, we have information to address illegal hunting that can lead to foodborne illness and loss of protected species and inform steps to provide agricultural assistance to develop poultry farming to provide a preferred protein source.

Keywords: bushmeat, food safety, conservation, social science, zoonoses

## Topic: Transboundary challenges of animal rabies control: Indo-Bhutan perspectives



Dr. Jyoti Buragohain Dutta is a Professor at the College of Veterinary Science, Assam Veterinary & Fishery University. She is actively involved in teaching, diagnosis, control, and prevention of infectious diseases affecting animals and birds, including domestic and wildlife species, with a strong emphasis on the One Health approach. Her current professional work focuses on the diagnosis of rabies in animals, along with strategies for its control and prevention

### Abstract

Rabies is a neglected, fatal viral zoonosis, primarily transmitted by dogs, with wildlife canidae also acting as reservoirs, leading to approximately 60,000 human deaths globally each year. Livestock mortality due to rabies is manifold higher in the South Asia region, with significant impacts on both the economy and public health. Although rabies is vaccine-preventable, its persistence in domestic animals in the north-eastern region of India presents a myriad of challenges to achieving the Zero by 2030 goal set by the World Health Organisation (WHO), with important transboundary implications in the Indo-Bhutan context. The geographic terrain of the Indo-Bhutan international border facilitates the movement of humans and animals, including wildlife. India bears a high burden of dog-mediated rabies, posing a potential risk of transboundary spillover into Bhutan, with which it shares an international border of approximately 700 km across the Indian states of Arunachal Pradesh, Assam, Sikkim, and West Bengal. Laboratory surveillance of animal rabies in Assam, Sikkim, and West Bengal during 2025 to 2026 showed that dogs accounted for the highest proportion of cases (39%) among domestic animals. The Integrated Disease Surveillance Portal recorded 36 human rabies deaths in Assam during 2021 to 2025, while West Bengal reported one case in 2025; no human cases were reported from Sikkim and Arunachal Pradesh during this period. The high density of unvaccinated, free-roaming dogs in border townships on the Indian side represents a major red flag for Bhutan. To achieve the WHO goal of freedom from dog-mediated human rabies by 2030, India has initiated the National Action Plan for Rabies Elimination (NAPRE) and State Action Plans for Rabies Elimination (SAPRE), which emphasise multisectoral cooperation and coordination under a One Health approach. Towards this shared goal, a robust Indo-Bhutan One Health mechanism is imperative for achieving freedom from dog-mediated rabies and supporting the economic growth of both nations.

### Keywords:

Dogs, One Health, Rabies, Transboundary

# Topic: The Decline of Indigenous Siri Cattle of Bhutan – Implications for Sustainable Agriculture and Climate Resilience



Dr. Rinchen Tshering is a veterinarian at the District Veterinary Hospital in Punakha under the Department of Livestock, Ministry of Agriculture and Livestock. His work is centred at the critical intersection of animal health, national food security, and public health, with a specific focus on managing emerging infectious diseases and building resilient food systems. Looking forward, he is eager to explore the application of genomics and molecular biology as transformative tools to advance animal welfare, enhance public health outcomes, and secure the future of sustainable agriculture.

## Abstract

The population of Nublang and Thrabum, Bhutan's indigenous Siri cattle (*Bos indicus*), has experienced sharp decline over the last two decades. While several studies quantify this trend and evaluate conservation efforts, there remains a significant research gap concerning how this loss of the native breed threatens sustainable agriculture and climate resilience. Utilising secondary data from national livestock censuses, this study analyses population trends over nearly two decades (2006–2024). The study further reviews regional and global literature on how indigenous breeds provide resilience against climate change and emerging infectious diseases that would threaten livestock production. The findings confirm a sharp population decline, dropping by more than 60% since the early 2000s, which poses a severe threat to animal genetic diversity and food security. Indigenous breeds are vital to mountain ecosystems; they possess evolved morphological and physiological traits, such as higher sweating capacity and lower metabolic rates, allowing them to thrive under low-input regimes, flourish on local grasses, and resist emerging diseases. Furthermore, these cattle are fundamental to a circular bioeconomy. They effectively convert non-edible biomass into high-value food and organic manure, the latter of which is essential for maintaining soil health and reducing reliance on costly synthetic fertilisers. The study concludes that the application of advanced genomic tools, including genome-wide association studies (GWAS) and next-generation sequencing (NGS), is essential to identify molecular biomarkers for heat tolerance and disease resistance, ensuring the long-term viability of these climate-resilient resources.

## Keywords:

Climate resilience, Indigenous cattle, Nublang and Thrabum, Sustainable agriculture, Genetic diversity

# Topic: Antimicrobial Use in Bhutan's Veterinary Services: A Baseline Analysis from the Veterinary Information System in Paro District



Dr. Tenzin Wangchuk is a veterinary surgeon with over 13 years of practical field experience in clinical veterinary services. He currently serves at the National Veterinary Hospital, Thimphu, where his work focuses on small animal surgery, orthopaedic procedures, anaesthesia, emergency case management, diagnostic imaging, and animal welfare. He holds a master's degree in veterinary surgery and Radiology, with specialisation in orthopaedic and soft-tissue surgery as well as clinical radiological interpretation. Dr. Wangchuk played a key role in achieving 100% sterilization and vaccination of free-roaming dogs in Bhutan. He is a Fleming Fund Professional Fellow, actively engaged in national antimicrobial use (AMU) and antimicrobial resistance (AMR) surveillance and strategy development.

## Abstract

Antimicrobial resistance (AMR) is a growing global public health concern, driven partly by antimicrobial use in both human and animal health sectors. Although Bhutan reports one of the lowest levels of antimicrobial consumption globally, the detection of resistant bacterial strains in livestock and food products highlights the need for systematic monitoring of antimicrobial use. This study provides the first baseline analysis of antimicrobial use in Bhutan's veterinary services using routine data from the Veterinary Information System (VIS) in Paro District. Antimicrobial use data were extracted from all individual clinical consultations recorded between January and December 2024, excluding mass treatment records due to the lack of animal-level dosing information. Antimicrobial use prevalence was calculated as the proportion of consultations involving antimicrobial prescriptions, with descriptive analyses conducted by species, antimicrobial class, route of administration, and dosing frequency. Both weight-based indicators (mg/kg biomass) and dose-based indicators, including Treatment Incidence calculated using Defined Daily Doses for animals, were applied. Of 7,647 veterinary consultations recorded, 1,722 (22.5%) involved antimicrobial use. Companion animals accounted for most prescriptions, with cats and dogs contributing the largest share, while food-producing animals such as cattle showed comparatively low antimicrobial use. Third-generation cephalosporins and fluoroquinolones were frequently prescribed in small animals. Overall, antimicrobial use was low by international standards, but the prominence of critically important antimicrobials and higher use in companion animals underscores the importance of antimicrobial stewardship, strengthened VIS data capture, and a One Health approach to mitigate AMR.

Keywords: Antimicrobial use, Antimicrobial stewardship, One Health, Veterinary Information System

# Plenary Session I: Biotechnology for Bhutan's Future: Innovation, Regulation and Pathways for Development.

## *Exploring Innovation, Capacity, and Responsible Adoption*

Globally, advances in genome editing, microbial technologies, and bio-based innovations are transforming agriculture, healthcare, and environmental management. For Bhutan, responsible adoption of biotechnology offers an opportunity to accelerate sustainable development, enhance food and nutritional security, improve conservation outcomes, and generate economic value. However, realising this potential requires identifying where to start and aligning capacity with national priorities.

The country's current biotechnology ecosystem is nascent. Colleges and government research institutions have capacity in the form of laboratories, personnel, and partnerships, but gaps remain in high-throughput infrastructure, regulatory oversight, and translational pathways to industry and markets. The panel will discuss how Bhutan can strategically build on these foundations to create tangible innovation outcomes in the future.

A central question is where biotechnology initiatives should be anchored. Should innovation primarily begin within academic institutions, leveraging research and student talent, or should government agencies take the lead in programs linked to national priorities? How can colleges, universities, and government institutions collaborate to ensure research is not in silos, but translated into applications in agriculture, health, and environmental conservation? What economic opportunities could arise from Bhutan's unique biological resources?

The panel will also examine the regulatory and governance landscape. What biosafety frameworks are required to allow innovation while protecting public health and biodiversity? How can policy, monitoring, and compliance systems be strengthened to support safe scaling of biotechnology applications?

This session will bring together experts in genome editing, agricultural and medical biotechnology, and conservation science.

## Moderator

Nima P Yangchen, Associate Researcher (Biotechnology), Royal Society for STEM, His Majesty's Secretariat. Nima is a graduate in Biotechnology from the University of Manchester with primary interests in biotechnology for medicine, molecular research, and advancing accessible healthcare for all. She is particularly passionate about how biotechnology and molecular science can contribute to the discovery of new therapeutics and improve healthcare equity and has been involved in research exploring Bhutanese medicinal plants and fungi, focusing on phytochemical profiling and their potential pharmaceutical applications. She aims to strengthen biotechnology research in emerging scientific environments and foster international collaboration to connect local initiatives with global scientific communities.




## Panels


Karma Wangchuk is an Associate Lecturer in the Department of Food Science and Technology at the College of Natural Resources, Royal University of Bhutan. He holds both MSc and BSc degrees in Biotechnology from SRM Institute of Science and Technology, India. His work focuses on microbial and industrial biotechnology, particularly the application of microbiomes, fermentation, and bioprocessing for food systems and sustainable agriculture. His research includes microbial inoculum development, metagenomics-based microbial analysis, and value-added bioproducts from biological resources. He has also contributed to regional biotechnology and nutrition initiatives as Principal Investigator and Co-Principal Investigator for projects on the Asian Food Composition Database funded by AFACI-RDA, South Korea. As a 2023–24 U.S. Fulbright Fellow, he engaged in technology transfer and innovation management, promoting biotechnology-driven solutions for food security and sustainable bioeconomy development.



## Panels

A circular portrait of Dr. Jerald Stuart Feitelson, a man with dark, curly hair, wearing a light blue shirt. The background is a light green circle with a repeating pattern of small white snowflake-like shapes.

Dr. Jerald Stuart Feitelson is CEO and Co-Founder of AgriVita LLC, a California-based agricultural biotechnology company commercialising a novel, patent-pending genome-editing target designed to improve crop shelf life, increase yields, and enhance tolerance to abiotic stress. He previously served as CEO and Co-Founder of Agribody Technologies, Inc., where he partnered with innovative seed and farming companies. He has held senior leadership roles, including Chief Scientific Officer at GCEH and Sustainable Oils; Manager of Business Development, Intellectual Property, and Alliances at Beckman Coulter; Vice President of Technology and Business Development at GenWay Biotech; and Research Director at Akkadix. During his tenure at Mycogen, his research group discovered the majority of the currently known *Bacillus thuringiensis* toxin genes. Earlier in his career, he was a Senior Research Microbiologist at American Cyanamid and served as an Adjunct Professor at Rutgers University. Dr. Feitelson is an inventor on 16 U.S. patents and the author of more than 40 scientific publications. He earned a B.S. in Life Sciences from Massachusetts Institute of Technology, completed his Ph.D. in Genetics at Stanford University School of Medicine under Nobel Laureate Joshua Lederberg, and conducted NIH-funded postdoctoral research at the John Innes Institute in Norwich, focusing on *Streptomyces* molecular genetics. There, he cloned the first gene involved in antibiotic biosynthesis with a known biochemical function.

A circular portrait of Kinley Tenzin, a man with dark hair, wearing a colorful patterned shirt. The background is a light green circle with a repeating pattern of small white snowflake-like shapes.

Kinley Tenzin is a biotechnologist currently working at RSSTEM as a research associate. He graduated from the University of Manchester with a BSc (Hons) in Biotechnology. He is interested in bridging Bhutan's unique biodiversity and traditional knowledge with modern biotechnological applications. He is also passionate about establishing sustainable research frameworks and exploring the economic potential of biotechnology for the country.

# SPEAKERS

DAY-02

Technical Session IV: Sustainable  
Food Systems

## Key Note: Can ecology-based farming, biodiversity preservation and technological management go hand in hand?



Peter Groot Koerkamp is a Professor and Managing Chair holder in the Agricultural Biosystems Engineering Group at Wageningen University & Research (formerly the Farm Technology Group), where he leads a large academic team comprising more than 20 staff members and over 40 PhD candidates. His areas of expertise include agricultural and biosystems engineering, agricultural systems, animal and plant production systems, environmental engineering and technology, and the design of sustainable production systems. He has extensive experience in manure and nutrient management, gaseous emissions from farming systems, design methodologies, and regenerative agriculture. Professor Groot Koerkamp has successfully supervised 21 PhD graduates, manages major scientific research projects, and has served as Chairman of both the Dutch and European associations of agricultural engineers.

# Topic: A Microbiosocial Approach to Food Systems: Contributing to Health and Well-being in GNH and GMC



Jelle J. P. Wouters is an Anthropology Professor and Director of Research and Development at Royal Thimphu College, Bhutan. He holds an MPhil (Distinction) in Anthropology from Oxford University and a PhD from North-Eastern Hill University, Shillong. Before joining Royal Thimphu College in 2015, he taught at Sikkim Central University and was visiting faculty at Eberhard Karls University of Tübingen under the German Research Foundation's Excellence Initiative. He has authored or edited eleven books, including *In the Shadows of Naga Insurgency* (OUP, 2018), *Vernacular Politics in Northeast India* (OUP, 2022), *Subaltern Studies 2.0* (Chicago, 2023), *The Routledge Handbook of Highland Asia* (Routledge, 2023), *Storying Multipolar Climes* (Routledge, 2023), and *Himalayan Climes and Multispecies Encounters* (Routledge, 2024). His research focuses on the affective, spiritual, experiential, terrestrial, and relational dimensions of climate change in Bhutan and the Himalayas, multispecies ethics and justice, and human and more-than-human migration.

## Abstract

Microbes are everywhere and play a central role in sustaining plant, animal, and human life and they circulate across different entities and beings in socio-culturally mediated ways. The human microbiota—collection of viruses, archaea and microbes in and on human beings—is therefore actually more-than-human. It constitutes the most complex and most studied of all human microbiota and aids us to harvest energy and nutrients from the ingested food, shapes our immunological system, and is associated with mental illnesses through the gut-brain axis. Notably, the human gut microbiota is highly responsive to socio-ecological elements, such as socio-culturally patterned interactions with environmental microbiota (of plants, soils and animals), exposures to pollution, hygiene and other lifestyle practices. Food, however, exerts the dominant influence. As food systems shape our food intake and are complex systems emerging from multiple synergies between heterogeneous cultural, social, political, economic, technological, (micro)biological and ecological aspects, I argue in this paper that a microbiosocial approach is required to examine the entanglement of these multiple aspects in food systems and to develop food systems for both human and environmental health and wellbeing. Based on the ongoing EATWELL project and more than 10 months of fieldwork among the Layap community, I elicit how we have operationalized the microbiosocial approach in relation to the study of food systems and show how such approach can contribute to the global One Health, Planetary Health, sustainable-food-systems-for-health agenda as well as contributing to visions spelled out in GNH and GMC.

## Key Words

Food systems, microbiosocial, health, wellbeing, Bhutan

## Topic: Essential micronutrients (trace elements) in foods and their analysis for assessment of dietary intakes, bioavailability and health status.



Dr. Ujang Tinggi is the Acting Chief Chemist of the Inorganic Chemistry Laboratory, Department of Queensland Health, Australia. His research interests are in the field of analytical inorganic chemistry, and his areas of expertise include trace element analysis, elemental speciation, metabolism and bioavailability, nutrition and food quality, chemical toxicology and health risk assessment. He has published widely in these areas. Over the years, Dr Tinggi provides training programs and workshops related to chemical analyses in foods and method development for scientists from Southeast Asia and Pacific countries. His Inorganic Chemistry Laboratory provides analytical services to various national and international agencies for chemical analyses in food, soil, water and biological materials for health risk assessment and compliance with standards and regulations. Dr Tinggi is also actively involved with collaborative research projects at the Griffith University, Australia.

### Abstract

Increasing food trade between countries has significantly contributed to changes of dietary patterns of populations as there are more food choices and varieties for consumption. However, in some countries inadequate intakes of certain foods have caused concerns from micronutrient deficiencies of iron, iodine, zinc and selenium, which are critical for physiological functions in neurodevelopment, immune response, energy production, maintaining enzymatic activity and mitigation of chronic diseases. The deficiency of micronutrients in a population, often referred to as “hidden hunger”, affects 2 billion people in developed and developing countries. In Australia, mild to moderate deficiency in iron and iodine is still present. Food is the main source of micronutrients, and its analysis is important for assessment of dietary intake and nutritional status of a population. The most widely used methods for analysis of trace elements in foods include relatively inexpensive atomic absorption spectrometry (AAS) and more advanced and highly sensitive inductively coupled plasma mass spectrometry (ICP-MS). Monitoring of micronutrient content in foods is important given ongoing changes in agricultural practices and food production. Although there are programs in many parts of the world to improve trace element nutritional status, there are still regions where populations of high-risk groups such as children and women of childbearing age, are still deficient in micronutrients, and this is a global challenge. Innovation in the development of low cost fortified food products and cost-effective biofortification of agricultural crops could be a strategy for sustainable improvement of micronutrient status.

### Key Words

Analysis, deficiency, dietary intake, micronutrients, trace elements,

# Topic: Economic Impact of Climate Control Systems on Oyster Mushroom Production in Bhutan: A Net Present Value Approach



Mr. Thinley Gyeltshen is currently serving as Deputy Chief Agriculture Officer at the Agriculture Research and Development Centre (ARDC), Wengkhar, Mongar, under the Department of Agriculture, Ministry of Agriculture and Livestock, Bhutan. He holds a bachelor's degree in agriculture science from Sam Higginbottom University of Agriculture, Technology and Sciences, India, and a Master's degree in Agricultural Economics from the University of Hohenheim, Germany. His professional work focuses on both research and development of agricultural socio-economic activities, with emphasis on enterprise development, value-chain analysis, and the impacts of climate change on agriculture. He is the lead researcher of the mushroom development program at ARDC Wengkhar. His research interests include economic analysis of agricultural enterprises to support evidence-based decision-making, particularly in response to the growing demand from financial institutions for investment appraisal in loan-supported agribusiness initiatives.

## Abstract

Oyster mushroom cultivation has become a promising agricultural enterprise for smallholder farmers in Bhutan, offering income diversification and employment opportunities. However, production remains highly susceptible to climate variability, particularly fluctuations in temperature and humidity, which affect yield and quality. To address this challenge, Internet of Things (IoT) based climate control systems (CCS) are being introduced to enable year-round production under stable environmental conditions. This study evaluates the economic impact of adopting CCS in oyster mushroom enterprise using a Net Present Value (NPV) framework, based on primary data from a Samsara mushroom farm in Kalapang, Mongar. It compares two scenarios: oyster mushroom production without CCS and with CCS for a 12-year project timeline at 9% discount rate. Key financial indicators, including NPV, Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), and discounted payback period, were calculated and tested under uncertainty using sensitivity and Monte Carlo Simulation. The results show that adoption of the CCS significantly enhances the profitability of the mushroom enterprise, demonstrating strong economic viability with an incremental NPV of Nu 9.68 million, an IRR of 333%, a BCR of 8.1, and a discounted payback period of just two years. Both sensitivity and Monte Carlo simulation results confirm the robustness of these outcomes to moderate variations in market price and the discount rate. However, the enterprise is more sensitive to changes in market price than the other variables. Thus, CCS investment can strengthen the resilience of the mushroom enterprise to climate variability, providing valuable evidence for policymakers and investors promoting climate-smart agriculture.

Keywords: Oyster mushroom, NPV, BCR, Monte Carlo Simulation, Climate Smart Technologies.

# SPEAKERS

DAY-02

## Technical Session V: Environmental Hazards and Adaptation

# Topic: Under the Rainbow - Indigenous Cultural Land Management - Carbon and Nature Repair



Suzanne Thompson is an Aboriginal leader and cultural knowledge holder with 30+ years’ experience across government, community, and industry. Founder and Managing Director of YACHATDAC, she advances Indigenous self-determination, economic empowerment, and nature-based economies. She serves on national committees, represents Australasia at the International Rangelands Congress, is an ATSE Fellow, and leads initiatives in Indigenous land management, carbon farming, First Foods and Medicines, and the Turraburra Research Institute with Queensland University of Technology.

## Abstract

Under the RAINBOW capture propose a transformative framework for climate action grounded in Indigenous governance, cultural values, and holistic land management systems. Drawing from Aboriginal Lore — including the enduring principle of intergenerational responsibility embodied in the “Children’s Fire” — RAINBOW Capture integrates traditional ecological knowledge with contemporary carbon and biodiversity markets. Over the past century, agricultural intensification has significantly depleted soil carbon, degraded waterways, and reduced biodiversity across Australia. While carbon abatement methodologies such as Human-Induced Revegetation (HIR) offer technical pathways for restoration, they often operate within siloed market structures that separate soil, water, biodiversity, and culture. Indigenous land management systems, by contrast, are inherently integrated — uniting cultural fire regimes, canopy regeneration, water restoration, species management, and cultural governance within a single relational framework of responsibility to Country. This paper presents the case study of Yambangku Aboriginal Cultural Heritage and Tourism Development Aboriginal Corporation’s (YACHATDAC) land restoration project at Turraburra (formerly Gracevale Station) under the Queensland Land Restoration Fund. It examines how Indigenous land stewardship principles evolved beyond the initial HIR carbon methodology to establish a broader RAINBOW Capture model — encompassing revegetation of endemic species, traditional mosaic burning, rotational grazing reform, wetland and spring restoration, erosion control, and preservation of cultural landscapes and significant sights. Under the RAINBOW capture represent more than a market instrument; they propose structural reform of carbon and biodiversity frameworks to embed Indigenous governance at their core. By uniting scientific and cultural knowledge systems, this model offers a pathway toward regenerative climate solutions that are environmentally effective, culturally grounded, and accountable to future generations.

# Topic: Hazard Assessment of Chubda GLOF using Scenario-Based Simulation in Chamkhar River Basin



Mr. Sonam Dorji is an Assistant Environment Officer at Water Resources Management Division (WRMD), Department of Water (DoW) under Ministry of Energy and Natural Resources (MoENR). He graduated with BSc. Environment and Climate Studies from College of Natural Resources (CNR) in 2025. He is passionate about Water Resources Management and the use of advanced tools such as GIS and hydraulic modeling software to address real-world hazards. He is also passionate about Water Resources Management and the use of advanced tools such as GIS and hydraulic modeling software to address real-world hazards due to changing climate

## Abstract

Glacial Lake Outburst Floods (GLOFs) are a major natural hazard in the Eastern Himalayas, threatening downstream communities and infrastructure in Bhutan. This study assessed the hazard potential of Chubda Tsho in the Chamkhar River Basin using a scenario-based approach with NWS-BREACH-J for dam breach simulation and HEC-RAS 2D for flood routing. Four breach scenarios (30%, 50%, 80%, and 100% lake volume release) were simulated to capture the variability of hazard dynamics. Results showed peak discharges ranging from 1,234.45 to 1,482.51 m<sup>3</sup>/s, increasing linearly with released volume ( $R^2 = 0.991$ ). Flood arrival times were consistent across scenarios, ranging from 2.38 hrs at the nearest station (Tsampa) to 6.03 hrs at Chamkhar Old Town, indicating that channel geometry (roughness) was the dominant control. Even the partial breach scenario (S\_30) inundated 7.16 km<sup>2</sup> and affected over 20,600 people, while the full breach (S\_100) impacted 7.51 km<sup>2</sup> and 21,889 people, with forests and agricultural lands being the most affected land cover types. The findings highlight that even partial breaches can produce severe downstream impacts, reinforcing the importance of strengthening preparedness measures, integrating hazard-informed land use planning, and incorporating socio-environmental vulnerability into long-term risk management for glacier-fed catchments in Bhutan.

## Keywords:

Dam-breach, hydrodynamic, peak-flow flood arrival, time to peak

# Topic: Environmental Determinants of Urban Air Pollution and Health Outcomes in Bangladesh: A Scoping Review



MD Shiyam Sadik is a Lecturer in the Department of Environmental Science & Management at North South University, Bangladesh. Trained in Economic Development at the Adam Smith Business School, University of Glasgow, and in Economics at the University of Dhaka, his work bridges environmental economics, climate policy, and sustainable development. His research interests include green budgeting, climate diplomacy, blue economy, climate migration, and environmental governance. Shiyam is actively involved in policy research and consultancy. Beyond academia, he is a dedicated educator and mentor, committed to student engagement, youth advocacy, and public outreach on sustainability issues. His work emphasizes translating research into policy-relevant insights and empowering the next generation to address climate and development challenges.

## Abstract

Bangladesh faces rapidly worsening urban air pollution, with severe implications for respiratory, cardiovascular, and overall population health. This scoping review aimed to map existing evidence on environmental determinants of air pollution and their health impacts in Bangladesh. Following the Arksey and O'Malley framework, literature published between 2000 and 2024 was systematically identified through PubMed, Scopus, and Google Scholar. Studies addressing sources, exposure levels, and health effects of particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), nitrogen oxides, and household emissions were included. Findings reveal that unregulated brick kilns, vehicular emissions, biomass burning, and industrial discharges are dominant pollution sources in Dhaka, Chattogram, and Narayanganj. Health outcomes most frequently reported include chronic obstructive pulmonary disease, ischemic heart disease, asthma, and low birth weight. Evidence also highlights socioeconomic and gender disparities in exposure, with low-income populations disproportionately affected. Despite growing literature, major research gaps persist regarding cumulative exposure, rural impacts, and policy implementation effectiveness. This review underscores the urgent need for integrated environmental and public health policy responses, including cleaner energy transitions, stricter emission monitoring, and expansion of epidemiological surveillance systems to mitigate the long-term health burden of air pollution in Bangladesh.

## Keywords:

Air pollution, Environmental health, Public health policy, Scoping review

# Topic: A Comparative Study on the Growth and Reproductive Capacity of Two Exotic Earthworm Species in Three Bhutanese Feedstock Types



Pelsup Sailesh Bhandari is a recent graduate with a Bachelor of Science in Organic Agriculture from the College of Natural Resources and the founder of Yoering-Ma, a social enterprise focused on converting food waste into high-quality organic fertiliser through composting and vermicomposting. The initiative was recognised as the Best Business Idea among 11 colleges of the Royal University of Bhutan and secured investment funding of Nu. 2.6 million (approximately USD 28,000) for implementation. He was recognised as the Academic Topper of his institute in 2025 and received the Best Poster Presenter Award at the 5th Annual Student Research Meet organised by the Centre for Sustainable Mountain Agriculture. As a first-batch Pelsung member, he actively contributed to community and municipal initiatives supporting Gelephu Mindfulness City, gaining experience in sustainable systems, waste management, and environmental solutions.

## Abstract

As the global population continues to grow, managing biodegradable waste through sustainable technologies like vermicomposting is gaining importance. While vermicomposting holds considerable promise, the adaptability and performance of specific exotic earthworm species, particularly in locally available feedstocks in Bhutan, remain underexplored. The study investigated the growth and reproductive capacity of two exotic earthworm species, *Eisenia fetida* and *Eudrilus eugeniae*, in three Bhutanese feedstocks: Cow Manure, Banana Stem + Farm Yard Manure, and Kitchen Scraps + Farm Yard Manure. A factorial design with six treatments and three replicates was used over 10 weeks, monitoring biomass and cocoon production weekly. Results indicated that while *eugeniae* generally showed better growth parameters, *fetida* exhibited comparable reproductive ability. For instance, juvenile *eugeniae* (126.88 mg) achieved higher peak biomass (616 mg) and growth rates (26.3 mg/day) compared to juvenile *fetida* (115.65 mg), which reached only 599 mg with a growth rate of 25.5 mg/day. Feedstock type significantly influenced growth and reproductive performance across species, producing the highest total cocoon production (119.83 cocoons) and hatchling success (83.33%) in kitchen scraps. Significant interactions ( $p < .05$ ) were observed for biomass accumulation and vermicompost quality, with N and OM content depending on both earthworm species and feedstock. *E. fetida* in cow manure produced vermicompost with the highest nitrogen (3.23%) and organic matter content (64.51%), while *eugeniae* in kitchen scraps had the highest P(7.18 ppm) and K(328 ppm). The findings indicate that both species can process local organic wastes effectively; however, feedstock selection is key to maximizing vermicomposting efficiency and quality. Future studies should focus on identifying the optimal combination of various earthworm species and diverse feedstocks across different agroecological regions and seasons. Exploring the potential of vermi-protein for animal feed and investigating traditional medicinal applications are recommended for subsequent research.

# SPEAKERS

## DAY-02

### Technical Session VI: Livelihoods, Rural Innovation & Inclusive Development

# Topic: Assessing the Dual Impact of Artificial Intelligence (AI) on Sustainable Development in Vietnam: Opportunities and Challenges



Dr. Nguyen Thi Phan Thu, Ph.D. is a lecturer at the Faculty of Development Economics, VNU University of Economics and Business (UEB), with nearly a decade of experience in higher education. She has a strong and diverse international academic background, having earned a bachelor's degree in international economics in Beijing in 2012, followed by a master's degree in financial economics Analysis from the University of Greenwich, United Kingdom, in 2014. She completed her Ph.D. in Finance and Banking and specialises in Economic Statistics, Economic Research Methods, and Creative Thinking. In addition to her teaching and research responsibilities, she is actively involved in mentoring student startups and providing consultancy support for business operations. Her primary research interests focus on economic statistics and the application of quantitative and research methodologies to two-sided markets, particularly within the broader context of digital transformation.

## Abstract

Artificial intelligence (AI) is increasingly recognized as a double-edged sword for sustainable development in Asia. This paper provides a structured review of AI's environmental footprint alongside its potential contributions to sustainable innovation in agriculture, resource management, climate adaptation, and biodiversity conservation. First, we synthesize evidence on AI's direct environmental impacts, highlighting rapidly growing energy demand, associated greenhouse-gas emissions, water consumption for data-center cooling, and rising volumes of electronic waste linked to accelerated hardware turnover (OECD, 2023; UNEP, 2024; Wang et al., 2024; Zewe, 2025). We then examine positive use cases where AI improves resource efficiency and resilience: precision and data-driven farming for smallholders that raises yields while reducing inputs (Mazhari, 2023), AI-enabled smart grids and water systems that optimize demand and integrate renewable energy (Correia et al., 2025), impact-based early warning systems that enhance preparedness for floods and storms (Aridati, 2025), and AI-assisted monitoring tools that transform forest protection and wildlife conservation (Kang, 2025). Building on this dual perspective, the paper discusses strategies to maximize net environmental benefits, including green AI design, renewable-powered compute, circular approaches to hardware, and the integration of sustainability criteria into national and regional AI policies (OECD, 2023; UNEP, 2024). We argue that, with proactive governance and region-appropriate innovation, AI can substantially support Asia's sustainable development goals, but deliberate efforts are required to ensure that its overall environmental balance remains positive rather than burdensome

## Keywords:

Asia, Artificial intelligence, sustainable development, environmental impacts

# Topic: Adoption Dynamics of Combine Harvesters and Contribution to Increased Agricultural Productivity in Wetland Areas of Bangladesh



Professor Mohammad Taj Udin is a senior academic and researcher in the field of Agricultural Economics at Bangladesh Agricultural University. He has extensive teaching experience across core areas of economics and agricultural economics and has played a key role in mentoring and supervising PhD, MS, and MBA students. His academic work focuses on agricultural production economics, farm management, and applied economic analysis, contributing to capacity building and evidence-based decision-making in the agricultural sector.

## Abstract

The adoption of combine harvesters (CHs) has become increasingly important in regions with labour shortages and high vulnerability to climatic risks, ensuring timely harvesting and increasing farm income. This study analyses the effects of the adoption of CH on the productivity and profitability of Boro (winter) rice farmers in the wetlands of Bangladesh. A total of 360 farmers (239 adopters and 121 non-adopters) were selected through a multistage random sampling method. To achieve the objectives, t-tests, probit model, profitability analysis and endogenous switching regression (ESR) model were applied. The t-test results revealed that the adopters obtained significantly higher yields and net returns than non-adopters. The probit estimates implied that education, access to credit, training, extension, along with market information and group membership, significantly increased the likelihood of CH adoption, whereas age significantly reduced the likelihood of adoption. The ESR results showed that adopters would have increased yield and net returns by an additional 189.43 kg and \$55.41 per hectare, compared with non-adopters. On the other hand, non-adopters would have increased only 54.18 kg and \$9.21 per hectare, respectively, if they had adopted combine harvesters. The average treatment effect supported the overall gains of 143.95 kg and \$39.88 per hectare, and heterogeneity effects showed that adopters consistently captured greater benefits, whereas non-adopters were confronted by structural and institutional obstacles. In addition, the study recommends expanding credit and subsidies, strengthening training and extension services, and promoting public-private partnerships with affordable loans to improve the adoption level of combine harvesters in the wetland areas of Bangladesh.

## Keywords:

Boro rice , Combined harvester, ESR, Productivity, Profitability and Wetland

# Topic: Harnessing Traditional Wisdom: Exploring the Intersection of Indian Millets, Agriculture, and Intellectual Property Rights



Dr. Sunanda Bharti is a Professor of Law at the Faculty of Law, University of Delhi, India where she has been teaching law for 22 years. She has several published works in Intellectual Property Laws, Jurisprudence around foetal personality and rights, Mediation, contemporary socio-legal issues of relevance and the interface of ethics with all laws. Having been invited to the Oxford Summer School on Animal Ethics twice, first in 2024 and then recently in August 2025, her latest area of interest includes animal law and its interface with intellectual property. Sunanda received the ‘Top 100 Legal Falcons’ Global Award in Dubai LexTalk World Conference in April 2021 for making an impactful contribution through her writings in IP Law. She successfully represented the Faculty of Law, University of Delhi, in an International Project –RISHII (Resources for Internationalisation of Higher Education Institutions in India) funded by the European Commission under the ERASMUS Scheme. Sunanda is also a Certified Professional Mediator from the Indian Institute of Arbitration and Mediation (IIAM) and has done pioneering research work on ‘Legal Personality of Unborn/Foetus’

## Abstract

India is home to a large variety of agrarian crops and has a proportionally larger workforce involved in it. Among other crops, millets have a significant share in the total agricultural production of the country, making India the largest producer in the world. However, agricultural practices in contemporary times, with over-reliance on crops such as rice and wheat, have led to a challenge to soil health, climate change and commercialisation. If India’s contextual traditional knowledge is utilised, and millet production is ably supported by the IP regime, such as trademark and geographical indications, it would turn the tide in favour of expanding millet production and encouraging broader adoption and possibly reducing food security issues. The paper analyses the present profile of Indian Agriculture and the placement of Indian millets in the same. And how the tool of IP can be used to protect these super foods and incentivise the stakeholders engaged in the production of millets. When we talk of stakeholders, it means especially the farmers, the breeders or the practitioners of associated traditional knowledge, and the ones marketing the various millets and millet-based products to some extent. So, the paper touches upon three disciplines--Agriculture, IP Law and Commerce. The write-up is primarily doctrinal in nature, but the author has brought in a flavour of empirical into it, as for the chapter on conclusions and for suggesting the way forward, interviews were conducted with 20 experts. They were administrators, academicians, policy makers and researchers in agriculture.

## Keywords:

Bio-Diversity, Indian Millets, Sustainable Agriculture, Geographical Indications, IP Protection, Traditional Knowledge

# Topic: Organic Rice Cultivation for Environment Regulation in Nagaland, India: A Case Study



Dr. Velan Nirmala served as Professor in the Department of Economics at Pondicherry University for 35 years. She held several academic leadership roles, including Department Chair, Academic Council Member, Court Member, College Inspection Committee Member, DDE Course Coordinator, and Board of Studies Chairperson/Member. She has supervised 16 Ph.D., 39 M.Phil., and 79 M.A. dissertations, presented 135 papers at national and international conferences, and published 84 research papers/chapters and three books. She also completed two ICSSR-funded research projects. During her tenure as Head, she organized 10 conferences, workshops, and symposia, and served on the editorial boards of three Indian journals. Her academic engagements include visits to 23 countries, supported by organizations such as the World Bank and the International Association for Feminist Economists. She is a life member of several national and international professional associations. Most recently, she served as Director of the School of Humanities and Social Sciences at GITAM University, Bengaluru.

## Abstract

India is the largest rice producer in the world during 2024–25, accounting for 150 million metric tons of milled rice (28%). Most of the agricultural lands currently under cultivation in India are reported to suffer from indiscriminate use of irrigation, pesticides and chemical fertilizers. The environmental degradation resulting from commercial agricultural practices has caused serious concerns among consumers, scientists and conservationists. Thoughtful deliberations in seminars and policy conferences on the issue have stressed on organic farming and ecological agriculture as an alternative. Organic farming using natural manure, pesticides and seeds are found to increase nutrient efficiency, crop quality, human health and reduction of environmental risks (Dhekane 2025). Consequently, organic cultivation has gained increased attention in recent years. Studies have analyzed cultivation practices, production, determinants and benefits of organic rice cultivation. In this context, the paper attempts to study organic rice cultivation costs and returns, productivity and gender attitudes on environmental issues in Nagaland, India. Since female land owners by tradition are very few in the country, the paper also examines gender dimensions of organic rice cultivation in Nagaland. The study is based on primary data collected from a sample of 118 farmers (40 females and 78 males) cultivating Naga Special organic rice variety in Suhoi and Kuhuboto villages of Dhimapur District in Nagaland, during November-December 2019. Simple averages, ratios, percentages, multiple regressions and Garret Ranking Technique have been used for the analysis.

## Keywords:

Cost–return analysis; Environmental awareness; Gender in farming; Nagaland; Organic rice

# Topic: Aggregator Network as Drivers of Agricultural Marketing: A Process Innovation in Bhutan



Sangay Thinley is the Chief Economic Development and Marketing Officer with the Department of Agricultural Marketing and Cooperatives (DAMC) of the Ministry of Agriculture and Livestock, Bhutan. He holds a Master's degree in International Development with a specialisation in Rural Development from Nagoya University, Japan. With extensive experience in local economic development, agricultural marketing, and Gross National Happiness (GNH)-based policy research, he has played a key role in advancing community-based agri-business and tourism initiatives in Bhutan. He is the founder and initiator of several rural and eco-tourism ventures in Chhukha District, and is recognised for introducing the process innovation of “Aggregator Networks” for Agricultural Marketing Aggregator Network to strengthen farmer–market linkages. His professional interests include community-based tourism, community-based organisations (CBOs), agri-marketing innovation, agri-tourism, rural entrepreneurship, and developing international market linkages for Bhutanese agricultural products.

## Abstract

Farming in Bhutan is mostly small-scale and scattered, which makes it difficult for individual farmers to produce enough volume to meet market demand or offer buyers the option to purchase in bulk at competitive prices. In addition, many farmers grow crops without fully understanding market requirements, leading to seasonal gluts of produce. To address these challenges, the Department of Agricultural Marketing and Cooperatives (DAMC) has introduced Aggregator Networks (AGNs) to aggregate scattered production and promote market-led agricultural practices. Currently, AGNs have been established in Chhukha and Samtse, with formal recognition through cooperative registration certificates issued by DAMC. This paper outlines the rationale behind AGNs and clarifies the role of an aggregator in Bhutan's agricultural marketing system. An aggregator is a village-based entrepreneur who resides within the community and works to support local farmers. Aggregators serve as the first point of contact for market prices, production guidance, and government initiatives, while collaborating closely with local agricultural extension staff. They receive training in agricultural marketing and have access to price and market information through social media and messaging platforms managed by DAMC. The paper also explores how AGNs are transforming agricultural marketing in Bhutan, even though they are currently formalized in only two southern districts. Efforts are underway to expand AGNs to other Dzongkhags, including those bordering the Gelephu Mindfulness City, to prepare for future agricultural supply demands.

## Keywords:

Agricultural marketing; Aggregator Networks (AGN); Bhutan agriculture; Cooperative development; Market-led farming

## Topic: Connecting sustainability with spirituality for reimagining new food systems



Dr. Mohit Sharma, Assistant Professor at Dr. Rajendra Prasad Central Agricultural University (RPCAU), Bihar has about 8 years of experience for post graduate (MBA programmes) teaching in central universities and has also experience of about 2 years in banking institution working under retail agriculture domain prior to his research journey. Dr. Sharma had research engagement with National Bee Board, NABARD, DBT sponsored projects and presently his research interests are on agribusiness models for GI, agritourism, & business models for FPOs. He has wide range of academic publication in various national and international journals indexed in Scopus, ABDC etc. He has also contributed in the skill development sector by developing skilling content on various job roles under Agriculture Skill Council of India (ASCI). During 2025, he was also invited by Royal Government of Bhutan for capacity building of Economic Development and Marketing Officers on agribusiness models, agritourism among others.

### Abstract

The study highlights that integrating Buddhist principles of mindfulness, right livelihood, and ecological harmony into India's agriculture could strengthen sustainability and community connection with farming. India has expanded organic and natural farming through initiatives like Bhartiya Prakritik Krishi Padhati and the Namami Gange project, and holds a significant share of global organic cultivation. However, challenges such as certification costs and competitiveness remain. Drawing on experiences from Thailand and Buddhist practices elsewhere, present study suggests that principles like mindfulness and respect for nature encourage farmers to adopt organic cultivation and deepen their connection with the environment. Buddhist monks in some regions have modelled organic farming both for self-use and demonstration, underscoring a spiritual as well as practical link between Buddhist ethics and environmental conservation. The study proposes establishing model farms in the Buddhist circuit of Uttar Pradesh and Bihar in India that combine local indigenous knowledge with Buddhist philosophy. These could serve as examples for sustainable agriculture, improve India's environmental performance, conserve cultural heritage, and strengthen food systems that align with both local needs and global sustainability goals.

Keywords: Sustainability, spirituality, agriculture, certification, organic farming, right livelihood

# Plenary Session II: Making Agrifood Profitable in Bhutan: Markets, Institutions and Youth at the Centre.

## *Can Bhutan Build a Competitive Agrifood Economy? The Institutional and Market Reforms Required.*

Bhutan's agrifood sector stands at a decisive moment in its development trajectory. Under the 13th Five-Year Plan, guided by the national vision of building a "Developed Bhutan: A Healthy, Prosperous and Secure Bhutan," agriculture is no longer viewed solely as a subsistence safety net but as a driver of economic transformation. The Agrifood Sector Strategy 2034 further sharpens this ambition, envisioning a commercially vibrant, export-oriented, technology-enabled, and youth-driven agrifood economy. With the sector currently contributing 14.67% of GDP while employing 43.5% of the national workforce, the productivity–prosperity gap is evident. The strategy sets bold targets for increasing agrifood GDP to Nu. 100 billion and trebling export value to Nu. 9 billion by 2034. These commitments raise a timely discussion. How can Bhutan realistically build a competitive agrifood economy, and what reforms are required to make that ambition credible?

If export value is to triple within the next decade, which commodities will drive growth, and are markets already validated? Should Bhutan focus on premium niche positioning or scale within regional markets? Are standards, certification systems, traceability mechanisms, and laboratory capacities sufficiently aligned with the aspirations? Institutional reform is equally central to this transformation. What roles should public agencies play in a market-led agrifood economy? Can coordination across ministries, financial institutions, cooperatives, and local governments be strengthened to reduce fragmentation? What roles can universities and researchers play? If commercialisation is to proceed alongside smallholder inclusion, how can productivity be raised without deepening inequality?

Youth empowerment lies at the heart of the sector's future. With agriculture often perceived as unattractive to young people, what models can help young people become machinery service providers, processors, digital platform operators, logistics managers, and exporters? Are land access, finance, mentorship, and regulatory frameworks conducive to youth-led enterprises?

This panel session will bring together policymakers, private sector actors, and youth representatives to identify actionable reforms and priority interventions that can turn Bhutan's agrifood ambitions into a competitive, inclusive, and resilient reality

### Moderator

Chhimi Dorji is an experienced horticulturist and development professional with over three decades of leadership in agricultural training, rural development, and value chain facilitation in Bhutan and the region. He has served in senior roles across government, international development organisations, and consultancy assignments, specialising in project management, market systems (M4P), community mobilisation, and curriculum development. Chhimi has led numerous evaluations, capacity-building programs, and value chain studies for agencies including the World Bank, SDC, HELVETAS, and the Bhutan Foundation. He is widely recognised for strengthening rural livelihoods through practical, inclusive, and sustainable agriculture interventions.



### Panels

Mahesh Ghimiray is a senior Lecturer, Department of Agriculture at the College of Natural Resources, Royal Government of Bhutan, Punakha. He holds a BSc Agriculture degree from GB Pant University of Agriculture and Technology, India, an MPhil in Plant Breeding and Biodiversity from the University of Reading and Birmingham, UK and a Doctorate (honoris causa) in Agriculture Research from the Thames International University, France. Specialised in crop breeding and variety improvement, he helped to develop several new varieties of rice, maize and wheat while posted in the Agriculture Research and Development Centre at Wangdue under the Department of Agriculture. After formally joining CNR, he teaches plant breeding, seed production, agronomy, climate resilient agriculture, nutrient management and organic agriculture.



## Panels



Dr. Tayan Raj Gurung is an experienced advisor with a strong track record in the research sector. He brings extensive expertise in sustainable development, policy analysis, research and development, and organisational management. With well-developed analytical skills and a strategic approach to problem-solving, he has contributed to evidence-based planning and regional development initiatives. Dr. Gurung holds a Doctor of Philosophy (PhD) in Human Geography and Regional Economics, reflecting his deep academic grounding and commitment to advancing research-driven solutions for sustainable growth.



Mr. Sangay Thinley is the Chief Economic Development and Marketing Officer with the Department of Agricultural Marketing and Cooperatives (DAMC) of the Ministry of Agriculture and Livestock, Bhutan. He holds a master's degree in international development with a specialisation in Rural Development from Nagoya University, Japan. With extensive experience in local economic development, agricultural marketing, and Gross National Happiness (GNH)-based policy research, he has played a key role in advancing community-based agri-business and tourism initiatives in Bhutan. He is the founder and initiator of several rural and eco-tourism ventures in Chhukha District and is recognised for introducing the process innovation of “Aggregator Networks” for Agricultural Marketing. Aggregator Network to strengthen farmer–market linkages. His professional interests include community-based tourism, community-based organisations (CBOs), agri-marketing innovation, agri-tourism, rural entrepreneurship, and developing international market linkages for Bhutanese agricultural products.

## Panels



Pelsup Sailesh Bhandari is a recent graduate with a Bachelor of Science in Organic Agriculture from the College of Natural Resources and the founder of Yoering-Ma, a social enterprise focused on converting food waste into high-quality organic fertiliser through composting and vermicomposting. The initiative was recognised as the Best Business Idea among 11 colleges of the Royal University of Bhutan and secured investment funding of Nu. 2.6 million (approximately USD 28,000) for implementation. He was recognised as the Academic Topper of his institute in 2025 and received the Best Poster Presenter Award at the 5th Annual Student Research Meet organised by the Centre for Sustainable Mountain Agriculture. As a first-batch Pelsung member, he actively contributed to community and municipal initiatives supporting Gelephu Mindfulness City, gaining experience in sustainable systems, waste management, and environmental solutions. Through his entrepreneurial and professional efforts, he aims to promote sustainable agriculture, reduce landfill waste, and enhance access to organic fertilisers for farmers across Bhutan.

## Q&A session Moderators



Technical session 1: Mr. Mahesh Ghimiray, Senior lecturer, Specialist, Department of Agriculture, CNR, Royal University of Bhutan



Technical session 2: Dr. Om Katel, lecturer, Department of Environment and Climate Studies, College of Natural Resources, Royal University of Bhutan



Technical Session 3: Dr. Penjor, Associate professor, Department of Animal Science, College of Natural Resources, Royal University of Bhutan.



Dr. Sonam Tashi, Associate Professor, Dean of Research and Industrial Linkages, College of Natural Resources, Royal University of Bhutan.



Technical session 5: Dr. Ugyen Thinley, Assistant professor, Department of Environment and Climate Studies, College of Natural Resources, Royal University of Bhutan.



Technical session 6: Dr. Rekha Chettri, Assistant Professor, Department of Sustainable Development, College of Natural Resources, Royal University of Bhutan.

## Master of Ceremonies



Mr. Chimi Yoezer is a faculty member in the Department of Food Science and Technology at the College of Natural Resources, Royal University of Bhutan. He has a strong academic and professional foundation in food science and technology and is actively involved in projects related to food innovation, food safety, and sustainable food systems.



Ms. Tenzin Choden is a final-year student pursuing Bachelor's degree in Environment and Climate Studies at the College of Natural Resources. She is passionate about environmental sustainability and actively volunteers with youth-led initiatives, including WWF Bhutan Chapters, Youth for Environment, Y-PEER, Red Cross, and Disabilities2030, contributing to sustainability and social engagement efforts.

**DAY-03**

**One-Day Cultural Excursion for  
International Delegates**



**Group A: Early Departure**

# Site 3: Chimi Lhakhang



Drukpa Kunley (1455–1570) was an enlightened Buddhist master who embodied the true spirit of the Vajrayana tradition, often described as “Crazy Wisdom” a profound form of insight that transcends conventional religious norms. Affectionately known to devotees as the “Divine Madman,” he was renowned for his unconventional approach to teaching. His symbolic use of the phallus as a “flaming thunderbolt” represented the shock and discomfort society experiences when confronted with spiritual truth. Among his most legendary and sacred deeds was the subjugation of numerous demons and demonesses believed to be tormenting the Bhutanese people. Most notably, he subdued the feared demoness of Dochula and buried her at the site where Chimi Lhakhang was later built in the late fifteenth century by his cousin, Ngawang Chogyal. Through his enlightened actions, Drukpa Kunley is believed to have liberated countless beings from cycles of negative karma. Even today, devotees from across the world visit Chimi Lhakhang to seek blessings, particularly for the health, protection, and well-being of their children. Located about 10 kilometres from Punakha, Chimi Lhakhang is reached by a scenic 20-minute walk through rice fields from the village of Sopsokha, with prayer flags lining the path, making the journey as spiritually enriching as the destination itself.

# Site 1: Punakha Dzong



Punakha Dzong, also known as Pungthang Dewa Chhenbi Phodrang meaning “The Palace of Great Happiness or Bliss,” is the administrative centre of Punakha District in western Bhutan. Built in 1637–1638 by Zhabdrung Ngawang Namgyal, it is the second oldest and third-largest dzong in the country and stands as one of Bhutan’s most majestic architectural achievements. Strategically located at the confluence of the Pho Chhu (Male River) and Mo Chhu (Female River) in the fertile Punakha Valley, the dzong benefits from a warm and healthy climate, making Punakha winter residence of the Central Monk Body. According to legend, its design originated from a visionary dream of the architect Zowe Balep, who, guided by the spiritual powers of the Zhabdrung, envisioned a palace for Guru Rinpoche after sleeping near a small structure known as Dzong Chug (“small dzong”), which once stood on the site. Built directly from this dream without written plans, the dzong was completed within a year, coinciding with the period when Ngawang Namgyal unified Bhutan as a single nation. Today, the grandeur of Punakha Dzong is further enhanced in spring when jacaranda trees bloom with soft mauve flowers, adding natural beauty to its deep historical, political, and spiritual significance.

## Site 2: Chimi Lhakhang



Drukpa Kunley (1455–1570) was an enlightened Buddhist master who embodied the true spirit of the Vajrayana tradition, often described as “Crazy Wisdom” a profound form of insight that transcends conventional religious norms. Affectionately known to devotees as the “Divine Madman,” he was renowned for his unconventional approach to teaching. His symbolic use of the phallus as a “flaming thunderbolt” represented the shock and discomfort society experiences when confronted with spiritual truth. Among his most legendary and sacred deeds was the subjugation of numerous demons and demonesses believed to be tormenting the Bhutanese people. Most notably, he subdued the feared demoness of Dochula and buried her at the site where Chimi Lhakhang was later built in the late fifteenth century by his cousin, Ngawang Chogyal. Through his enlightened actions, Drukpa Kunley is believed to have liberated countless beings from cycles of negative karma. Even today, devotees from across the world visit Chimi Lhakhang to seek blessings, particularly for the health, protection, and well-being of their children. Located about 10 kilometres from Punakha, Chimi Lhakhang is reached by a scenic 20-minute walk through rice fields from the village of Sopsokha, with prayer flags lining the path, making the journey as spiritually enriching as the destination itself.

A high-angle, panoramic view of a lush green valley. A wide, light-colored river flows through the center, winding between terraced rice fields. The fields are a mix of vibrant green and golden yellow, indicating different stages of growth. In the background, rolling green mountains rise under a bright blue sky with scattered white clouds. The overall scene is peaceful and scenic, typical of a rural mountain region.

DAY-03

One-Day Cultural Excursion for  
International Delegates

Group B: Full-Day Stay in Punakha

# Site 1: Punakha Dzong



Punakha Dzong, also known as Pungthang Dewa Chhenbi Phodrang meaning “The Palace of Great Happiness or Bliss” is the administrative centre of Punakha District in western Bhutan. Built in 1637–1638 by Zhabdrung Ngawang Namgyal, it is the second oldest and third-largest dzong in the country and stands as one of Bhutan’s most majestic architectural achievements. Strategically located at the confluence of the Pho Chhu (Male River) and Mo Chhu (Female River) in the fertile Punakha Valley, the dzong benefits from a warm and healthy climate, making Punakha winter residence of the Central Monk Body. According to legend, its design originated from a visionary dream of the architect Zowe Balep, who, guided by the spiritual powers of the Zhabdrung, envisioned a palace for Guru Rinpoche after sleeping near a small structure known as Dzong Chug (“small dzong”), which once stood on the site. Built directly from this dream without written plans, the dzong was completed within a year, coinciding with the period when Ngawang Namgyal unified Bhutan as a single nation. Today, the grandeur of Punakha Dzong is further enhanced in spring when jacaranda trees bloom with soft mauve flowers, adding natural beauty to its deep historical, political, and spiritual significance.

## Site 2: Khamsum Yulley Namgyal Chorten (Hike)



Khamsum Yulley Namgyal Chorten is a striking spiritual monument set amid lush green valleys, dense forests, and the serene flow of the Mo Chhu River in Punakha, making it a must-visit site for both locals and visitors seeking peace and reflection. Commissioned by Queen mother Ashi Tshering Yangdon Wangchuck and completed in 2004, the chorten was built to promote peace, harmony, and protection for the kingdom. Its name carries deep spiritual meaning: Khamsum refers to the three realms of existence—desire, form, and formlessness; Yulley signifies the land of the deity; and Namgyal symbolises victory and triumph. The journey to the chorten begins from Yebesa Village near the riverbank, followed by a scenic uphill walk—through rice fields and pine forests, offering sweeping views of the Punakha Valley, while an alternative road allows closer access for those unable to hike. Architecturally, the chorten follows the traditional stupa form with three levels and a rooftop, richly decorated with symbolic paintings and designs intended to subdue negative forces and foster universal peace, and it functions as a spiritual monument rather than a monastic residence. From the rooftop, visitors are rewarded with panoramic views of the valley, making it a popular place for meditation and photography, while a nearby Bodhi tree and the surrounding landscape of forests, fields, and the winding river further enhance the chorten's serene and majestic presence.

# CONFERENCE ESSENTIALS

BOOKMARK  
AND SAVE



112  
113

## Venue for the Conference



**Multi-purpose Hall**  
College of Natural  
Resources, Royal  
University of Bhutan  
Lobesa, Punakha, 14001

College of Natural Resources,  
Punakha is 3 hours drive from  
Paro International airport and  
routes via Thimphu, the capital  
city of BHUTAN.

## Networking Dinner

RKPO Green resort  
Lobesa, Punakha.



# Accomodation



## **Namsayphodrang Resort**

Jangmagang, Wangdue

Phodrang,

Bhutan

[info@namsayphodrang.com](mailto:info@namsayphodrang.com)

<https://namsayphodrang.com/>

## **Hotel Vara**

Metsina, Lobesa, Punakha

[hotelvarabhutan@gmail.com](mailto:hotelvarabhutan@gmail.com)

<https://varabhutan.com/>



## Airport pick up info

When you exit the airport door, look for a person holding this sign



Trouble finding?

Contact organisers in  
whatsapp at  
**+97577855692**

and

**+97517361328**

## Health and Safety



Identity document



Device



Prescribed Medicine

We suggest bringing your prescribed medicine if you are having any health related issues

## Outfits



March in Bhutan brings pleasant, warming spring weather with clear skies, making it an ideal time for travel. Punakha is the warmest of the three, with pleasant temperatures of 20°C–25°C (68°F–77°F). Thimphu and Paro are cooler due to higher altitude, with daytime highs around 14°C–20°C (57°F–68°F) and chilly nights at 5°C–10°C (41°F–50°F)

## Personal Expenses

We advise you to bring sufficient Bhutanese Ngultrum (BTN) for personal expenses, as most local vendors prefer cash payments. Currency exchange facilities are available at Paro International Airport upon arrival

## Contact Us



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