



GGGS 2026

15th GoGreen Summit

 25th-26th September, 2026

 Bangkok, Thailand

“

Life Sciences and
Innovation for
Planetary Health and
Sustainable Futures

Organized by



IFERP Life Sciences-
Formerly BioLeagues



15th GoGreen Summit (15th GGS-2026), Bangkok, Thailand

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ISBN 978-93-92106-87-3

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Conference Theme

Life Sciences and Innovation for Planetary Health and Sustainable Futures



Preface

We are delighted to extend a warm welcome to all participants attending 15th GoGreen Summit (15th GSS-2026) organized by IFERP Life Sciences-Formerly BioLeagues on September 25th-26th, 2026 at Bangkok, Thailand. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in the fields of green innovation, sustainable practices and climate resilience. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for 15th GoGreen Summit 2026 contain the most up-to-date, comprehensive, and globally relevant knowledge in the fields of green innovation, sustainable practices and climate resilience. All submitted papers were subject to rigorous peerreviewing by 2-4 expert referees, and the papers included in these proceedings have been selected for their quality and relevance to the conference. We are confident that these proceedings will not only provide readers with a broad overview of the latest research results in green innovation, sustainable practices and climate resilience but also serve as a valuable summary and reference for further research in this field.

We are grateful for the support of many universities and research institutes, whose contributions were vital to the success of this conference. We extend our sincerest gratitude and highest respect to the many professors who played an important role in the review process, providing valuable feedback and suggestions to authors to improve their work. We also extend our appreciation to the external reviewers for providing additional support in the review process and to the authors for contributing their research results to the 15th GoGreen Summit 2026.

We express our gratitude to the keynote and individual speakers and all participating authors for their dedication and hard work. We also sincerely appreciate the efforts of the technical program committee and all reviewers, whose contributions made this conference possible. Finally, we extend our thanks to all the referees for their constructive comments on all papers, and we express our deepest gratitude to the organizing committee for their tireless work in making this conference a reality.

About 15th GGS 2026

The 15th Go Green Summit (15th GGS 2026) will be held in Bangkok, Thailand, bringing together leading voices in life sciences, sustainability and innovation. With the theme “Life Sciences and Innovation for Planetary Health and Sustainable Futures”, the summit emphasizes the critical role of biological research, healthcare innovation and environmental stewardship in shaping a greener, healthier world.

This prestigious international gathering serves as a platform for scientists, researchers, policymakers, industry leaders and educators to share knowledge, present cutting-edge discoveries and explore collaborative solutions to global challenges. The summit highlights how life sciences can drive sustainable development, protect biodiversity and improve human well-being while addressing climate change and ecological resilience.

Purpose & Vision

- To integrate life sciences with sustainability goals, advancing research that supports planetary health.
- To foster interdisciplinary collaboration across biology, medicine, environment and technology.
- To align scientific innovation with the United Nations Sustainable Development Goals (SDGs).
- To empower communities and industries with eco-conscious practices and health-focused solutions.

About IFERP Life Sciences

IFERP Life Science is a globally recognized professional association meant for research, innovation and development in the field of life sciences and medical sciences. It serves to propel and fuel all innovative works of research with immense potential in the fields of Healthcare, Life Sciences, Pharmaceutical Sciences, Medical Sciences, Food & Nutrition, Environmental Science, Oncology, Cardiology, Nursing, Microbiology, Physiotherapy, Dentistry and many more. IFERP Life Science has been directly responsible for a significant amount of the revolutionary developments that have taken place in these fields over the past few decades.

IFERP Life Science is a specialized platform that supports life science and medical professionals in advancing their careers and research impact. Our tailored solutions include international conferences, Faculty Development Programs, Webinars, author services, membership and scientific communications, designed to foster collaboration and knowledge-sharing within the global medical community.

Our Mission

- Promote global research, innovation and development in life science, medical science, environmental science, pharmaceutical science and health care, to attain sustainable development goals (SDG's) for universal benefit.
- Advance Life Science & Medical Science for societal service.
- To facilitate knowledge exchange and growth through our professional activities and scientific conferences.

Our Vision

- An inclusive global scientific community promotes excellence in life science and medical events, author services, membership, informed decisions, and actions worldwide.

Director's Message, IFERP

On behalf of IFERP & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers.

The goal of the 15th GoGreen Summit (15th GGS) is to provide knowledge enrichment and innovative technical exchange between international researchers or scholars and practitioners from the academia and industries in various fields of green innovation, sustainable practices and climate resilience.

This conference creates solutions in different ways and to share innovative ideas in the fields of green innovation, sustainable practices and climate resilience. 15th GoGreen Summit (15th GGS) provides a world class stage to the Researchers, Professionals, Scientists, Academicians, and students to engage in very challenging conversations, assess the current body of research and determine knowledge and capability gaps.

15th GGS will explore the new horizons of innovations from distinguished researchers, scientists and eminent authors in academia and industry working for the advancements in green innovation, sustainable practices and climate resilience from all over the world.

15th GGS hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in various fields of green innovation, sustainable practices and climate resilience.



Mr. Siddh Kumar Chhajer

Founder & Managing Director
IFERP, Technoarete Group,
India

CEO's Message, IFERP

IFERP is hosting the 15th GoGreen Summit (15th GGS) this year in month of September. The main objective of 15th GGS is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points, and experience enormous growth and development as a professional.

There will be no shortage of continuous networking opportunities and informational sessions. The sessions serve as an excellent opportunity to soak up information from widely respected experts. Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader.

I express my hearty gratitude to all my Colleagues, Staffs, Professors, Reviewers and Members of organizing committee for their hearty and dedicated support to make this conference successful.

I am also thankful to all our delegates for their pain staking effort to make this conference successful.



About Guest of Honour

Dr. Wijarn Simachaya is President of the Thailand Environment Institute (TEI), Secretary-General of the Thailand Business Council for Sustainable Development (TBCSD), President of PPP Plastics Association, and President of the Thai Sustainable Consumption and Production Network. He works with government agencies, businesses, civil society, and local communities to advance environmental management and sustainable development in Thailand.

He serves on several national committees, including those on the Bio-Circular-Green (BCG) Economy, Circular Economy, Coastal and Marine Resources, and National Water Resources. He is Chairman of the Thailand Greenhouse Gas Management Organization (since 2020) and Chairman of the National Energy Technology Center. He also chaired the Bio-based Economy Development Office from 2020 to 2023.

During more than three decades in public service, Dr. Simachaya held key leadership positions, including Director-General of the Pollution Control Department, Secretary-General of the Office of Natural Resources and Environmental Policy and Planning, and Permanent Secretary of the Ministry of Natural Resources and Environment until his retirement in 2019. He also served as Director of the Environment Division of the Mekong River Commission Secretariat in Lao PDR.

He has played an important role in shaping Thailand's environmental and climate policies and represented the country in United Nations, ASEAN, and regional environmental initiatives. Notable contributions include the ASEAN Haze-Free Roadmap and the Bangkok Declaration on Combating Marine Plastic Debris. In 2020, he was recognized as "Thailand Climate Leader 2019" by Climate Scorecard and has authored more than 50 technical publications on environmental management, sustainability, and pollution control.

Dr. Simachaya holds degrees in Chemical Education, Law, Environmental Science, and a Ph.D. in Environmental Engineering from the University of Guelph, Canada. He has also received honorary doctoral degrees from seven leading universities in Thailand.



**Dr. Wijarn
Simachaya**

President

Thailand Environment Institute,
Thailand

About Invited Keynote Speaker

Dr. Pahurat has been a dedicated public health professional at Thailand's Ministry of Public Health since 2001, specializing in infectious disease control and crisis risk communication.

She holds a Ph.D. in Medical and Public Health Social Sciences and has led numerous initiatives addressing emerging infectious diseases such as COVID-19, SARS, MERS, and Zika.

Currently, she serves as the Director of the Secretariat Office of the Royal Development Projects Committee, focusing on disease prevention and health programs for vulnerable populations, including rural communities and prison inmates. Her work emphasizes health communication, emergency response, and health literacy.



**Dr. Pahurat Kongmuang
Taisuwan**

Director

Secretariat Office of the Royal
Development Projects Committee
Department of Disease Control
Ministry of Public Health, Thailand

About Keynote Speaker

Dr. Sandhya Babel is a distinguished full professor at the School of Biochemical Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, Thailand.

She also serves as Adjunct Professor at Ton Duc Thang University, Ho Chi Minh city, Vietnam and Dr D. Y Patil Vidyapeeth (Biotechnology and Bioinformatics Institute), Pune, India. Her main research interests include microplastics pollution and uptake by biota, microbial fuel cells, adsorption, photocatalysis, waste valorization, waste to energy, phytoremediation, LCA and membrane technology.

She has published over 180 scholarly articles in reputed international journals, four edited books and several book chapters. Her h-index is 41 with a total citation of over 12,100 based on Scopus database as of August 2026. She has been listed in the top 2% scientists in the world by Stanford University and Elsevier BV for 5 consecutive years in the field of Environmental Sciences for whole career and single year.

She has received distinguished alumni award from AIT and several other awards from Thammasat university for her research contribution including outstanding researcher award in Science and Technology (2025) by Thammasat university, Thailand.

Recently, she also received Distinguished Scientist award at the 2nd International conference on Advances in Chemical and Materials Sciences (ACMS2026) held at Kolkata, India from April 12-14, 2026.



**Dr. Sandhya
Babel**

Professor

Thammasat University,
Thailand

About Keynote Speaker

Dr. Goutam Brahmachari, M.Sc (1st Class 1st), Ph.D., D.Sc., FRSC, FAScT, is a distinguished professor of organic chemistry at Visva-Bharati (a Central University), Santiniketan, West Bengal, India. He is an acclaimed researcher, a prolific author, and an editor. His group made significant contributions to the development of effective, practical synthetic methods for carbon-carbon and carbon-heteroatom bond formation in the construction of medicinally important organic scaffolds, including functionalized heterocycles, using C-H functionalization, cascade, and cross-coupling approaches, with a focus on green and sustainable chemistry. Prof. Brahmachari also made outstanding contributions to natural product chemistry by unearthing the chemical profiles of several traditionally used Indian medicinal plants, studying their chemistry and biology, and thus presenting novel phytochemicals of interest.

With about three decades of experience in teaching and research, he has authored over 300 scientific publications, including original research papers, review articles, books, and invited book chapters in the fields of synthetic organic chemistry and natural products chemistry. He has already authored/edited 30 books from the leading scientific publishers. He has supervised 20 Ph.D. fellows so far. He is the Founding Series Editor of the Elsevier Book Series 'Natural Product Drug Discovery'.

Prof. Brahmachari is an Elected Fellow of the Royal Society of Chemistry (FRSC) and West Bengal Academy of Science & Technology (FAScT), and a recipient of the Acharya P. C. Ray Memorial Lecture Award-2025 from the Indian Science News Association (ISNA), Kolkata, Dr. Satyajit Chakrabarti Memorial Award-2025 (global contribution to chemical science) from IEM, Kolkata, CRSI (Chemical Research Society of India) Bronze Medal-2021 (contributions to research in chemistry), Dr. Basudev Banerjee Memorial Award-2021 (Contribution in chemical sciences) from the Indian Chemical Society, INSA (Indian National Science Academy) Teachers Award-2019, Dr.



**Dr. Goutam
Brahmachari**

Professor

Visva-Bharati (A Central University),
India

Kalam Best Teaching Faculty Award-2017, and Academic Brilliance Award-2015 (Excellence in Research).

Prof. Brahmachari was featured in the World Ranking of the Top 2% Scientists (Organic Chemistry Category) in 2020-2025 (both in whole career and single years), in the AD Scientific World Ranking of Scientists-2022-2025, as the ScholarGPS Highly Ranked Scholar-2022-2024 (Lifetime, securing a position in the top 0.05% of all scholars worldwide). Current Citations: 8035; h-index: 47; i10-index: 151 (as of 05.05.2026).

About Keynote Speaker

Dr. Enas Taha Sayed is an Associate Professor at Minia University, Egypt, and an Adjunct Professor at Heriot-Watt University Dubai, UAE.

She specializes in sustainable energy, bioelectrochemical systems, and fuel cells, with over 20 years of teaching and research experience. She earned her PhD from Gunma University, Japan, focusing on microbial fuel cells using Baker's yeast as a catalyst.

Her research focuses on microbial fuel cells, direct urea fuel cells, hydrogen production, wastewater treatment, and AI-driven optimization of renewable energy systems. Dr. Sayed has published more than 224 scientific publications with over 24,000 citations and an h-index exceeding 84.

She has secured research funding exceeding USD 750,000 and holds a US patent related to bioelectrochemical devices. She has been recognized among Stanford University's World's Top 2% Scientists since 2021 and was named a Clarivate Highly Cited Researcher in 2023.



**Dr. Enas Taha
Sayed**

Associate Professor

Minia University,
Egypt

About Keynote Speaker

Professor Mohammad Ali Abdelkareem is a distinguished global researcher and academic leader in Sustainable Energy. He specializes in Fuel Cells, Green Hydrogen production, and Advanced Electrochemical Energy Storage.

As a testament to his significant international impact, he has been designated a Highly Cited Researcher (Clarivate 2023) and consistently ranked among Stanford University's Top 2% of Scientists worldwide since 2019. He is also ranked 111th globally in the Energy field. Professor Abdelkareem earned his PhD from Gunma University, Japan, where he pioneered novel fuel cell designs.

His current, highly applied research focuses on developing innovative standalone electrodes for fuel cells, supercapacitors, and redox flow batteries, as well as the AI-driven optimization of integrated energy systems. He has secured over \$3 million in research funding and holds five granted US patents in energy technologies.

His academic and research leadership has been recognized with the prestigious 2024 Khalifa Award for Education (Distinguished University Professor) and the 2025 Abdul Hameed Shoman Arab Researchers Award for Alternative and Renewable Energy Storage Technologies.



**Dr. Mohammad Ali
Abdelkareem**

Associate Professor

University of Sharjah,
United Arab Emirates

About Session Speaker

Dr. Ayten Shukurova, a distinguished Assistant Professor at the Department of Pharmacognosy, Azerbaijan Medical University. She earned her PhD in Pharmacy in 2023.

She have authored over 50 scientific publications and three books, and she hold a Eurasian patent. Her expertise is supported by extensive research conducted in Turkey and participation in prestigious grant projects.

As a recipient of the “Türkiye Bursları” research scholarship, She actively serve as a thesis supervisor for international students and as a member of various dissertation councils.



**Dr. Ayten
Shukurova**

Assistant Professor

Azerbaijan Medical University,
Azerbaijan

About Session Speaker

Umair Riaz, PhD, is working as an Assistant Professor (BS-19) in the Department of Soil & Environmental Sciences at MNS University of Agriculture Multan, Pakistan.

Dr. Riaz also served as a Scientific Officer (Lab)/BS-17 for six years in the Soil and Water Testing Laboratory for Research, Bahawalpur, under Punjab Government, specializing in waste management, potentially toxic elements determination in sewage sludge and waste, phytochemistry, and phytoremediation.

Dr. Riaz's research interests are related to the development of new fertilizer technology based on Nanochemistry with an emphasis on plant nutrition and management of sewage sludge & solid waste management in peri-urban areas. He has supervised graduate & postgraduate students of environmental sciences for the past several years. He is the author of more than 40 research papers and book chapters, and he has presented and participated in numerous state, national, and international conferences, seminars, workshops, and symposia.

Dr. Riaz has worked as a Research Associate in Higher Education Commission (HEC) funded projects regarding field studies. Dr. Riaz also serves as a Technical Assessor for ISO 17025 Laboratory accreditation standard with the Pakistan National Accreditation Council (PNAC), Islamabad. Dr. Riaz is also a certified trainer for ISO 9001, ISO 17025, and 14001.

He has received many awards, appreciation, and recognition for his services to the science of soil, water, pesticide, and fertilizer testing analysis. He has also served as an editorial board member and reviewer of international journals.



**Dr. Umair
Riaz**

Assistant Professor

MNS-University of Agriculture,
Pakistan

About Session Speaker

Zarinah Arshat received a B.Sc. (Human Development), M.Sc. (Family Ecology), and Ph.D. (Family Ecology) from Universiti Putra Malaysia.

She is currently an Associate Professor in the Department of Human Development and Family Studies, Faculty of Human Ecology, Universiti Putra Malaysia.

Zarinah's work has principally focused on the field of family and child studies, particularly focusing on the strengths and the stressors that are available in the various types of families, such as commuter families, divorce families, and low-income families.

She also analyzed how these strengths and stressors may influence the development of each family member, especially in children.



**Dr. Zarinah
Arshat**

Associate Professor

Universiti Putra Malaysia,
Malaysia

About Session Speaker

Dr. Jatinder Kaur, Ph.D., is an Associate Professor with over 12 years of teaching and research experience in Image Processing, Machine Learning, Deep Learning, and Nanotechnology.

She has authored 20+ SCI-indexed papers in reputed international journals and guided several M.Tech theses and B.Tech projects. Recipient of AICTE VAANI grants in consecutive years, she has been honored with numerous awards, including Best Teacher and multiple appreciation recognitions from AICTE and the Ministry of Education's Innovation Cell.

Actively involved in conferences as a session chair, organizer, and technical committee member, Dr. Kaur continues to advance academic excellence through research, innovation, and mentorship.



**Dr. Jatinder
Kaur**

Associate Professor
Gokul Global University
India

About Session Speaker

Dr. Kareem Aldali is an Assistant Professor of Sustainable Architecture, an AI researcher, and a LEED Green Associate with over 14 years of academic and research experience.

He currently serves as the Program Coordinator for the Sustainable Architecture Engineering Program at Horus University in Egypt.

His academic research focuses on integrating machine learning and artificial intelligence with climate-responsive systems to optimize building performance and energy efficiency in hot and warm regions.

Through his academic and professional endeavors, he maintains an active cross-regional presence, collaborating with institutions across both Egypt and Saudi Arabia.



**Dr. Kareem
M. Aldali**

Assistant Professor
Horus University,
Egypt

About Panel Discussion

Empowering Communities for a Sustainable Future:

The Role of Education, Inclusive Leadership and Innovation in Driving Global Transformation



Dr. Pattamawadee Sankheangaew

Senior Lecturer & Researcher

Buddhaphanya Sridvaravadi
Buddhist College,
Mahachulalongkornrajavidyalaya
University, Thailand



Dr. Supapan Permpool

Assistant Professor

Expert Committee of
ASEAN Studies Center,
Mahachulalongkornrajavidyalaya
University, Thailand



Dr. Thosporn Sangsawang

Assistant Professor

Head, Center of Innovation
Learning and Technology, Faculty of
Technical Education, Rajamangala
University of Technology
Thanyaburi, Thailand

About Conference Convenor

Dr.G.P.Ramesh is a distinguished academician, visionary technologist and ambitious researcher with over 26 years of multifaceted experience spanning higher education, advanced research and industry leadership.

His career reflects a seamless integration of academic excellence and technological innovation, positioning him as a transformative force in engineering education and applied research.

A dynamic leader and passionate educator, Dr.G.P.Ramesh has served as Professor and Head of Electronics and Communication Engineering at prestigious institutions across India and abroad.

He has mentored undergraduate, postgraduate and doctoral scholars, successfully guiding Twenty-Two Ph.D. candidates and nurturing a culture of inquiry and excellence. His academic expertise encompasses artificial intelligence, machine learning, embedded systems, VLSI design and antenna technologies.

With more than 125 publications in Scopus-indexed journals, his scholarly influence is evidenced by an H-index of 32 and an i10-index of 70, marking him as a prominent contributor to global research discourse. He has also organized Twelve International and Six National conferences, publishing proceedings with Springer and ensuring global visibility through Scopus and Web of Science.

A pioneer in Outcome-Based Education and a strategic advisor for NAAC, NBA and Autonomous frameworks, Dr.G.P.Ramesh continues to shape future-ready engineers and scalable, tech-driven solutions for India and beyond.



About Committee

Organizing Committee

Conference Chair

Dr. Wijarn Simachaya

President, Thailand Environment Institute, Former
Permanent Secretary of the Ministry of Natural
Resources and Environment (MNRE), Thailand

Conference Co-chair

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Lecturer, Sustainable Environment Research Institute,
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Multi-stressor Blind Spot in Sustainable Workspace Productivity: A Network-Based Evidence Synthesis of Indoor Environmental Quality and Cognitive Performance

Ashik S

Christ University, Bengaluru, India

Dr. Ajai Chandran C K

Christ University, Bengaluru, India

Abstract:

Indoor environmental quality (IEQ) being one of the most critical controlling aspects of cognitive performance of a workspace, is observed to be assessed predominantly through single stressor criteria such as air quality, thermal wellbeing, acoustics and daylighting, negating the basic idea that workplace cognition is shaped by their combined influence. This study meticulously reviews and quantifies the observed multi-stressor empirical gap among the evidence corpus. Using a rigorously screened evidence base of 75 publications, 42 primary empirical investigations were identified linking measured IEQ exposures to cognitive outcomes. This data base was then stratified into various IEQ domains, combinations of various stressors, cognitive results, outcome modality and the research design. Followed by identification and quantification of Single, Dual, Tri and Quad Domain investigations, meanwhile weighted bipartite network maps were deployed to decode IEQ-Cognitive relationships. Underrepresented Combinations and dominant links were identified using Shannon entropy, weighted-degree centrality, network density and Herfindahl-Hirschman concentration indices. Preliminary extraction suggests only 7 of 42 (16.7%) were multi-stressor investigations, stating the domination of individual over multi-stressor combined relationship in the evidence base. The study identifies the hierarchy in stressor-outcome combinations by revealing concentration and fragmentation in the current evidence base, for a holistic integrated perception while introducing an index to guide workplace performance.

A Study of Sustainability Assessment Tools for Data Centers in Thailand

Sitthipong Homkate

Ramkhamhaeng University, Bangkok, Thailand

Abstract:

This study aims to analyze the key factors and performance metrics for sustainable data centers in Thailand and to propose policy integration guidelines that support long-term growth while minimizing impacts on energy consumption and natural resources. Qualitative research methodology was employed through document analysis of databases, government policies, and international standards, including the ISO/IEC 30134 Series and The Green Grid Data Center Metrics Guidelines. The rapid expansion of the data center industry is expected to increase electricity demand in Thailand from 0.6 Gigawatts at present to 5 Gigawatts by 2030. Concurrently, water consumption and greenhouse gas emissions associated with data center operations are projected to rise substantially. To address these challenges, the Thailand Board of Investment (BOI) has established a Power Usage Effectiveness (PUE) requirement of no greater than 1.3 for projects seeking investment incentives. However, no regulatory thresholds have yet been established for other critical sustainability indicators, including Energy Reuse Effectiveness (ERE), Carbon Usage Effectiveness (CUE), and Water Usage Effectiveness (WUE). The study further reveals that effective interagency collaboration, measured through the Policy Integration Index (PII), is a crucial enabler for the successful implementation of sustainable data center policies and practices. The integration of comprehensive sustainability metrics with coordinated policy frameworks can enhance energy efficiency, reduce environmental impacts, and improve resource management. The research concludes that the adoption of multidimensional performance indicators alongside stronger policy integration mechanisms will support Thailand's transition toward sustainable digital infrastructure and strengthen its competitiveness as an ASEAN Digital Hub.

Exploring Socio-Political Factors Influencing Relations Between Nepal's Hydropower Projects and Local Communities

Prabhakar Ghimire

Kathmandu University, Nepal

Sudhamshu Dahal

Kathmandu University, Nepal

Abstract:

Hydropower development is a highly prioritized sector in Nepal. However, several hydropower projects have faced conflicts with local stakeholders, causing project delays and cost overruns.

This study explores socio-political and communicative factors that influence relationships between Nepal's hydropower projects and local stakeholders.

This study is focused on the 1200 MW Budhigandaki Hydropower Project and the 900 MW Arun-3 Hydropower Project in Nepal to assess how communication practices and local socio-political dynamics shape stakeholder relations. This study uses qualitative methods- Focus Group Discussions, semi-structured interviews, and analysis of relevant documents in relation to communication with stakeholders.

Findings suggest that vested political interests, high expectations for local benefits, fair compensation and resettlement, and greater involvement in decision-making processes are identified as key social-political factors. Communicative factors, mainly limited access of local communities to project-related information, a poor level of transparency in environmental and social assessments, and the absence of a permanent mechanism for meaningful dialogues, are found to contribute to generating conflicts and social risks in the projects.

The study concludes that effective strategic communication and meaningful stakeholder engagements will be instrumental in building cordial and sustainable stakeholder relationships.

Index Terms:

Nepal, Hydropower Projects, Socio-Political, Communicative Factors, Stakeholders, Relations

Identification and Evaluation of Green Building and Balinese Traditional Architecture Measurement Principles: A Systematic Literature Review

Ari Setiya Wibawa

Sepuluh Nopember Institute of Technology, Surabaya, Indonesia

Abstract:

This study intends to develop a more contextual sustainability framework for Indonesia by identifying and assessing the measurement principles of Balinese traditional architecture and green building. This study synthesizes information from 39 scholarly articles published between 2015 and 2025 using the Systematic Literature Review approach based on PRISMA criteria. According to the findings, Green Building prioritizes quantifiable technical elements including environmental preservation, water conservation, energy efficiency, and material management. Balinese Traditional Architecture, on the other hand, uses the philosophical principles of Tri Hita Karana, Tri Mandala, Tri Angga, and Sanga Mandala to highlight spiritual, social, and ecological balance. Despite substantial technological advancements, the Green Building system's implementation still ignores local cultural and spiritual aspects. However, although it hasn't yet created quantitative assessment instruments, Balinese traditional architecture naturally embraces sustainability values. A comprehensive sustainability model that strikes a balance between spiritual harmony, cultural identity, and environmental performance is created by combining these two methods. Technically sound, locally informed, and contextually appropriate sustainable architecture is being developed in Indonesia because to this approach.

Biodegradable Films for Sustainable Packaging Applications from Waste Biomass

Sandhya Babel *

School of Bio-Chemical Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, Thailand

Cindy Agriningsih Haruna

School of Bio-Chemical Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, Thailand

Abstract:

Growing concern over accumulation of synthetic plastics, particularly in food packaging, has encouraged the research for materials that are both biodegradable and derived from renewable resources. At the same time, utilization of waste biomass also becomes important to achieve circularity and reduce impacts from waste disposal. In this study, composite films were developed using Microcrystalline cellulose (MCC) from durian rind (DR) and chitosan from shrimp shells (SS). The films were produced via solvent casting. Produced films were tested for mechanical, thermal and biodegradable properties. Both extracted biopolymers showed characteristics suitable for film formation, with MCC acting effectively as reinforcing agent. The resulting films were smooth surface, transparent, and structurally uniform. Among the formulations, MCC-DR-Chit-SS (20:80) demonstrated the best overall performance showing uniform thickness of 0.118 ± 0.007 mm, tensile strength of 13.05 ± 0.81 MPa, elongation at break of $28.85 \pm 1.75\%$, and Young's modulus 40.0 ± 0.33 MPa. Biodegradation tests revealed that all films achieved more than 50% degradation in soil, indicating good biodegradability over 30 days period. SEM images indicated strong compatibility and reinforcement between components. The film also showed larger inhibition zone in antibacterial testing. FTIR results indicated comparable functional groups across all films, while thermal analysis showed degradation beginning around 150°C. Crystallinity index (CrI) depicted by XRD was approximately 77.2%. The prepared biofilm from waste materials has good functional properties and also is structurally favourable. Overall, these findings support the use of biowaste as eco-friendly materials for sustainable packaging applications.

Index Terms:

Biodegradable films, Waste biomass, Valorization, Biopolymer composites, Sustainable packaging

Green Paper: Sustainable Paper Production from Water Hyacinth and Agricultural Waste Through a Circular Economy Approach

Khushali Borad

Grade XII (Science), Heritage Girls School, Udaipur, Rajasthan, India

Dr. Mamta Lodha

HOD, Science Department, Heritage Girls School, Udaipur, Rajasthan, India

Abstract:

Growing concerns over deforestation, climate change, and the environmental impacts of conventional wood-based paper manufacturing have created an urgent need for sustainable alternatives to virgin wood pulp. At the same time, large quantities of agricultural residues and invasive aquatic plants remain underutilized despite their significant resource potential. This review examines the use of water hyacinth (*Eichhornia crassipes*), together with agricultural residues such as rice straw, wheat straw, and sugarcane bagasse, as renewable lignocellulosic feedstocks for green paper production within a circular economy framework. The study critically reviews recent research on the chemical and fiber characteristics of these biomass resources, sustainable pulping technologies, paper manufacturing processes, and biomass valorization strategies. Existing evidence suggests that these non-wood materials contain sufficient cellulose to produce quality paper while simultaneously reducing pressure on forest resources, managing invasive water hyacinth, and utilizing agricultural waste that is often burned or discarded. The review also highlights that combining different biomass sources can improve resource efficiency, reduce environmental pollution, and support cleaner production practices. Although substantial research has been conducted on individual non-wood fibers, studies investigating the integrated use of water hyacinth and agricultural residues from a circular economy perspective remain limited. By identifying these research gaps, this review demonstrates that hybrid biomass-based paper production offers a practical and environmentally responsible pathway toward sustainable papermaking, contributing to resource conservation and supporting the achievement of Sustainable Development Goals (SDGs) 9 (Industry, Innovation and Infrastructure), 12 (Responsible Consumption and Production), 13 (Climate Action), and 15 (Life on Land).

Index Terms:

Water Hyacinth, Agricultural Waste, Green Paper, Circular Economy, Sustainable Paper Production, Biomass Valorization

Development of BioFlex EcoPlast™: A High-Strength Biodegradable Composite Plastic from Banana Peel, Sugarcane Bagasse, Banana Fibre, and Treated Textile Dye Wastewater

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Abstract:

The increasing accumulation of petroleum-based plastic waste, together with the growing generation of agricultural residues and industrial wastewater, has created a need for integrated and sustainable waste valorization strategies. Conventional plastics offer excellent durability and versatility but are highly persistent in the environment, while many existing bioplastics suffer from inadequate mechanical strength, moisture sensitivity, and limited thermal stability. The present study proposes BioFlex EcoPlast™: a High-Strength Biodegradable Composite Plastic from Banana Peel, Sugarcane Bagasse, Banana Fibre, and Treated Textile Dye Wastewater as a conceptual multi-waste material system developed through secondary research and systematic literature synthesis. Published studies were comparatively analyzed to evaluate banana-peel bioplastics, natural-fibre reinforcement, sugarcane-bagasse composites, banana-fibre applications, textile wastewater treatment, wastewater reuse, and circular-economy approaches. The synthesis indicates that banana peel can serve as a biodegradable biomass matrix but generally requires reinforcement to overcome limitations in mechanical performance. Sugarcane bagasse can potentially contribute stiffness and structural stability, while banana fibre provides a cellulose-rich reinforcing phase capable of supporting tensile load transfer. Plasticizer incorporation is considered necessary to improve flexibility and processability, although excessive plasticizer content may reduce strength and increase moisture sensitivity. Textile dye wastewater presents a distinct challenge; therefore, the proposed framework considers only appropriately treated wastewater as a controlled process-resource component, subject to contaminant removal, chemical characterization, toxicity assessment, and safety validation. Based on the reviewed evidence, BioFlex EcoPlast™ integrates these complementary functions within a circular-economy pathway that connects agricultural-residue valorization, industrial wastewater resource recovery, biodegradable composite development, and appropriate end-of-life management. The study identifies a significant research gap in the integrated utilization of banana peel, sugarcane bagasse, banana fibre, and treated textile wastewater within a single biodegradable composite framework. Importantly, BioFlex EcoPlast™ is a literature-derived conceptual model and has not yet been experimentally validated. Future research should therefore focus on formulation optimization, mechanical and thermal characterization, water-resistance testing, biodegradation assessment, wastewater safety, life-cycle assessment, techno-economic analysis, and pilot-scale development. The proposed framework provides a foundation for future experimental investigation into high-performance, waste-derived biodegradable composite plastics.

Index Terms:

BioFlex EcoPlast™; Biodegradable Composites; Banana Peel Bioplastics; Sugarcane Bagasse; Banana Fibre Reinforcement; Textile Wastewater Reuse; Circular Economy; Waste Valorization

Sustainable Utilization of Triple-Industrial Waste for High-Performance Eco-Tiles: A Circular Economy Approach

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Abstract:

The increasing generation of industrial waste due to rapid industrialization, urbanization, and infrastructure development has created significant environmental and resource management challenges worldwide. Simultaneously, the construction industry continues to rely heavily on virgin raw materials, leading to resource depletion and increased carbon emissions. In response to these challenges, the circular economy has emerged as a sustainable approach that promotes the reuse and recycling of industrial by-products as secondary raw materials. This study presents a systematic review of the sustainable utilization of triple-industrial waste for manufacturing high-performance eco-tiles within a circular economy framework. The review focuses on five major industrial waste materials—fly ash, ceramic waste, steel slag, marble dust, and granite powder—and evaluates their potential to replace conventional raw materials in ceramic tile production.

A secondary research methodology based on the Systematic Literature Review (SLR) approach was adopted. Relevant peer-reviewed studies published between 2015 and 2025 were collected from internationally recognized databases, including Scopus, Web of Science, ScienceDirect, SpringerLink, MDPI, Elsevier, and Google Scholar. The selected literature was analyzed using thematic analysis, comparative analysis, content analysis, and critical literature synthesis to examine waste utilization, eco-tile manufacturing processes, mechanical performance, environmental impacts, and circular economy contributions.

The review reveals that industrial waste incorporation significantly enhances the compressive strength, abrasion resistance, durability, and dimensional stability of eco-tiles while reducing water absorption, virgin raw material consumption, landfill disposal, and greenhouse gas emissions. The findings further indicate that triple-industrial waste systems offer greater engineering and environmental benefits than single- or binary-waste approaches because of the complementary physical and chemical properties of different waste materials. However, the review also identifies limited research on standardized mix optimization, long-term durability assessment, life cycle evaluation, and the integrated application of triple-industrial waste in eco-tile manufacturing. The study concludes that the sustainable utilization of multiple industrial wastes represents a promising strategy for developing high-performance eco-tiles, promoting resource efficiency, advancing circular economy principles, and supporting sustainable construction and green infrastructure development.

Index Terms:

Triple-Industrial Waste; Eco-Tiles; Sustainable Construction Materials; Circular Economy; Fly Ash; Ceramic Waste; Steel Slag; Marble Dust; Granite Powder; Industrial Waste Recycling; Mechanical Performance; Environmental Sustainability

