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International Conference on Environment and Climate Action

2026



Organized by
Environmental Sciences Program, Asian University for Women, Chittagong, Bangladesh

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About the Conference

The International Conference on Environment and Climate Action (ICECA) is a flagship initiative organized by the Asian University for Women (AUW) Environmental Sciences Program in collaboration with the Green Bangle Movement. This conference presents a vital platform for students, researchers, practitioners, policymakers and environmental activists to engage with the most pressing environmental challenges of our time through a gender-inclusive and justice-oriented lens.

Under the theme “Commoning Our Futures with Climate Justice”, ICECA 2026, the 2nd conference in the series, seeks to redefine climate action as a collective undertaking rooted in shared responsibility, equity and solidarity. ICECA 2026 recognizes that a sustainable future cannot be achieved in isolation; it must be co-created via inclusive governance, intergenerational dialogue and the active participation of communities, particularly women and marginalized groups.

A significant feature of ICECA is its focus on the Global South, the region bearing the harshest impacts of climate change despite contributing the least to global emissions. By centering perspectives from Bangladesh, South Asia, and beyond, the conference offers the academic and policy community invaluable insights into localized adaptation strategies, Indigenous and traditional ecological knowledge, and community driven resilience. Through its five interconnected pillars, **Just Transition and Motion, Embodied Earth, Roots & Resonance, Futures Regenerated, and Living Waters, Living Lands**, the conference explores the intersections of climate action with finance, health, culture, technology, biodiversity and social justice.

Central to ICECA’s mission is its commitment to intergenerational justice. The conference provides a bridge between seasoned experts and emerging young leaders, particularly women, who represent the future of environmental advocacy and policymaking. By fostering mentorship, dialogue, and collaboration, ICECA nourishes the next generation of changemakers equipped to address the complex, interconnected crises of our time.

We warmly invite scholars, practitioners, activists, and advocates to join us for this transformative gathering, and to contribute our voices to this critical and urgent conversation.

Partners



care



The
Climate
Watch



Conference Theme

1. Roots & Resonance: Culture, Education, and Intergenerational Power

Ecofeminism as praxis: linking patriarchy and ecological destruction
Cultural resilience, language loss, and climate change in Indigenous and coastal communities
Intergenerational transfer of Indigenous and traditional ecological knowledge
Youth-led climate movements in the Global South
Environmental education, campus activism, community outreach, and service learning
Storytelling, oral history, arts, and climate fiction as tools for climate awareness

2. Embodied Earth: Health, Bodily Autonomy, and Care

Climate change and water, sanitation, hygiene, and dignity
Heat exposure, air pollution, and maternal/reproductive health outcomes
Gender-based violence after climate disasters
Food security in climate-vulnerable regions
One Health and the climate-disease nexus
Menstrual health management, waste, taboo, and sustainable period products
Mental health, eco-anxiety, and psycho-social support for the climate-affected
The care economy dimension of climate crises: valuing women's unpaid and unrecognised labour

3. Just Transitions in Motion: Finance, Rights, Mobility, and Peace

Climate finance architectures and (de)coloniality
Microfinance, green loans, and climate entrepreneurship
Philanthropy versus public finance in climate funding
Climate-induced migration, displacement, and trafficking
Resource scarcity and environmental peacebuilding
Indigenous peoples' legal recognition and FPIC in conservation
Legal personhood for nature and the rights of rivers

4. Living Waters, Living Lands: Ecosystems, Biodiversity, and Regenerative Livelihoods

Nature-based Solutions and the Kunming-Montreal Global Biodiversity Framework
Freshwater ecosystem decline, salinity intrusion, and water livelihoods
Wildlife corridors and human-wildlife conflict
Agri-biodiversity, seed sovereignty, and food forests
Job security in offshore renewable energy: labour, safety, and leadership

5. Futures Regenerated: Digital Justice, Circularity, and the Feminist Green Economy

Global Plastics Treaty and informal recycling economies

Fast fashion, repair culture, and second-hand clothing markets

Just energy transition: renewable energy, green hydrogen, clean cooking access

Critical minerals extraction, supply chain justice, and labour rights

Ecopreneurship, eco-tourism, and digital marketplaces in conservation zones

Nanotechnology, biotechnology, and green chemistry for affordable pollution solutions

Decolonising climate data and algorithmic justice

AI, big data, and geospatial tools for community-based climate risk monitoring

Digital environmentalism and new climate communicators

Climate disinformation and online violence against environmental defenders

Organizing Committee

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Message



Founder
Kamal Ahmed

It is my pleasure to extend my warm greetings to all participants of the International Conference on Environment and Climate Action (ICECA 2026), held under the timely theme, "Commoning Our Futures with Climate Justice."

The defining challenges of our time demand empathy, inclusion, and a shared commitment to justice, perhaps more than scientific innovation or policy reform. The burdens of climate change fall disproportionately on those with the fewest resources, particularly women, marginalized communities, and those whose voices have too often been absent from decision-making. A just response to the climate crisis must therefore be one that is inclusive, participatory, and rooted in equity.

At Asian University for Women, we believe that educating and empowering women is one of the most transformative investments society can make. When women are equipped with knowledge, leadership, and opportunity, they become powerful agents of change within their communities and beyond. The pursuit of climate justice is inseparable from the pursuit of gender equality, as resilient and sustainable societies are built through the participation of diverse voices and lived experiences.

May this conference inspire meaningful partnerships, innovative solutions, and courageous leadership that advance a more sustainable, equitable, and compassionate future for all.

I wish ICECA 2026 every success.

Kamal Ahmad

Founder

Asian University for Women

Message



Vice Chancellor
Dr. Sangita Rayamajhi

It gives me great pleasure to welcome you to the International Conference on Environment and Climate Action (ICECA 2026). I extend my warm greetings to the distinguished speakers, researchers, practitioners, students, and guests who have gathered under the theme "Commoning Our Futures with Climate Justice."

Universities occupy a unique position in responding to the environmental challenges of our time. They serve both as centers of learning as well as spaces where critical questions are asked, evidence is generated, and future leaders are prepared. Conferences such as ICECA 2026 remind us that addressing climate change requires an ongoing dialogue between science, policy, innovation, and society.

At the Asian University for Women, we encourage our students to think beyond disciplinary boundaries and to engage with complex global issues through curiosity, collaboration, and a commitment to public service. I hope the exchange of ideas over the course of this conference will spark new research collaborations and strengthen partnerships across institutions and sectors.

I congratulate the Environmental Sciences Program, the organizing committee, faculty mentors, and all collaborators whose dedication has made ICECA 2026 possible. Your efforts demonstrate that meaningful academic engagement extends well beyond the classroom.

I wish every participant a rewarding conference filled with insightful discussions, lasting connections, and renewed commitment to advancing environmental sustainability for generations to come.

Dr. Sangita Rayamajhi
Vice Chancellor
Asian University for Women

Message



Organizing Chair

Dr. Mosae Selvakumar Paulraj

Dear Participants, Honored Guests, and Colleagues,

It is with immense pleasure and a profound sense of urgency that I welcome you all to the 2nd International Conference on Environment and Climate Action (ICECA 2026), proudly hosted by the Environmental Sciences Program at the Asian University for Women (AUW). Building upon the remarkable success and foundation of our inaugural conference last year, ICECA has quickly matured into a refined academic platform and a vital signature effort of our university. We are thrilled to bring together a diverse, global community of students, scientists, faculty, women researchers, activists, NGOs, industry leaders, and policymakers from August 7–8, 2026, at the Sonapahar Farmhouse Resort in Chattogram, Bangladesh.

Our guiding theme for this year, “Commoning our futures with climate Justice,” addresses a critical imperative: resolving the global climate crisis demands deep rootedness in community resilience, gender equity, and a radical imagination. In a world experiencing rapid pollution and unsustainable growth, advanced scientific research must be paired with actionable community adaptation strategies. ICECA 2026 aims to serve as an intersection where local realities meet global perspectives, fostering deep academic dialogue on environmental justice and sustainable development.

Central to our mission at AUW Environmental Sciences program is the cultivation of women-led environmental leadership. ICECA 2026 stands proud as a collaborative, multi-sector initiative. We are profoundly grateful to our co-organizers and sponsors whose shared vision and tireless efforts have made this landmark gathering possible. Bringing together AUW students from many Asian countries alongside local coastal communities, the Green Bangle Movement exemplifies ecofeminism in action through vital mangrove restoration and biodiversity conservation. This critical work is further strengthened by the structural support and strategic collaboration of our community partners and esteemed sponsors. .

No major vision is achieved in isolation, and I firmly believe that every good work becomes great through meaningful networking and collaboration. I extend my profound gratitude to the Organizing Committee, our energetic student teams, sponsors, reviewers, session chairs, and judges whose unwavering dedication brought this event to life. Most importantly, I thank our distinguished keynote speakers, panelists, presenters, and attendees for sharing their bold ideas and advanced research.

We wish you a deeply inspiring, collaborative, and highly successful ICECA 2026 as we join forces to design a greener, more climate-resilient future.

Warm regards,

Mosae Selvakumar Paulraj

Organizing Chair, ICECA 2026

Director, Environmental Sciences Program

Asian University for Women

Co-Chair



Dr. Ahmedul Kabir



Dr. Shanta Dutta



Ms. Nazifa Rafa

It is our distinct honour and privilege to welcome you to the International Conference on Environment and Climate Action (ICECA 2026). On behalf of the organising committee, we extend our warmest greetings to our esteemed keynote speakers, presenters, participants, and guests who have come together to explore the vital theme of “Commoning Our Futures with Climate Justice.”

As Co-Chairs, we are profoundly grateful for the spirit of collaboration that has brought this conference to life towards a shared purpose. The challenges we face are complex and interconnected, and thus require us to build bridges between disciplines, across sectors, and among communities. This conference is a direct response to that call, serving as a dynamic platform for critical dialogue and actionable solutions.

We are particularly inspired by the emphasis on inclusivity and justice at the heart of this year’s theme. We have seen time and again how the climate crisis exacerbates existing inequalities. In our roles, and as part of the Asian University for Women (AUW) community, we are committed to ensuring that the conversations held here amplify the voices of those most impacted and foster solutions that are equitable and empowering.

We extend our deepest gratitude to the tireless organising committee, our dedicated volunteers, and all our partners, whose hard work and vision have created a space where ideas can flourish and such collaborations can take root. To our presenters and participants, we encourage you to take full advantage of the sessions, discussions, and networking opportunities. It is through these exchanges that we can move from theory to meaningful action.

We are confident that the insights and connections forged over the coming days will have a lasting impact, inspiring us all to work towards a more sustainable and just world.

Thank you for being part of this important journey.

Dr Ahmedul Kabir, Dr Shanta Dutta, and Ms Nazifa Rafa

Co-Chairs

ICECA2026

Message

Message

Secretary



Afra Nawar Rahman



Ayesha Shafika Bhuiyan



Ayesha Fairouz Mumu



Anika Mehejabin



Anika Tabassum Shoumi



Denazia Da Silva



Mehenu Marma



Nanggaw Htoi Nan



Faria Arefin Rifat

On behalf of the Organizing Committee, we, the student secretaries, are delighted to welcome you to the International Conference on Environment and Climate Action (ICECA 2026). In its grand appearance, the ICECA represents a stage that strives to build interdisciplinary dialogue to address a problem as complex and urgent as climate change and find solutions that balance development, equity, and justice. Behind the curtains, however, there were collective struggles of a group of still inexperienced students striving to build something they believe in while balancing the challenges of an academic life. Behind every email, every banner, every carefully arranged session, and even this message you now read, there is a group of students working late into nights, in between classes, and on top of academic deadlines. ICECA 2026 is our shared effort to create a space where conversations about climate action are grounded in justice, inclusion, and hope. As students, we may not have all the answers, but we know that meaningful change begins with people willing to come together, listen to one another, and act with purpose.

Organizing ICECA 2026 has been an enriching journey of learning and teamwork. We are grateful to our distinguished speakers, faculty members, partners, volunteers, and every participant whose enthusiasm and commitment have made this conference possible. We hope the conversations, collaborations, and ideas fostered during this conference will extend beyond these sessions, inspiring lasting partnerships and tangible action within our communities and across the globe.

Thank you for being part of ICECA 2026.

Message



Director of Dean of Academic Affairs

Dr. Mohiuddin A. K. Chowdhury

It is my great pleasure to welcome you to the International Conference on Environment and Climate Action (ICECA 2026).

ICECA 2026 brings together academics, researchers, practitioners, policymakers, and students to examine one of the most important issues of our time through diverse disciplinary and cultural perspectives. The conference embodies the spirit of Asian University for Women, a place that encourages questions, welcomes curiosities, and challenges assumptions.

I am particularly pleased that this conference has been envisioned and organized by our very own faculty members, staff, and students of the Environmental Sciences program. Their initiative reflects the intellectual ability, leadership, and collaborative spirit that we strive to nurture at Asian University for Women. May the conversations initiated here inspire new research, meaningful collaboration, and practical solutions that contribute to a more sustainable and just future.

I wish you a productive conference and an enriching exchange of ideas.

Dr. Mohiuddin Ahsanul Kabir Chowdhury

Associate Dean of Academic Affairs

Asian University for Women



Director of Research and Publication

Dr Tuhin Biswas

Distinguished guests, respected researchers, policymakers, and fellow advocates, It is a privilege to address you at the International Conference on Environment and Climate Action (ICECA 2026). Climate change is not only an environmental challenge but also one of the greatest public health issues of our time. Rising temperatures, air pollution, extreme weather events, and changing disease patterns are already affecting the health and well-being of communities across the globe.

As public health professionals, we recognize that protecting human health requires protecting our environment. Clean air, safe water, sustainable food systems, and resilient communities are essential foundations of a healthy society. Our response to climate change must therefore be grounded in science, equity, innovation, and collaboration.

ICECA 2026 provides a valuable platform to share knowledge, strengthen partnerships, and develop practical solutions that address both environmental sustainability and public health resilience. Together, we can promote policies and actions that reduce health risks, support vulnerable populations, and build healthier, more sustainable communities for future generations.

I encourage all participants to engage in meaningful discussions, exchange innovative ideas, and commit to collective action. By working together across disciplines and borders, we can create lasting positive change for both people and the planet.

I extend my sincere appreciation to the organizers, speakers, and participants for their dedication to this important cause. I wish everyone a productive and inspiring conference.

Message

Speakers and Panelists

Nancy Mock

Associate Professor of School of Public Health and Tropical Medicine, Tulane University, USA

Elizabeth Eklund

Environmental Anthropologist, Lecturer, Purdue University, USA

İsmail Bezirganoglu

Associate Professor of Molecular Biology and Genetics, Erzurum Technical University, Erzurum, Türkiye

M.S.A. Muthukumar Nadar

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Associate Professor, Dean of the International College, Maejo University, Thailand

Mohammad Zakir Hossain

Divisional Officer & Project Director, Forest Chemistry Division, Whole tree agarwood induction technique project, Bangladesh Forest Research Institute, Chattogram

M. Zakir Hossain Khan

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Shamsuddin Illius

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Abstracts

Two Deltas, One Commons: Women's Leadership and the Future We Build Together

Nancy Mock, DrPH

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Resilience is not a technical achievement; it is a social one. A commons is not a resource but a relationship — and the question of who governs that relationship is the central question of climate justice. This keynote reads two deltas against each other: the Mississippi River Delta of coastal Louisiana and the Ganges–Brahmaputra Delta of coastal Bangladesh. Both face land loss, salinity intrusion, and intensifying storms; in both, the people holding communities together through displacement and recovery are overwhelmingly women, most of them without formal title or budget.

The talk grounds this observation in a Tulane–AUW bibliometric mapping of the global literature on women's leadership and leadership effectiveness (Scopus, Web of Science, PubMed; 2010–2026; approximately 3,200 de-duplicated records, keyword co-occurrence analysis). Three findings anchor the argument. First, delta science and gender-leadership scholarship occupy almost entirely separate citation clusters, so evidence that women's networks function as load-bearing adaptation infrastructure remains largely invisible to the engineering and finance conversations where adaptation capital is allocated. Second, leadership effectiveness is structurally determined — by convening space, resources, legitimacy, and protection from backlash — and structures are changeable. Third, culture shapes the pathway to leadership rather than its possibility, which is why programs transplanted across contexts fail, and why the failure is too often attributed to the women rather than the design.

The talk closes by proposing the university in a delta under stress as itself a commons — a school without walls whose campus is its region — drawing on AUW's student-led Green Bangle Movement in Sitakunda, and on Ostrom's design principles as method rather than metaphor.

Keywords: women's leadership; delta resilience; climate justice; commons governance; participatory research; higher education

Climate Change And Emerging Infectious Diseases

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Climate change at the height that it is at, is fundamentally altering the epidemiology of infectious diseases globally. Rising temperatures, shifting precipitation patterns, and ecological change are slowly but surely expanding the geographical range and the seasonal transmission window of vector-borne pathogens such as the likes of: Malaria, Dengue fever and Zika virus. Altered environmental conditions facilitate pathogen survival and vector breeding, enabling for disease establishment in previously unaffected regions. Climate-driven habitat loss, forced migration and changes in agricultural and land use practices increases human-wildlife contact accounting for zoonotic spillover. Concurrently warming waters influence water borne and marine pathogen dynamics while simultaneously weakened public health infrastructure and socioeconomic vulnerabilities magnify outbreak impacts. Interaction among climate, biodiversity loss, urbanization and global travel further creates more complex and non-linear pathways that alter disease emergence and complicate its surveillance and control. Addressing these risks require integrated approaches: climate mitigation, ecosystem conservation, strengthened one health surveillance, targetted vector control, resilient health systems and equitable adaptation strategies. Proactive investment in interdisciplinary research and early warning systems can reduce future disease burden and improve preparedness for climate-linked infectious threats.



Drought-Tolerant Endophytic Bacteria from Cactus Enhance Alfalfa Drought Tolerance through Synergistic Interaction with SiO₂ Nanoparticles

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Drought is one of the major environmental constraints limiting agricultural productivity worldwide. This study aimed to isolate and characterize drought-tolerant endophytic plant growth-promoting bacteria (PGPB) from cactus and evaluate their ability, individually and in combination with silicon dioxide (SiO₂) nanoparticles, to improve drought tolerance in alfalfa (*Medicago sativa* L.) under in vitro conditions.

A total of 40 endophytic bacterial isolates were obtained and screened for drought tolerance and plant growth-promoting characteristics, including indole-3-acetic acid (IAA) production, ACC deaminase activity, siderophore production, nitrogen fixation, Gram staining, and pathogenicity. Four promising isolates (A2, AT3, HT1, and H17) were selected for further evaluation. Drought stress was induced using 10% and 20% polyethylene glycol (PEG-6000).

The selected isolates significantly improved plant growth and physiological performance under drought stress. Co-application of the bacterial isolates with SiO₂ nanoparticles further enhanced drought tolerance by decreasing reactive oxygen species (ROS) accumulation, membrane lipid peroxidation, and oxidative damage while increasing catalase (CAT) activity and chlorophyll content compared with untreated stressed plants. Bacterial colonization and SiO₂ nanoparticle accumulation within plant tissues were confirmed by scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM). Molecular identification based on 16S -rRNA gene sequencing verified the taxonomic identity of the selected isolates.

These results indicate that drought-tolerant endophytic bacteria isolated from cactus, particularly when combined with SiO₂ nanoparticles, constitute a promising and sustainable biostimulant approach for improving drought tolerance and enhancing crop resilience under water-limited conditions.

This study was supported by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) under the 1002-A Rapid Support Program (Project No. 122Z810).

Advancing Circular Economy through Sustainable Materials and Green Innovation for Climate-Resilient Communities

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Rice Climate change and environmental degradation have accelerated the need for sustainable technologies that simultaneously support economic development and ecological conservation. The transition from a linear economy toward a circular economy presents unprecedented opportunities to minimize waste, improve resource efficiency, and reduce greenhouse gas emissions. Sustainable materials, green manufacturing processes, and innovative engineering solutions are becoming essential pillars for achieving climate resilience and sustainable development. This presentation explores recent advances in sustainable materials engineering and environmentally friendly technologies that contribute to climate action through resource recovery, waste valorization, renewable materials, and low-carbon production systems. It highlights how interdisciplinary collaboration among material scientists, engineers, policymakers, industry, and communities can accelerate the implementation of circular economy strategies. Case studies demonstrating the transformation of agricultural residues, industrial by-products, and biodegradable materials into value-added products will be discussed to illustrate practical pathways toward reducing environmental impacts while generating economic opportunities. The presentation further examines the role of higher education institutions in promoting research, innovation, and capacity building for sustainable development. Universities serve as important catalysts for developing environmentally responsible technologies, fostering international collaboration, and preparing future leaders capable of addressing complex environmental challenges. By integrating scientific innovation with social responsibility and policy support, sustainable materials and green technologies can contribute significantly to climate justice, environmental protection, and resilient communities. The presentation concludes by outlining future research directions and collaborative opportunities that align engineering innovation with the United Nations Sustainable Development Goals (SDGs), particularly those related to responsible consumption and production, climate action, and sustainable industrial development.

Keywords: Climate Action; Circular Economy; Sustainable Materials; Green Innovation; Climate Justice; Waste Valorization; Resource Efficiency; Sustainable Development.

Digital dreams, parched reality: environmental costs of Bangladesh's data centre expansion

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Bangladesh is promoting data centres as essential infrastructure for artificial intelligence, cloud services, digital sovereignty and economic growth. Yet their environmental footprint remains largely absent from national technology and climate policy. This study assesses the electricity, groundwater and social implications of data-centre expansion, focusing on Kaliakoir Hi-Tech Park in Gazipur. It applies an investigative case-study approach using government and company records, electricity-consumption data, field observations, stakeholder interviews and testimonies from neighbouring communities.

Bangladesh hosts at least 48 public and private data centres, while latent capacity demand is projected to rise from about 200 MW to more than 500 MW by 2030. At Kaliakoir, one proposed Tier-IV facility would require a 20 MW electricity supply and an estimated 21.67 million litres of groundwater daily for cooling. The park's planned expansion could require approximately 120 MW, despite its dependence on groundwater and a national power system dominated by fossil fuels. These pressures are significant because research documents persistent groundwater decline in Dhaka and Gazipur, while global data-centre electricity consumption is rising rapidly with artificial-intelligence deployment. The investigation further identifies limited public disclosure of water consumption, energy efficiency and emissions, inaccessible environmental assessments, and relatively low direct employment compared with the scale of investment and resource use.

The study concludes that Bangladesh's digital strategy requires mandatory environmental reporting, groundwater-use limits, water recycling, renewable-energy procurement, independent impact assessments and meaningful community consultation. Without these safeguards, the pursuit of data sovereignty may intensify carbon emissions, aquifer depletion and unequal access to essential resources.

Nature + Science = Sustainable Future

Climate-Smart Agriculture for Net-Zero Futures: Integrating Carbon Monitoring, Sustainable Bioeconomy, and Nature-Based Solutions

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Agriculture is both a contributor to climate change and one of the sectors most vulnerable to its impacts. Developing climate-smart agricultural systems that simultaneously enhance productivity, reduce greenhouse gas (GHG) emissions, and strengthen environmental resilience has become a global priority for achieving sustainable development and climate justice. The transition toward low-carbon agriculture requires integrating scientific innovation, sustainable resource management, and circular bioeconomy approaches. This presentation examines emerging strategies for mitigating agricultural greenhouse gas emissions through climate-smart farming practices, precision carbon monitoring, and bio-based innovations. Special emphasis is placed on greenhouse gas dynamics in agricultural ecosystems, including methane and carbon dioxide emissions from rice production, and the application of advanced monitoring technologies such as LI-COR systems for accurate field-based carbon assessments. These technologies provide valuable evidence for evaluating mitigation practices and supporting evidence-based environmental policies. The presentation further explores the role of biochar, organic waste valorization, agro-refinery technologies, circular bioeconomy principles, and nature-based solutions in improving soil health, enhancing carbon sequestration, and promoting sustainable agricultural production. Integrating these approaches with digital agriculture and climate policy frameworks offers practical pathways toward achieving resilient food systems while contributing to national and global climate commitments. Finally, the presentation highlights the importance of interdisciplinary collaboration among researchers, universities, governments, industry, and farming communities in accelerating climate action. By linking scientific research with policy implementation and sustainable innovation, climate-smart agriculture can become a powerful driver of environmental sustainability, green economic growth, and climate justice.

Keywords: Methane emissions; Carbon dioxide fluxes; Rice paddies; LI-COR measurements; Mitigation strategies

Sustainable Agarwood Production and Authentication: Insect-Mediated Induction to Quality Assessment

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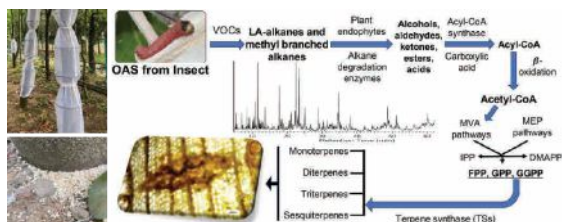
Agarwood, the resinous heartwood of *Aquilaria* species, faces major challenges including overharvesting, slow natural resin formation, optimal inducers for resin formation, and increasing adulteration for higher demands. We developed an integrated research platform that combines biological induction, laboratory insect rearing, resin characterization, and anatomical authentication.

Iron-nailing is a traditional method, whereas *Zeuzera conferta walker* (syn. *Neurozerra conferta*) is a potential natural inducer for agar resin formation. We investigated the controlled inoculation with *N. conferta* larvae that resulted in successful agarwood formation within one year, confirmed by visual inspection, burning tests, microscopy, and GC-MS/MS analysis. Forty-nine terpenoids and key chromones confirmed high-quality agarwood, while oral and aboral secretions (OAS) analysis suggested insect secretions synergize with endophytes to induce resin biosynthesis.

For mass propagation and understanding its lifecycle, an in vitro rearing protocol was developed for year-round larval production with modified diets and gender identifications. However, 20% of the larvae reached adulthood, while the others succumbed to fungal infections caused by *Talaromyces pinophilus*, identified through DNA barcoding.

Quantitative analysis showed significant variation, with chemical induction yielding the highest (3.6%), followed by insect (2.9%), fungal (2.5%), and traditional (2.3%) methods. Most importantly, resin-filled phloem (interxylary phloem) is a promising marker of authentic agarwood and associated ray parenchyma compared to counterfeit samples. This offers a rapid, cost-effective, and field-deployable alternative to chemical and molecular techniques.

Together, these studies establish a tree-to-product-to-verification framework for sustainable, scalable, and climate-resilient agarwood production in Bangladesh by integrating biological induction, insect rearing, resin chemistry, wood anatomy, and authentication.



Keywords: Agarwood; *Neurozerra conferta*; Induction; Interxylary Phloem; Authentication

This research was supported by the project “Development of an Improved Agarwood Inoculation Technique” (Grant No. 224350400).

How Science Shapes Climate Action

Abul Bashar^{1,2}

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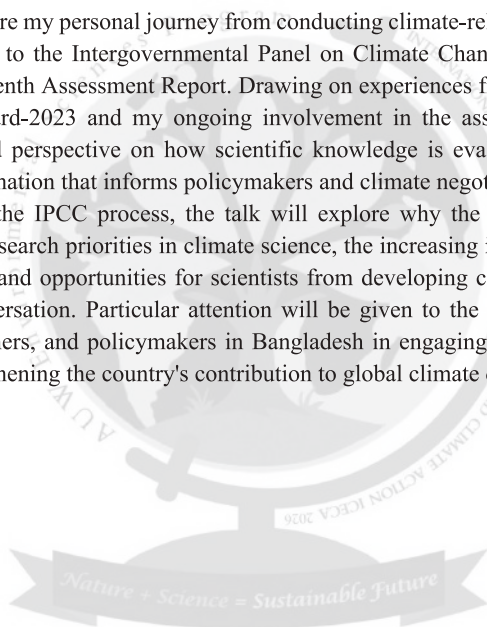
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Climate change is often discussed through global agreements, international negotiations, and ambitious targets. Yet behind every climate decision lies a vast body of scientific evidence generated by researchers around the world. How does this science find its way into global climate action?

In this talk, I will share my personal journey from conducting climate-related research in Bangladesh to contributing to the Intergovernmental Panel on Climate Change (IPCC) as a Chapter Scientist for the Seventh Assessment Report. Drawing on experiences from research recognized with the IPCC Award-2023 and my ongoing involvement in the assessment process, I will provide a real-world perspective on how scientific knowledge is evaluated, synthesized, and translated into information that informs policymakers and climate negotiators.

Beyond explaining the IPCC process, the talk will explore why the science-policy interface matters, emerging research priorities in climate science, the increasing importance of interdisciplinary approaches, and opportunities for scientists from developing countries to contribute to global climate conversation. Particular attention will be given to the role of female students, early-career researchers, and policymakers in Bangladesh in engaging with the science-policy interface and strengthening the country's contribution to global climate discourse.



Oral presentation

Climate Risk and Wetland Pedagogy in Bangladesh

Anusree Ghosh

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Climate change severely threatens global wetlands through extreme weather, altered hydrology, and rising temperatures endangering livelihoods, food security, and cultural heritage. Bangladesh, with its diverse wetlands, like Haors, Baors, Beels, is especially vulnerable. Wetland degradation here means not just ecological loss but also a decline in national resilience and natural capital. This study, conducted from March 2025 to April 2026, assessed wetland-climate education and vulnerability in Bangladesh. Using a simplified Climate Change Vulnerability and Risk Assessment tool across three wetland types, viz., Medir Haor, Borni Baor, and Halti Beel, it found consistently high climate exposure (flooding and hydrological variability) and low adaptive capacity due to livelihood dependence on wetland services. Vulnerability patterns were similar across sites, indicating systemic issues. Parallel to this, the study reviewed wetland-climate integration in education: national secondary curricula (NCTB), university syllabi, and NGO outreach. A major pedagogical gap emerged. Formal education focuses on generic environmental science, lacking applied, local content on wetland adaptation or conservation. NGO initiatives engage communities but remain fragmented and disconnected from formal systems. Critically, Ecosystem-based Adaptation, Nature-based Solutions, Indigenous knowledge, and modern technologies like geospatial tools were almost entirely absent across all educational domains. These results indicate a clear mismatch between the scale of wetland vulnerability and current pedagogical approaches. Strengthening wetland education through applied, participatory, and systems-based learning is therefore essential for building socio-economic resilience and ensuring the conservation and sustainable management of Bangladesh's wetlands in a rapidly changing climate.



Climate Risk as a Planning Variable: A Framework for Resilient Renewable Energy Siting in Coastal Bangladesh

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Coastal Bangladesh faces challenges from accelerating renewable energy deployment amidst increasing climate hazards such as cyclones, storm surges, tidal flooding, salinity intrusion, and extreme heat events. Current energy planning fails to address these climate risks, which are not considered in site selection, technology specifications, or long-term investment assessments. This study introduces the Climate-Risk-Informed Renewable Energy Planning (CRIREP) framework, developed through a three-stage methodology across 31 coastal and peri-coastal sites in Chittagong, Barisal, and Khulna. The first stage involves creating multi-hazard climate exposure profiles by combining CMIP6 downscaled projections, IPCC AR6 regional risk assessments, and historical hazard data from the Bangladesh Meteorological Department. The second stage derives a composite CRI using AHP across four dimensions: hazard exposure, asset vulnerability, adaptive capacity, and energy security continuity. The final stage applies scenario-based stress testing to current and planned renewable energy installations against RCP4.5 and RCP8.5 climate scenarios through 2050, accounting for infrastructure disruptions and compound hazard events. The analysis finds that 61% of currently planned coastal renewable installations fall within high-to-extreme climate hazard zones under RCP8.5 projections, representing an estimated BDT 38,000 crore in assets at risk of performance degradation or premature stranding by 2050. CRIREP-guided preplanning across the same sites identifies resilience-optimised alternatives that reduce composite hazard exposure by 43% while sacrificing less than 7% of projected energy yield. These results demonstrate that generation-centric planning systematically underestimates long-term investment risk in climate-frontline geographies, and that integrating quantified climate-risk metrics into siting decisions materially improves both infrastructure resilience and energy security outcomes.

Keywords: climate risk; coastal Bangladesh; AHP; CMIP6; hazard exposure

Climate Change, Water Insecurity, and Women's Vulnerability in Bangladesh: A Comparative Study of Char, Haor, Coastal, and Hill Regions

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Climate change is exacerbating water insecurity in Bangladesh through saline intrusion, declining freshwater availability, and increasing pressure on safe drinking water sources. These challenges disproportionately affect women, who are primarily responsible for household water collection and management. The study aimed to explore gender-stereotyped responsibilities in water collection, water-related health challenges, gender-based violence (GBV), and policy gaps associated with safe water access. A mixed-methods approach was employed in four climate-sensitive regions of Bangladesh: Char/Floodplain, Haor, Coastal, and Chittagong Hill Tracts (CHT), combining a household survey of 384 respondents with 26 Focus Group Discussions (FGDs), 38 Key Informant Interviews (KIIs), and 15 Case Stories. The findings reveal significant regional disparities in water access and quality. Women, particularly adult and elderly females, remain the principal water collectors and managers (90%) across all regions, with limited male participation. In the Haor region, 94% of women reported water-related challenges, including harassment during water collection (34%) and increased domestic violence (81%) linked to water scarcity. Disasters further intensified unpaid care work (95%) and harassment (33%), making the CHT the most vulnerable region. Existing policy frameworks acknowledge gender inclusion but largely fail to address water-related GBV and women's vulnerabilities. These findings provide evidence for developing inclusive, climate-resilient water management strategies that strengthen women's rights, safety, and adaptive capacity in Bangladesh's climate-vulnerable regions.

Keywords: climate change; water insecurity; gender-based violence; gender vulnerability; climate adaptation; water governance; Bangladesh.

This work was supported by Manusher Jonno Foundation (MJF) through the project titled "Community-based Resilience, Women's Empowerment and Action (CREA)".

Hydrochemical shifts in the Meghna River: Gendered Livelihood Collapse Amid Hilsa (*Tenualosa ilisha*) Decline in Chandpur, Bangladesh.

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Chandpur, the ‘Home of Hilsha’, depends on the unique estuarine ecosystem of the Meghna River. However, rapidly changing ecological shifts threaten Hilsa, the iconic GI product of Bangladesh and the fisherwomen whose livelihoods are connected to hilsa dependent economies. There is a significant gap in existing research, as water quality and fish populations have been never examined in socio-economic context. Currently, there is no integrated framework to establish a relationship between the abundance of hilsa and hydro chemical shifts of water, particularly from the female fishers’ livelihood lens. The core motivation behind this research is the link between water quality, Hilsa abundance, and the economic status of the female fishers. The fluctuations of hydro chemical parameters (dissolved oxygen, BOD, salinity, temperature) and monthly hilsa catch records were analyzed using Pearson correlation and multiple linear regression models based on 12 months of secondary data, in a mixed-methods approach. To understand the financial situation of marginal fisherwomen, we combined the ecological outputs and feedback from community focus groups, analyzing it via a chi-square test. The results indicated a significant cascading effect where decreasing DO and increasing BOD are negatively related to hilsa availability. Hilsa schools are displaced when water parameters shift. Consequently, this displacement creates an economic crisis –especially for women whereas males can switch to alternative occupations. Overall, this research underscores that any unique local product can be protected when the community behind it is economically stable. Research findings call for urgent policy reforms. Estuarine conservation must balance ecological imperatives with feminist economic security.

Keywords: hilsa, geographical indication, water quality, estuarine conservation, fisherwomen livelihood.

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State of Carbon Stock and Challenges for Carbon Credit Adoption in Saint Martin's Island of Bangladesh

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Globally, small island ecosystems are most vulnerable to climate induced risks, biodiversity, and unsustainable use of natural resources. Carbon credit mechanism therefor have emerged as a potential nature-based solution that can support climate change adaptation, ecosystem restoration and livelihood diversification. The overarching objectives are to identify: i) the current state of carbon stock; and ii) the major challenges to adopting carbon credit initiatives among local communities in Saint Martin's island of Bangladesh. The study employed a mixed-methods approach including remote sensing, GIS, machine learning, and household surveys. We perform Sentinel-2 imagery and a Random Forest model to detect carbon stock, while socio-economic and institutional barriers were investigated using a household survey of 413 island residents in 2026. The study findings indicate that the island embodied approximately 23,108.61 tons of carbon in 2020, declining to 21,527.51 tons in 2025, representing a net loss of 1,581.10 tons (6.84%). The study found the mean carbon density decreased from 57.94 tC/ha to 53.97 tC/ha, showing ongoing ecosystem degradation and reduced carbon sequestration capacity. The model achieved high predictive performance ($R^2 = 0.78$; RMSE = 7.85 tC/ha). Survey result reveals substantial constraints to adopt carbon credit in Saint Martin's island. A large number of respondents (more than 98%) had never heard of carbon credits, highlighting extremely low awareness. The major challenges were lack of awareness (mean = 4.32/5), lack of technical skills (4.22), unclear government policies (4.11), high verification costs (4.03), and uncertainty regarding income benefits (3.98). Despite these barriers, respondents focused strong willingness to participate in ecosystem restoration, tree plantation, and coastal vegetation conservation activities. The study concludes that Saint Martin's Island holds a significant carbon resource but is experiencing measurable carbon loss. Building awareness, carbon credit literacy, technical capacity, policy support, and equitable benefit-sharing mechanisms will be essential for developing community-based carbon credit programs that contribute to climate resilience and sustainable island development in Bangladesh.

Keywords: island ecosystem, biodiversity, household survey, carbon literacy, resilience

Who Makes Locally Led Adaptation Work? Women's Labor and the Co-production of Agricultura Climate Adaptation in the Coastal Polders of Bangladesh

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Locally Led Adaptation (LLA) has become a dominant paradigm in climate adaptation policy, yet women's labor that sustains adaptation remains largely overlooked. Focusing on the coastal polders of Bangladesh, the study examines how gendered agrarian institutions depend on Women's work to implement adaptation while limiting their recognition as farmers, their access to productive resources and their decision-making power over adaptation decisions. The analysis draws on longitudinal mixed-methods research conducted within a locally led adaptation programme, combining household-level adaptation demand assessment survey, pre-implementation political economy analysis with systems assessments carried out during agricultural adaptation trials. Guided by Feminist Political Ecology and Kabeer's empowerment framework, the study explores how gendered institutions how shape labor relations, recognition and adaptation outcomes. The findings indicate that women's agricultural work is commonly perceived as family labor rather than farming. This perception limits their recognition as farmers by households, communities, agricultural institutions and often by women themselves. Consequently, women experience unequal access to land, agricultural services, resources and decision-making processes while continuing to shoulder unpaid reproductive care work and post-harvest responsibilities. Within the adaptation programme, women actively participated in agricultural trials, adopted improved practices, attended technical training and shared knowledge within their communities. Although these activities strengthened women's engagement in climate adaptation, they did not consistently enhance their influence over agricultural decision-making across all cases. Our findings suggest that equitable climate adaptation requires more than participation or technology adoption; it also depends on strengthening their agency in adaptation planning, negotiation processes and decision-making.

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Association between Disaster Exposure and Mental Health Outcomes among Women in Bangladesh: Evidence from Nationally Representative Data

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Natural disasters are increasingly recognized as important determinants of mental health, particularly in low- and middle-income countries. Bangladesh is highly vulnerable to climate-related disasters. The objective of this study is to examine the association between living in disaster-affected districts and symptoms of anxiety and depression among ever-married women in Bangladesh. Data were drawn from the 2022 Bangladesh Demographic and Health Survey and the Emergency Events Database. A total of 20,029 ever-married women aged 15–49 years were included. Anxiety and depression symptoms were measured using the Generalized Anxiety Disorder 7-item (GAD-7) and Patient Health Questionnaire 9-item (PHQ-9) scales, respectively. Descriptive statistics, chi-square test, and multivariable logistic regression accounting for complex survey design were used. Overall, 19.5% of women reported symptoms of anxiety and 5.1% reported symptoms of depression. Women in disaster-affected districts had a higher prevalence of anxiety than those in non-affected districts (20.5% vs. 18.0%). After adjustment for key socioeconomic and demographic factors, living in disaster-affected districts was significantly linked to an 18% increased risk of having anxiety (AOR = 1.18, CI: 1.03–1.36; $p = 0.019$), whereas its association with depression was statistically nonsignificant (AOR = 1.03, 95% CI: 0.83–1.28; $p = 0.777$). Women aged 40–49 years (AOR = 1.49, CI: 1.31–1.70) had the highest odds of anxiety. Being widowed, divorced, or separated was associated with higher odds of anxiety (AOR = 1.49, CI: 1.21–1.84), while women whose husbands were residing abroad had lower odds of anxiety (AOR = 0.74, CI: 0.59–0.93) and depression (AOR = 0.66, CI: 0.45–0.97). Our findings indicate that disaster exposure among reproductive-aged women in Bangladesh was associated with an increased risk of anxiety but not depression. These findings highlight the importance of integrating mental health and psychosocial support into disaster preparedness and response strategies.

Salinity Intrusion, Water Security, and Household Impacts in Coastal Bangladesh: A Geospatial and Survey-Based Assessment

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Coastal Bangladesh is increasingly affected by salinity intrusion driven by sea-level rise, tidal influence, reduced upstream freshwater flow, and climate variability. The resulting degradation of freshwater resources threatens household water security and creates substantial social and health challenges. Although salinity-related vulnerability has received considerable attention, studies integrating geospatial salinity assessment with household-level evidence remain limited. Therefore, this study aims to (i) assess the spatial distribution of salinity intrusion and its effects on household water scarcity, (ii) examine household adaptation responses and their associated burdens, and (iii) evaluate the health outcomes related to salinity intrusion and water insecurity. The study was conducted in three coastal upazilas of Bangladesh: Dacope, Mongla, and Rampal. Data were collected from 743 households and 138 georeferenced surface-water samples. Salinity was measured using electrical conductivity, while GIS-based interpolation techniques were used to map spatial salinity patterns. Logistic and quasi-Poisson regression analyses were employed to examine the relationships among salinity exposure, water scarcity, adaptation, and health outcomes.

Salinity varied considerably across the study area, with mean concentrations ranging from 576 ppm in Dacope to 880 ppm in Mongla. Nearly 90% of households reported salinity exposure, and 65.4% experienced high exposure levels. Greater salinity severity significantly increased the likelihood of traveling at least 1 km to collect safe water ($p = 0.023$), a burden borne primarily by women. Higher salinity was also associated with adopting more coping strategies (IRR = 1.07, $p = 0.049$), with rainwater harvesting being the most common response (68.4%). Furthermore, higher salinity exposure was significantly associated with increased water-related illness ($p = 0.015$) and skin disease ($p = 0.015$). Skin diseases (77.8%), diarrhea (73.8%), and dehydration (72.3%) were the most frequently reported impacts. Children were the most affected group (75.9%), while women experienced substantially greater health burdens than men. These findings demonstrate that salinity intrusion undermines water security by increasing water scarcity, imposing greater adaptation burdens, and causing adverse health outcomes, highlighting the need for climate-resilient freshwater management and targeted interventions in coastal Bangladesh.

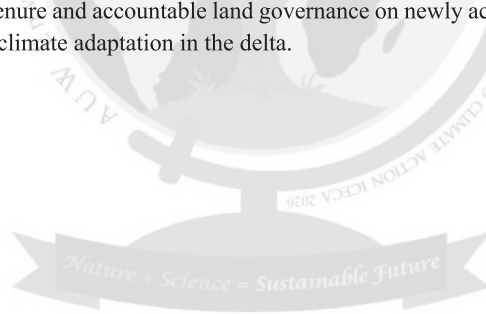
Displacement and Dispossession in Climate Adaptation: Evidence from the Bengal Delta

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Agrarian communities in the Bengal Delta face a double burden of recurrent displacement from riverbank erosion and the enduring legacy of historical marginalisation and land dispossession. This study examines the adaptation narratives of displaced people who relocate within the nearby chars or river island of the Meghna estuary. Drawing on ethnographic fieldwork in a remote char on the central coast of Bangladesh, it explores how displaced communities navigate environmental, political and institutional challenges to rebuild their livelihoods. The findings show that land is the most critical resource for adaptation: access to newly accreted char land enables households to reconstruct agriculture-based livelihoods and recover from repeated erosion-induced losses. However, this access is systematically constrained by patronage politics and institutional weakness, through which local elites capture newly emerged land and dispossess the most vulnerable settlers. As a result, many displaced households remain exposed to the next cycle of erosion, unable to consolidate recovery or build lasting resilience. The study points to the need for formalised land tenure and accountable land governance on newly accreted chars as prerequisites for meaningful climate adaptation in the delta.



Intergenerational shifts: Traditional Ecological Knowledge to Digital Climate Learning in Bangladesh from Grandmothers to Gen Z

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Environmental awareness and climate knowledge are key for sustainable and resilient development in the climate-vulnerable country of Bangladesh. This research aimed to examine the understanding, transmission and transformation of environmental knowledge from one generation to another in Bangladesh, focusing specifically on the transition from Traditional Environmental Knowledge to “climate learning”; in the digital sphere. Using a qualitative research approach, the study included semi-structured interviews with 30 individuals across the three generational groups (10 grandparents aged 55 years or older, 10 parents aged 30-54 years and 10 Generation Z youth aged 18-29 years). The subjects of the study were selected by purposive sampling from urban and semi-urban areas. The collected data were then analysed using thematic analysis to explore generational differences in understanding the environment, learning about it, the transmission of knowledge and perceptions about environmental responsibility. The results show that older people know about environmental change mostly through experiences, observing ecological changes in their own neighbourhoods, seasons, agriculture memories, and culturally deep knowledge. The attitude of parents is a mix between the norm of traditional environmental values and the more practical issues arising from urbanization, livelihood pressures and changing family structures. However, when it comes to climate issues, Generation Z participants primarily learn about the problem through social media, online content, formal education, digital campaigns, and youth-led environmental activism. The results indicate that the ecological knowledge is diminishingly shared at the family level, with increasing use of digital resources. But traditional and digital knowledge exists side by side, and together they foster a common concern for the degradation of the environment, uncertainty about climate change, and community-based action. This work connects TEK to digital climate learning, fostering intergenerational conversations on climate education and action in Bangladesh for an inclusive approach.

Keywords: Traditional Ecological Knowledge; Digital Climate Learning; Intergenerational Knowledge; Climate Justice; Bangladesh

The Influence of University Curricula on Intergenerational Environmental Perception in Bangladesh

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Bangladesh is one of the most climate-vulnerable countries in the world, making environmental education at the university level very urgent. Universities are widely recognized as institutions that shape values, attitudes, and perceptions. But limited research has explored how environmental knowledge transfers from students to their families and communities. This study examines how university curricula shape students' environmental perceptions and how this awareness spreads across generations through intergenerational learning. Using Environmental Education for Sustainable Development, this study argues that universities should not only teach theory but also influence how students think, feel, and act toward the environment. Data was collected through a structured questionnaire distributed via Google Forms across multiple academic disciplines, with a total of 141 responses recorded. The findings reveal a significant gap between student attitudes and curriculum delivery. While 78% of respondents reported environmental education as 'very important' only 19.5% reported it being discussed very often in their courses. Notably, 43.9% stated that university education increased their environmental awareness 'very much' and 48.8% identified younger generations as holding stronger environmental concerns. The findings suggest that students often act as environmental ambassadors within their families and communities. They are carrying ecological knowledge back into their households and communities and creating meaningful chains of intergenerational learning.

However, environmental topics remain unevenly integrated across academic disciplines. It limits the effectiveness of sustainability education. This study argues that Bangladeshi universities must adopt more practical, action-oriented, and policy-driven approaches to sustainability education to better prepare students for active participation in environmental decision-making and community engagement.

Keywords: environmental education; sustainability education; intergenerational learning; environmental perception; university curriculum

Just Transition Pathways for Coastal SMEs in Bangladesh: Opportunities for Climate Resilience, Green Growth and Decent Work

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Bangladesh's coastal economy supports thousands of Small and Medium Enterprises (SMEs) operating across production, processing, trade and service sectors, generating vital employment for millions of people. However, these enterprises face growing climate vulnerability as sea-level rise, salinity intrusion, heavy rainfall and extreme heat increasingly disrupt production systems, supply chains, market access and local livelihoods. Among these challenges, salinity intrusion is already threatening agricultural and aquaculture-based livelihoods across millions of hectares (Rabbani et al., 2019), while rising sea levels are projected to increase median soil salinity by up to 39% across coastal sub-districts by 2050 (Dasgupta et al., 2015). This study proposes an integrated Just Transition Framework with sector-specific pathways to strengthen the resilience and competitiveness of coastal SMEs. Using a mixed-methods approach, the study combined value chain assessments, labor market reviews and field data from 400 micro- and small-scale enterprises across Khulna, Satkhira, Bagerhat, Patuakhali, Barguna, Chattogram and Cox's Bazar to identify opportunities for renewable energy adoption, circular production, sustainable aquaculture and ecosystem-based adaptation. The findings demonstrate that investments in climate-smart technologies such as decentralized solar-powered cold-chain systems and resource-efficient production yield substantial dual dividends by reducing climate-induced operational disruptions, cutting operating costs by 15-30% and increasing net income by an average of 40%. Furthermore, incorporating formal labor safeguards within these transitions mitigates heat stress risks that reduce effective working hours in informal enterprises (ILO, 2019). Additionally, targeted green microfinance initiatives could enable female entrepreneurs to lead over 35% of newly established climate-adaptive kiosks. The study concludes that Just Transition for coastal SMEs offers a viable avenue to decouple regional economic expansion from environmental degradation; but scalability requires shifting national policies from reactive disaster management toward proactive structural investments, localized technical upskilling and inclusive tripartite social dialogues.

Keywords: Just Transition; coastal SMEs; climate adaptation; sustainable livelihoods; Bangladesh

Impact of Affordable & Clean Energy on Education: Role of Internet Use

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Access to affordable and clean energy is widely recognized as a key driver of socio-economic development, particularly in developing regions such as South Asia. Understanding its role in shaping educational outcomes is crucial for policymakers aiming to achieve inclusive and sustainable development. However, limited empirical evidence exists on the mechanisms through which affordable and clean energy influences education, particularly in the presence of expanding internet use. This study investigates the impact of affordable and clean energy on education in South Asian countries by employing the Panel-corrected standard errors (PCSE) method using data from 2000 to 2024. The findings show that: (1) affordable and clean energy improves education outcomes in South Asian countries; (2) mechanism analysis indicates that affordable and clean energy enhances education by increasing human capital and reducing income inequality; (3) internet use weakens the positive effect of affordable and clean energy on education, although it directly improves education; and (4) heterogeneity analysis indicates that the effect is stronger for female education than for male education. These findings suggest that policymakers should prioritize investments in affordable and clean energy infrastructure to enhance educational outcomes. In addition, policies promoting equitable internet access should be carefully designed to complement, rather than undermine, the benefits of energy access for education.

Keywords: affordable; clean energy; education; Internet

Investigating Mangrove Health and Coastal Ocean Darkening Adjacent to the Bangladesh Sundarbans Over 21 Years: A Remote Sensing and GIS-Based Assessment

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Ocean darkening, characterized by the progressive reduction in underwater light penetration due to changes in the optical properties of seawater, has emerged as an important indicator of coastal ecosystem health. Mangrove ecosystems influence these optical properties through sediment retention, shoreline stabilization, and the exchange of organic matter with adjacent coastal waters; however, their long-term relationship with coastal light attenuation remains poorly understood, particularly in the Bangladesh Sundarbans. This study investigated the temporal and spatial relationship between mangrove vegetation condition and coastal optical properties using Moderate Resolution Imaging Spectroradiometer (MODIS) satellite products, QGIS, and Google Earth Engine (GEE). Annual Normalized Difference Vegetation Index (NDVI) composites from MODIS Terra MOD13Q1 and annual diffuse attenuation coefficient at 490 nm (KD490) data from the NASA Ocean Biology Processing Group (OBPG) Aqua MODIS Level-3 Standard Mapped Image (SMI) product were analysed for 2003–2023. Offshore buffer zones extending 50 km, 125 km, and 200 km from the coastline were generated to evaluate spatial gradients in coastal optical properties. Temporal trends were assessed using linear regression, while Pearson correlation analysis examined relationships between annual NDVI and KD490 values. Results revealed a statistically significant increase in NDVI over the study period ($p = 0.0028$), indicating sustained mangrove vegetation resilience despite recurrent cyclone disturbances and environmental pressures. In contrast, KD490 showed considerable interannual variability but no statistically significant long-term trend across the three offshore zones ($p = 0.390, 0.780, \text{ and } 0.067$). Spatial analysis demonstrated consistently higher KD490 values in nearshore waters, with light attenuation decreasing offshore, reflecting the diminishing influence of terrestrial sediment and organic matter inputs. Pearson correlation analysis indicated weak positive relationships between NDVI and KD490 ($r = 0.082\text{--}0.367$), suggesting that long-term variability in underwater light attenuation is primarily governed by broader hydrological, biogeochemical, and oceanographic processes. Overall, this study demonstrates the value of integrating long-term MODIS observations with GIS-based spatial analysis to investigate terrestrial–marine interactions, supporting coastal ecosystem management and climate adaptation in the Bangladesh Sundarbans.

Keywords: Ocean darkening; Mangrove ecosystems; Remote sensing

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Transforming Organic Waste into Resources: Black Soldier Fly Research at the Asian University for Women

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Bangladesh faces an acute waste management crisis, with urban areas generating approximately 18,000 tons of biodegradable waste and 250,000 tons of cow dung daily. The Black Soldier Fly (BSF) Research Centre at the Asian University for Women (AUW) explores bioconversion as a sustainable solution to these challenges. BSF larvae rapidly reduce organic waste within 10–14 days, producing frass that serves as an organic fertilizer to enhance soil health, while simultaneously generating larvae biomass containing 42–50% protein for use in poultry, aquaculture, and pet feed. This integrated system mitigates greenhouse gas emissions, reduces landfill dependency, alleviates drainage blockages, and contributes to climate resilience. Beyond environmental benefits, the project fosters socio-economic development by creating employment opportunities for youth and women, supporting entrepreneurial ventures, and offering students hands-on internships in circular economy practices. Collaborations with academic, governmental, and private partners further strengthen research into bioremediation, bioplastics, and antimicrobial peptides derived from BSF. The AUW initiative demonstrates how insect-based waste management can transform ecological burdens into valuable resources, advancing sustainable agriculture and food security in Bangladesh and beyond.

Keywords: Waste management; Black Soldier Fly (BSF); Bioconversion; Bioplastics; Circular Economy; Sustainability.

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Environmental Inequality and Perception Gaps in Water Quality in Slum Households of Chittagong

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The urban poor living in the informal settlements known as slums in the Low- and Middle-Income Countries (LMICs) disproportionately bear the consequences of the deficit in meeting demands for necessities such as adequate and safe water. In addition, the varying socioeconomic status (SES) of slum dwellers creates inequalities even among households of the same plot, along with variation between different slums. This study explores the difference in water security by assessing how accessibility, affordability, and reliability differ based on SES indicators of the slum dwellers of Chittagong City Corporation (CCC). Among these three dimensions, measures of reliability are most strongly influenced by SES and have a higher inter-slum variation. Factors that affected the other dimensions of water security included the respondents' job, having a secondary source of water, and higher intra-slum variation, pointing to microlevel mismanagement. The type of primary source of water was again driven by SES, with the highest income group being the least likely to depend on community taps, workers in "other" job categories being more likely to depend on groundwater sources compared to formal workers, whereas informal workers were very unlikely, and no education to secondary education groups were more likely to rely on water vendors. Moreover, the study also explored the gap between perceived and actual water quality of both primary and secondary sources by comparing the perceived quality with lab-tested parameters on a Likert scale. Surprisingly, there was either no gap or a negative gap between the subjective perception and objective quality of the water, revealing a trend of over-pessimism. However, only 26.4% of the households treated their water, where a "not earning" head was significantly associated with increasing the likelihood of treating. Though the study has limitations on its temporal scope and generalizability, it reveals nuanced patterns of environmental inequality and discrepancy in perception and behavior among the urban poor of Chittagong.

Keywords: Water insecurity; slum settlements; SES indicators; perception gap; treatment and behavior

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Trees, Tenure, and the Right to Land: An International Rights Framework Analysis of Community-Based Restoration Conflict at the Green Bangle Project's Guliakhali Site, Sitakunda

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Sitakunda upazila was selected for Green Bangle Project (GBP) plantation because its Palmyra (*Borassus flabellifer*) cover has thinned below levels regional agroecological guidance recommends for a coastal population of its density, and because the sub-district records recurrent monsoon-season lightning fatalities, a hazard for which mature Palmyra stands are locally and regionally credited with measurable protective effect. Guliakhali beach was designated the flagship site to close both gaps at once. Between 2023 and 2026, GBP pursued every safeguard measure available within the current governance framework: formal, co-signed protection agreements with the Union Parishad, Forest Department, resident farmers, local women, and student leaders; physical fencing around vulnerable plots; and sustained multi-stakeholder engagement consistent with the FAO Voluntary Guidelines on the Responsible Governance of Tenure and the participatory principles underlying UNFCCC REDD+ safeguards. None of these measures resolved the conflict. Saplings continue to be uprooted, livestock continue to graze planted rows, and fencing has itself been dismantled by farmers reclaiming grazing access, destruction persisting even where every recommended engagement and enforcement step has already been exhausted. This study argues that Guliakhali's experience is therefore not a case of incomplete implementation, but evidence that Bangladesh's Social Forestry Rules (2004, amended 2011) contain a structural rights gap no amount of local engagement can close from below: the state holds planting authority over khas land, but assigns no corresponding usufruct, compensation, or co-ownership right to resident cultivators, leaving farmers with no legal stake in the land's new use regardless of what is negotiated informally. Using plot-level destruction records and household interviews distinguishing cooperating from resistant plots, this study benchmarks Guliakhali against Bangladesh's Social Forestry co-management provisions and regional statutory models, India's Joint Forest Management and Nepal's Community Forestry User Groups, that legally embed usufruct rights rather than relying on voluntary agreement. Findings indicate that only statutory tenure reform, not additional local negotiation, can resolve conflict of this kind, offering an evidence-based case for revising Bangladesh's khas land afforestation policy.

Keywords: Land tenure rights, Statutory reform, Khas land governance, Community forestry policy, REDD+ safeguards

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Poster presentation

Indigenous Knowledge, Ecofeminist Cultural Ecology, and Female Spiritual Governance Bonbibi and Mami Wata

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Cyclones, floods, and being hunted by predators have driven many communities into survival mode since ages. The environment has played a key role in guiding religious beliefs and shaping cultural ecology for survival and sustainability. Therefore, submitting to age-old ancestral wisdom through prayers and rituals seems the only plausible way to ward off communal fears. From the perception of syncretism and transculturation in Sundarban, the female forest goddess Bonbibi reigns in the mangrove to protect humans. The majority of Bonbibi's protection seekers are men, as they traditionally enter the forest as honey collectors, fishermen, or woodcutters, while women are generally not encouraged to undertake these occupations. Cultural ecology in Sundarban transcends sacred personalized doctrines, unifying diverse communities where feminine powers are used as mediators to survive environmental hostility and sustain generational living of resourcefulness.

Another deity, Mami Wata, as a comparison model, blends African, transatlantic, and some aspects of European domains. In the African diaspora affected by the transatlantic slave trade, Mami Wata reflects the instance of finding spiritual connection with natural water bodies, fostering protection, prosperity, and healing. Rooted in nature, Bonbibi and Mami Wata continue to be revered as eco-feminist icons in male-dominated societies, protecting communities and sustaining indigenous ecological knowledge. Both figures show similarities in their iconography, worship methods, and formation of cultural ecology in different regions of the world.

Hence, this study discusses the ancient wisdom of Bonbibi and Mami Wata to mediate relationships between humans and nature, shedding light to the indigenous frameworks for ecological coexistence and collective survival.

Knowledge and Practices of Menstrual Hygiene among Adolescent Girls in Public and Private Schools of Kathmandu

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Menstrual hygiene management plays an important role in the health, dignity and education of adolescent girls. Socio-cultural beliefs, availability of resources, and school environments influence practices in Nepal. There is limited information that examines the level of knowledge and hygiene practices of students from public and private schools in urban areas. This study was designed to determine and compare these among adolescents girls in Kathmandu. A cross-sectional study was carried out for 396 adolescent girls 10-19 years of age who had attained menarche. Schools were selected using a two-stage multistage sampling from private and public schools of Bhudhanilkantha municipality of Kathmandu city. A semi-structured self-administered questionnaire was used to collect the data and analyzed using descriptive statistics, chi-square tests and logistic regression in SPSS.

Almost all the respondents (98%) had prior knowledge about the menstruation before menarche. The majority identified menstruation as a natural process rather than a disease (74.7%), although there were still misconceptions, especially among the students from private schools. The overall knowledge about menstrual hygiene was high (66.2%). The overall attitude was positive with 80.8% very concerned with hygiene and 76.5% agreeing for the provision of free sanitary pads in schools. With respect to practices, 75.8% changed pads every 2-4 hours and 85.4% used sanitary pads, public school students showing better practices. Genital hygiene was well maintained (96%). Misconceptions about menstruation (OR: 2.02) and lack of uterine knowledge (OR: 1.89) were found to be significant predictors of poorer hygiene practices ($p < 0.005$) in logistic regression analysis.

Menstrual hygiene knowledge and practices were mostly appropriate, but there were some misconceptions and infrastructure gaps that heavily impacted practices. Therefore, menstrual health education in school, the availability of affordable products, and WASH facilities upgrades are crucial to achieve menstrual health equity among adolescent girls in urban Nepal.

Assessment of Indoor and Outdoor PM 2.5 and Their Health Impacts in Slum Households in Chittagong

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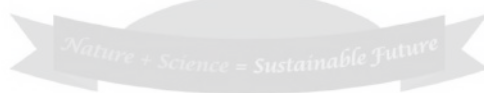
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The main objective of this study was to measure the concentration of Indoor and Outdoor PM_{2.5} in the slum areas of Chittagong and analyze the resulting respiratory health risks. A cross-sectional analysis was conducted on a total of 65 households in 4 areas. One-spot measurement method was used to measure air quality and Structured Questionnaire was used for health information. Binary Logistic Regression and ANOVA models were used for data analysis. The average level of Indoor PM_{2.5} obtained in the study was $122.40 \pm 119.54 \mu\text{g}/\text{m}^3$ and the outdoor level was $112.31 \pm 103.79 \mu\text{g}/\text{m}^3$, which is several times higher than the WHO Guidelines. The highest pollution was recorded in Hlishohor area due to its proximity to the road. According to the Logistic Regression model, indoor smoking increases the risk of hospitalization for chest diseases by about 2.7 times ($\text{OR} = 2.729$, $p = 0.044$). In addition, the risk of Chronic Cough was found to be about 6 times higher in low-income households. The results indicate a serious public health crisis caused by biomass fuel, inadequate ventilation and tobacco smoke in slum areas. Structural and behavioral improvements are essential to reduce this risk.

This study has been conducted and funded by the CATA-Earth Project of the European Union from the Center for Climate Change and Environmental Health (3CEH), Asian University for Women (AUW).



Prevalence and Determinants of Smokeless Tobacco and Its Association with Oral Health Among the Tea Workers in Sylhet, Bangladesh

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Smokeless tobacco (SLT) use remains a major public health concern in Bangladesh, particularly among socioeconomically disadvantaged populations with limited education and restricted access to healthcare. Tea garden workers, who perform physically demanding labor under difficult living conditions and often have limited access to preventive health services, are especially vulnerable. Although the association between SLT use and oral diseases is well established in the general population, evidence from underserved tea-growing communities is scarce. This study assessed the prevalence and patterns of SLT use and its association with self-reported oral health status among tea garden workers in Sylhet, Bangladesh.

A cross-sectional study was conducted among 304 tea garden workers aged 18 years and older in Sylhet. Participants were selected through a two-stage cluster sampling method followed by simple random sampling. Data were collected using semi-structured questionnaires that included sociodemographic information, age of SLT initiation, types of products used, frequency of use, and self-reported oral health complaints. Descriptive statistics, bivariate test, and binary logistic regression were performed using SPSS to identify factors independently associated with poor oral health.

Current SLT use was reported by 68.6% of participants. Sadapata (51.6%) and zarda or betel quid with tobacco (33.6%) were the predominant products, with mean initiation age at 20 years. More than half (54.9%) consumed SLT multiple times daily. Common oral health issues included halitosis, tooth staining, gingival bleeding, and oral lesions. SLT users had significantly higher odds of poor oral health than non-users ($OR = 3.61$; 95% $CI: 1.97-6.62$). Lower education and longer employment duration were also independently associated with poor oral health. The high prevalence of SLT use and its significant association with poor oral health highlight the need for targeted interventions in this marginalized workforce.

Access to Urban Green Spaces and Their Impact on Physical Activity and Well-being Among Middle Aged Park Visitors in Chattogram City, Bangladesh

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Rapid urbanisation during the Anthropocene has contributed to the loss of natural environments in many cities. Nature is increasingly being replaced with concrete, buildings, roads, and other man-made structures, reducing people's connection to and access to nature. Urban green spaces play a vital role in promoting physical and mental well-being. However, limited research has explored how residents of Chattogram experience and benefit from these spaces in the context of rapid urbanisation. This qualitative study examines the role of urban green spaces in enhancing physical activity and psychological well-being among middle-aged adults in Chattogram, focusing on DC Hill and Foy's Lake. Semi-structured interviews were conducted with 70 middle-aged park visitors, and 55 complete responses were analyzed using thematic analysis. Participants were also asked about perceived environmental changes, children's access to nature, and recommendations for preserving urban green spaces. The findings indicate that urban green spaces significantly reduce mental stress, improve psychological well-being, and encourage regular physical activity, particularly among middle-aged and older adults. Participants preferred DC Hill because of its free access and convenient location, whereas Foy's Lake was valued for its scenic beauty but considered less accessible due to its high entry fee. Many participants expressed concern about the declining availability of green spaces for children and highlighted environmental changes, including the loss of green cover and increasing urbanisation. The findings emphasize the importance of accessible, affordable, inclusive, and well-maintained urban green spaces for promoting public health and improving quality of life. Strengthening the protection and management of urban green spaces in Chattogram will benefit current and future generations, particularly children and other vulnerable groups.

Keywords: Urban green spaces; green space accessibility; physical activity; mental well-being; middle-aged adults; Chattogram, Bangladesh

This study is conducted and funded by the CATA-Earth Project of the European Union from the Center for Climate Change and Environmental Health (3CEH), Asian University for Women (AUW).

Climate Awareness and Anxiety Among University Students in Chattogram City

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Climate change is increasingly recognized not only as an environmental crisis but also as a mental health concern, particularly for young people living in climate-vulnerable regions. This study examined the relationship between climate change awareness and climate anxiety among university students in Chattogram City, Bangladesh. Using a cross-sectional survey design, data were collected from 235 students at the Asian University for Women, the University of Chittagong, and East Delta University via a structured web-based questionnaire. The survey measured climate knowledge, information exposure, emotional responses, coping strategies, and perceived behavioral impacts. Findings indicate that students generally had a high level of awareness of the causes and impacts of climate change in Bangladesh, as well as of local environmental issues, with social media as the most common source of climate-related information. At the same time, many respondents reported moderate climate anxiety, especially in the form of fear, anger, and sadness, although this anxiety rarely caused major disruption to daily functioning. Students from environmental science backgrounds and female students reported slightly higher levels of emotional distress. Importantly, climate concern was often linked to constructive responses, such as environmental engagement and activism, rather than to helplessness. The study suggests that universities should adopt a balanced approach to climate education, strengthen mental health support, and create opportunities for student action to help transform climate concern into positive engagement.

This study is conducted and funded by the CATA-Earth Project of the European Union from the Center for Climate Change and Environmental Health (3CEH), Asian University for Women (AUW).

Women's Ecological Labour Recognition: Making Women's Ecological Labour Visible: An Institutional Analysis of the Green Bangle Project in Coastal Bangladesh

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Community-based climate adaptation initiatives increasingly position women as central agents of ecological restoration and sustainable livelihoods. Yet, far less attention has been paid to how institutional documentation practices shape the visibility and recognition of women's contributions, particularly when projects produce divergent outcomes. This paper examines this gap through a comparative qualitative case study of two women-led interventions within the Green Bangle Project (GBP) in coastal Bangladesh: the successful Sitakunda nursery initiative and the unsuccessful Guliakhali pilot nursery. Guided by critical ecofeminism and an intersectional lens, the research employs a nested-level analytical framework (individual, collective, institutional, and discursive) to examine how institutional conditions, including land security, leadership recognition, and documentation practices, which influence both project outcomes and the preservation of women's voices. Drawing on semi-structured interviews with project participants and stakeholders, alongside analysis of GBP reports and project records, the study investigates whose labour is recorded, valued, and remembered. The paper proposes the proposition that women's ecological labour gains institutional visibility not through participation alone, but through formal recognition mechanisms that protect and narrate that labour. Findings reveal a systematic documentation asymmetry: successful initiatives preserve women's individual voices and achievements within project narratives, while unsuccessful interventions render participants largely undocumented, limiting both institutional learning and accountability. Emphasizing this asymmetry, the study extends ecofeminist scholarship from questions of participation toward questions of recognition, knowledge production, and institutional power. Beyond its empirical contribution, the paper offers a methodological framework for analysing gender-environment programmes through nested comparative case studies and proposes level-specific recommendations for equitable documentation and evaluation. Reflecting briefly on parallel community forestry initiatives in Timor-Leste, the paper identifies shared patterns of documentation asymmetry while acknowledging contextual differences that shape recognition dynamics, pointing toward a future research agenda for cross-regional comparative analysis.

Keywords: Critical ecofeminism; Documentation asymmetry; Institutional recognition; Climate adaptation; Women's ecological labour.

This work was supported by The Swiss Philanthropy Foundation

Impact of Rising Temperature Due to Climate Change on Labor Productivity and Health, and Policy Implications in Bangladesh

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Climate change is increasing at an alarming rate. While the entire world is suffering the repercussions, Bangladesh is not an exception. The issues are much more amplified in Bangladesh as it is a low-income nation. Hence, most solutions are not economically feasible for Bangladesh. In 2022, about 18.7% of the total population lived below the national poverty line in Bangladesh (Asian Development Bank, n.d.). Despite the harsh weather conditions, people cannot afford to remain absent from work. Both indoor and outdoor employees suffer alike, if not equally. Outdoor workers experience lower productivity owing to direct solar exposure, high WGBT (Wet Bulb Globe Temperature), humidity and peak midday heat (Kjellstrom et al., 2009; Khan et al., 2026; Liu et al., 2021). Indoor labor productivity losses are less visible in the context of rising heat but are equally important. The main causes of their suffering are poor ventilation, machinery heat, dense factory floors, long shifts, quota pressure, limited autonomy to rest or hydrate, especially in Bangladesh's RMG sector (Yeasmin et al., 2025). Therefore, it is imperative to initiate research to unearth the impacts of such rising heat and its solutions that are suitable for Bangladesh. This paper will conduct a systematic review on existing literature on the impact of rising heat on productivity and health among workers in countries with extreme hot climate like, Bangladesh, India, Australia. This analysis of impacts will be followed by a discussion of different policies implemented worldwide to combat the negative impact on heat-affected workers and assess the policies' applicability, especially economic feasibility, in Bangladesh. Through these analyses, the authors' goal is to primarily answer two research questions on how climate change impacting workers' productivity and their health, and which worldwide implemented policies are suitable for application in Bangladesh.

Keywords: Productivity; labor, health; climate change; RMG; indoor; outdoor; policies WGBT

Knowledge, Awareness, and Disposal Behaviours Related to Plastic Waste in Commercial Areas of Chattogram

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Plastic waste has been a critical challenge in developing countries, especially in commercial areas of mega-cities like Chattogram. The generation of plastic waste is not only dependent on the amount of plastic used but also on people's disposal habits, awareness, and willingness to adopt alternatives. Though there are studies on plastic waste and usage patterns, only a few studies have focused on plastic waste generation from informal street stalls, as well as sellers' awareness and disposal practices, a critical gap considering heavy plastic use in the sector. This study was conducted in two major commercial areas of Chattogram (2 No Gate and Patenga), using a cross-sectional research design, where 39 street stall owners were interviewed to investigate their plastic use, disposal habits, awareness, and willingness to adopt eco-friendly alternatives. Findings suggested that 82% of street vendors are well aware of the adverse impacts of plastic waste, but only 10% are willing to adopt alternatives, indicating the gap between awareness and action. In addition, variables like consumer products being sold (food, jewelry, clothes) and the location of the businesses have significant influences on the plastic usage; In addition, tourist spots like Patenga have high plastic consumption and waste generation due to higher demand for food stalls. Sustainable practices are hindered due to the high cost (62%), lack of availability (10%), and the inconvenience (15%) of alternatives to plastic, as well as the lack of institutional support (8%). Many vendors perceived that neighboring businesses contributed more to plastic waste than their business. Findings point to weak policy, waste management disruption, and low confidence in existing plastic regulations. This study highlights that despite the high awareness of plastic pollution, economic and structural factors constrained behavioral change. This research helps to address the gap in localized studies that focus on vendors and provides practical insights for policymakers who aim to reduce plastic pollution in urban commercial environments.

This study is conducted and funded by the CATA-Earth Project of the European Union from the Center for Climate Change and Environmental Health (3CEH), Asian University for Women (AUW).

A Spatio-Temporal Analysis of Land Cover and Land Surface Temperature Variations in Rajshahi District, Bangladesh (2015–2024): Implications for Climate-Resilient Urbanism

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Rapid urbanization in developing countries often drives substantial land-use change, with consequences for local climate, agricultural productivity, and vegetation health. This study examines spatiotemporal changes in vegetation cover, built-up area, and land surface temperature (LST) in Rajshahi District, Bangladesh, between 2015 and 2024, using satellite remote sensing. Landsat 8 OLI/TIRS (2015) and Landsat 9 OLI/TIRS (2024) imagery were processed in Google Earth Engine (GEE) to derive the Normalized Difference Vegetation Index (NDVI), the Normalized Difference Built-up Index (NDBI), and LST, while higher-resolution Sentinel-2 MSI imagery supplemented built-up area extraction for 2024; cartographic outputs were produced in QGIS. Results show a considerable expansion of built-up area, concentrated in and around the urban core and along the Padma River corridor, accompanied by a shift of large areas from moderate and moderately-high to low and very-low NDVI classes, consistent with the conversion of cropland and vegetated land to urban use. The spatial extent of the warmest LST classes also expanded over the study period, particularly over newly urbanized and vegetation-depleted areas. Because the LST and NDVI classification thresholds were derived independently for each year, this pattern is best interpreted as a shift in relative spatial distribution rather than a confirmed absolute temperature increase. Taken together, the findings are consistent with a coupled process of vegetation loss, built-up expansion, and localized warming associated with an intensifying urban heat island, underscoring the need for climate-responsive urban planning in fast-growing secondary cities such as Rajshahi.

Keywords: Remote Sensing; Land Surface Temperature (LST); NDVI; Urban Heat Island; sustainable urban planning; climate resilience; Rajshahi.

GIS-Based Climate Risk Assessment of Riverine Floodplain Communities: A Case Study from Gaibandha, Bangladesh

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Bangladesh is a low-lying deltaic nation that ranks 13th among the world's most climate-vulnerable countries. Its northern riverine districts are experiencing intensifying hazard conditions, including floods, riverbank erosion, droughts, and heatwaves. This study presents a GIS-based climate risk assessment for 12 mouzas across Uria and Kanchipara Unions in Fulchari Upazila, Gaibandha District, northern Bangladesh. The assessment followed the IPCC AR5 framework, where risk is the product of hazard, exposure, and vulnerability, with vulnerability defined as the ratio of sensitivity to adaptive capacity. Indicators across all components are derived from multiple secondary sources, including Landsat imagery and SRTM DEM from USGS Earth Explorer, soil data from BARC, and socioeconomic and demographic data from the population and housing census 2022, collectively capturing biophysical, demographic, housing, livelihood, and infrastructure dimensions. All indicators are assigned equal weights to avoid subjective bias, in the absence of empirically validated weight coefficients for the study area, and are standardised and spatially integrated in ArcMap to generate a mouza-level composite risk score. The analysis reveals that while hazard and sensitivity remain relatively consistent across mouzas, adaptive capacity emerges as the primary differentiating driver of climate risk, exhibiting the widest variation among all components. Kabilpur recorded the highest risk score of 1.65, far exceeding all other mouzas, driven predominantly by a critically low adaptive capacity score of 0.13 and a high exposure and vulnerability score of 0.68 and 4.22. Ratanpur (0.53) follows, with a reduced adaptive capacity score of 0.31 and a high exposure and vulnerability score of 0.67 and 1.45, respectively. Meanwhile, Dhanarpara (0.09), Gholdaha (0.11), and Madanerpara (0.11) recorded the lowest risk scores, reflecting stronger adaptive capacity, low sensitivity and minimal vulnerability. The results indicate that strengthening adaptive capacity and reducing vulnerability are key to enhancing climate resilience in the flood-prone communities of northern Bangladesh.

Keywords: Climate risk assessment; IPCC AR5; adaptive capacity; vulnerability; Gaibandha

Leaves and Ink That Leave an Impression: Developing Sustainable Dye for Palm Leaf Card Products

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Growing environmental concerns have increased the demand for sustainable alternatives to everyday printed products. This project shows the use of palm leaves as a sustainable material for developing visiting cards that are biodegradable, durable, and naturally attractive. Palm leaves are abundant, renewable, and culturally significant in South Asia, making them a promising material for eco-friendly printing. The fresh tender palm leaves have been carefully processed and treated in various stages, such as washing, cutting, processing with turmeric (for natural preservation), drying, pressing, and printing. Several experiments were conducted to develop natural colors for printing, to further improve the sustainability of the product. The first experiment was to create a maroon printing color by mixing extracts from Segun (*Tectona grandis*) leaves with Haritaki (*Terminalia chebula*), rice starch, and alum. However, the mixture resulted in a thick greenish color rather than the expected maroon shade and lacked durability after drying. This was probably due to the dominance of chlorophyll in the Segun leaves, the unstable nature of the natural pigments, the poor bonding of the colour with the surface of the palm leaf, and poor fixation of the colour. Additional experiments using natural pigments extracted from dragon fruit, beetroot, and marigold flowers also produced unsatisfactory results because the colors faded quickly, adhered poorly to the palm leaf surface, and did not provide long-lasting print quality. Although the natural color experiments were unsuccessful, the study successfully demonstrated that processed palm leaves can be transformed into attractive, durable, and biodegradable visiting cards. The findings highlight both the opportunities and the challenges of developing sustainable alternatives for printed products. While improving natural color stability remains an important area for future research, the project demonstrates that palm leaves are promising to be a sustainable, innovative, and eco-friendly material for visiting cards.

Keywords: Palm leaf; sustainable visiting cards; natural pigments; eco-friendly printing; biodegradable materials; sustainable product development.

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Consumer Awareness and Sustainable Clothing Practices among University Students in Chittagong

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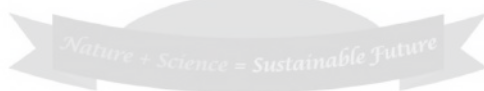
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The global fashion industry contributes approximately 10% of annual carbon emissions, consumes nearly 79 billion cubic meters of freshwater annually, and generates an estimated 92 million tonnes of textile waste, highlighting the urgent need for sustainable clothing consumption to mitigate environmental impacts. As the world's second-largest exporter of ready-made garments (RMG), Bangladesh has a significant role in promoting sustainable consumption alongside sustainable production. Despite this, limited evidence exists regarding sustainable clothing awareness and consumption practices among university students in Chittagong.

This study assessed consumer awareness and sustainable clothing practices among university students in Chittagong through a cross-sectional online questionnaire. It examined awareness, purchasing behavior, clothing disposal, willingness to buy eco-friendly apparel, and barriers to sustainable consumption.

Results showed moderate awareness but limited sustainable purchasing. Price, quality, and design were the main purchase factors, while high prices, limited eco-label knowledge, and poor availability were the major barriers. Most respondents supported clothing reuse, repair, and donation to reduce textile waste and promote circular economy practices.

The study recommends strengthening sustainability education and improving access to affordable sustainable apparel to encourage responsible consumption among university students in Bangladesh.



Life Cycle Assessment of Fiber Production from Banana Pseudo-stem and Pineapple Leaf in Bangladesh

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Sustainability in textile sector is a catchphrase getting known in Bangladesh due to increased concern for environment and constant push toward the greenness trend. Following the trend and climate change concern, in 21st century, the new generation being more focused on reducing the footprint from their daily consumption. This leads to thinking about the alternative fiber production from waste. In this study, the environmental performance of banana fibers (BF) and pineapple leaf fibers (PALF) is compared with that of conventional cotton and polyester fibers using the life cycle assessment (LCA) method. Banana fibers and PALF are considered by-products of fruit production. In this study, the system boundary is set as a "cradle-to-gate" LCA. Life cycle inventory, midpoint impact assessment and endpoint damage assessment methods are used. Data on the input of all relevant materials and energy were collected from agricultural areas of 2 upazilas of 2 districts with highest banana and pineapple production rate in Bangladesh and 4 entrepreneurs. To calculate the selected midpoint environmental indicators, the ReCiPe 2016 v. 1.07 impact assessment method was used. Calculations were performed by using SimaPro v.10.3.0.1 software. From the inventory analysis, it is observed that the hotspots for environmental impacts of banana fiber and PALF are mainly linked to the shared agricultural inputs such as fertilizers, pesticides, irrigation water, diesel and electricity, rather than the process of fiber extraction. Cotton fiber appears to be the major contributing factor in categories related to eutrophication and ecotoxicity, accounting for about 63% of terrestrial acidification, 96% of marine eutrophication and about 68% of freshwater ecotoxicity problems. The value of each category is 0.0571 kg SO₂ eq, 0.042958 kg N eq and 0.2774 kg 1,4-DCB respectively. On the other hand, polyester fibers record the highest impact for fossil resource scarcity (1.844 kg oil eq) and human carcinogenic toxicity (0.10096 kg 1,4-DCB) due to the use of fossil fuels. Banana fibers record moderate impacts for ecotoxicity and eutrophication categories, mainly due to the use of agricultural inputs. On the other hand, PALF records the lowest impacts for all midpoint categories. Banana fibers exhibit a high contribution to damage in the category of human health (8.98E-06 DALY) due to pesticide use and energy consumption, while cotton fibers exhibit the highest damage in the ecosystem (1.1E-07 species.yr) due to soil and water pollution resulting from intensive farming practices. Polyester fibers exhibit the highest damage in the resource category (US \$0.6545), which confirm sustainability issues related to fossil-based fibers. Among all the fibers considered, the least endpoint impacts are observed for PALF, followed by banana fiber. Again, the cost-benefit ratio (BCR) of banana fiber and PALF stands above 1, which shows that this production is making profit compared to the investments made in them. Moreover, this study offers evidence to support the inclusion of agro-residue-based fibers in sustainable and circular textile supply chains.

From Agricultural Waste to Sustainable Packaging: A Pectin–Anthocyanin Based Smart Film for Monitoring Chicken Freshness

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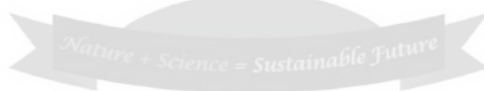
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There is an increasing need for sustainable biodegradable alternatives because of plastic pollution and food packaging waste. A smart packaging film was developed to monitor chicken freshness from lemon-peel pectin, red-cabbage anthocyanins. 0-2% anthocyanin containing films were prepared by solution casting and characterized for their structural, morphological, antioxidant, mechanical and pH-responsive properties [1].

FTIR confirmed hydrogen-bonding associations of pectin with anthocyanins SEM analysis revealed a compact and homogeneous structure for the 1.5% film, whereas 2% anthocyanin caused aggregation. The control film had a percentage of antioxidant activity of 11.68%, which increased to 82.48% as the concentration of the film was increased to 2%. During the storage of chicken at 4 °C, it was observed that the optimized 1.5% film experienced a colour change wherein the pink colour changed to green colour and violet colour. After eight days storage, pH, total viable count (TVC) and total volatile base nitrogen (TVB-N) of control-packaged chicken was found to be 6.96, 8.49 log CFU/g, and 50.68 mg/100 g respectively. The chicken packaged in an optimized film showed significantly lower values of pH 6.75, TVC 7.62 log CFU/g and TVB-N 41.90 mg/100 g.

Keywords: lemon-peel pectin; red-cabbage anthocyanin

The authors would like to acknowledge the Department of Food Engineering & Tea Technology, Shahjalal University of Science and Technology, Sylhet, for providing laboratory facilities and research support.



Flash Flood Hazard Assessment in Megna River Estuary Region of Bangladesh using Fuzzy AHP-MCDA and GIS-based Spatial Analysis

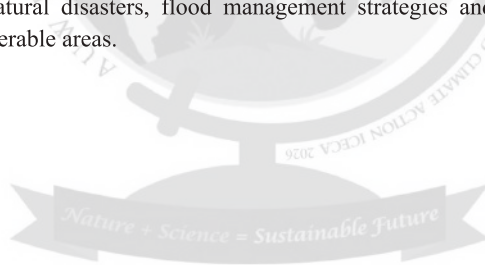
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Bangladesh is prone to serious and chronic flooding and occurs on an annual basis due to its complex hydrological and geomorphological characteristics. Despite researching annually on flood dynamics, there is still a significant gap precisely identifying and mapping the highly flood prone areas. This study aimed to identify and map the highly flood risk areas by integrating the Fuzzy Analytical Hierarchy Process (FAHP) and GIS-based Multi-Criteria Decision Analysis (MCDA). We selected Seven key geo-environmental factors: Land Use/Land Cover (LULC), elevation, drainage density, distance from rivers, slope, rainfall, and distance from roads. Data acquisition was conducted by using Google earth engine and followed by systematic processing within Arcgis software. We weighted these seven indicators through fuzzy pairwise comparisons and Created Flood Hazard Index(FHI) Maps. The resultant spatial analysis flood map, classifies risk into various categories: very low risk (0.0184%), low risk (9.84%), moderate risk (45.28%), high risk (41.63%), and river zones (3.21%). Besides, The consistency ratio is 6.8% which determines all comparisons are consistent and reliable. Ultimately, this research underscores the critical importance of integrating GIS and AHP methodologies in flood risk assessment, fostering resilience against natural disasters, flood management strategies and promoting sustainable development in vulnerable areas.



From Waste to Justice: Youth-Led Plastic Governance and Community Climate Action in Chattogram Metropolitan, Bangladesh.

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Plastic pollution has become one of the defining environmental challenges of the twenty-first century, with profound implications for climate change, public health, and social equity. (Rahman and Lateh, 2017) Although often framed as a municipal waste management problem, plastic pollution is increasingly recognized as a climate justice issue because its environmental and socio-economic burdens are disproportionately borne by vulnerable communities. (Hunt and Watkiss, 2011) In rapidly urbanizing coastal cities such as Chattogram Metropolitan, inadequate waste management systems, uncontrolled plastic consumption, and weak environmental governance exacerbate urban flooding, ecosystem degradation, and livelihood insecurity.

At the same time, youth-led environmental movements are emerging as influential actors in addressing local environmental challenges. Through community mobilization, awareness campaigns, plastic recovery initiatives, advocacy, and citizen participation, young people are contributing to new forms of community climate action. (Dastagir, 2015) However, their role in promoting climate justice and transforming environmental governance remains insufficiently explored in the context of Bangladesh.

This study explores how youth-led plastic governance can contribute to community climate action and environmental justice in Chattogram Metropolitan. Guided by the theoretical perspectives of Climate Justice, Environmental Governance, and Civic Participation, the research adopts a qualitative case study approach. Data will be collected through Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), stakeholder consultations, and case studies of youth-led environmental initiatives.

The paper argues that youth should be recognized not simply as volunteers but as governance actors capable of influencing environmental decision-making and strengthening community resilience. By connecting plastic pollution with climate justice, the study contributes to the growing discourse on participatory environmental governance and offers policy recommendations for integrating youth into urban climate and waste management strategies.

Keywords: climate justice; plastic governance; youth engagement; community climate action; environmental governance

Fast Fashion, Textile Waste, and Climate Justice: Can Repair Culture Transform Urban Consumption?

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The global fashion industry has become one of the largest contributors to environmental degradation, generating significant greenhouse gas emissions, excessive water consumption, and growing volumes of textile waste. The expansion of fast fashion has accelerated consumption patterns, shortened product lifecycles, and intensified pressure on waste management systems, particularly in developing countries. While the environmental impacts of fast fashion have been widely discussed, its implications for climate justice remain underexplored.

Climate justice perspectives suggest that the social and environmental costs of overconsumption are disproportionately experienced by marginalized populations who contribute least to the problem. In urban Bangladesh, discarded clothing, imported second-hand garments, and increasing textile waste create complex environmental and social challenges. At the same time, local repair practices and informal clothing reuse markets continue to provide low-carbon alternatives to disposable fashion.

This paper explores whether repair culture can serve as a transformative strategy for sustainable urban consumption and climate justice. Drawing on theories of Circular Economy, Climate Justice, and Sustainable Consumption, the study argues that repair culture extends product lifecycles, reduces waste generation, lowers carbon emissions, and promotes more equitable access to clothing resources.

The paper adopts a qualitative approach based on literature review, policy analysis, and case-based exploration of urban clothing consumption practices in Bangladesh. The study concludes that strengthening repair culture and integrating it into urban sustainability policies can contribute to a more just and circular fashion system.

Keywords: Fast fashion; climate justice; textile waste; repair culture; circular economy; sustainable consumption

Ecocide and Its Status Under International Criminal Law: A Critical Analysis of Legal Gaps and Reform

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Ecocide is defined as severe, widespread or long-term environmental destruction initiated by human actions. Despite, rising international concern on the alarming environmental degradation, ecocide is not acknowledged as an international crime under current laws. According to the enactment by Rome Statue of International crime in 1998, it grants the court jurisdiction over genocide, war crimes and crimes against humanity but fails to address the prohibition of ecocide explicitly. This study examines whether the exclusion of ecocide from international criminal law showcases the tremendous loophole and constitutes arguments for and against its inclusion in international crime under the Rome Statue. This paper emphasizes a qualitative legal review of existing international legal system based on scholarly literature and secondary reports on environmental hazards from war conflict, referencing specifically the case of Gaza and Ukraine. According to the findings of the analysis, there is strong evidence that wars lead to severe environmental damages, which include water pollution, soil pollution, damage to agricultural lands, loss of biodiversity, and ecosystem damage. It is clear that the Rome Statute does not provide sufficient measures related to environmental damage caused by wars because the provisions regarding environmental damages are indirect in nature. The proponents of this international crime claim that the acceptance of this form of crime would result in improved accountability, better deterrence, and response to transboundary damage. The critics, on the other hand, cite vagueness, difficulties in implementation, and redundancy with other crimes within international law. In spite of all the aforementioned deficiencies, this research concludes that the introduction of ecocide as the fifth international crime at the Rome Statute is required.

Nature + Science = Sustainable Future

Only the wealthy can afford to feel hot: Impacts of Urban Heat Stress on Informal Workers in Chattogram, Bangladesh

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Rapid urbanization and climate change have intensified urban heat stress, especially in low- and middle-income countries. In developing and rapidly urbanising countries like Bangladesh, exposure to heat stress has increased due to the Urban Heat Island (UHI) effect, disproportionately affecting the health, well-being, financial security, and daily lives of the vulnerable, urban populations. Informal workers belong to a large portion of these populations. They are faced with increased risk due to their prolonged outdoor physical labour in demanding work conditions that provide very limited access to any form of occupational protection and cooling infrastructure. This study particularly focuses on the effects on health, productivity and adaptive capacity of informal workers because of heat stress in Chattogram, Bangladesh. 30 semi-structured interviews were conducted with participants working in the informal sector, including street vendors, rickshaw pullers, and construction workers. The data were collected from Chattogram Metropolitan regions, including roadside markets from Chawkbazar and Chatteshwari road, construction sites, transport hubs, and commercial areas. Thematic analysis revealed that heat stress significantly affects both the physical and mental well-being of informal sector workers. Commonly reported symptoms included fatigue, dehydration, dizziness, and reduced concentration, which directly reduced their work capacity, productivity, and income stability. While some coping strategies such as drinking glucose, staying hydrated, taking breaks under shade, and resting under trees are available, these measures are short-term and may be inaccessible based on environmental and economic constraints. The study highlights that the dynamic effects of urban heat stress are shaped by environmental, occupational and socioeconomic factors. It shows the necessity for strengthened integrated policies to reduce the vulnerability of informal workers in rapidly urbanising cities.

Keywords: Informal workers, Urban Heat Island, climate change, heat stress, occupational health

This study is conducted and funded by the CATA-Earth Project of the European Union from the Center for Climate Change and Environmental Health (3CEH), Asian University for Women (AUW).

Climate-Adaptive Urban Agriculture for Improving Food Security among Climate-Vulnerable Urban Households in Bangladesh

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Climate change is significantly reshaping urban food systems across municipalities in Bangladesh, with low-income communities facing the greatest risks to food security and nutrition. This study evaluated whether climate-adaptive urban agriculture could improve food security and nutrition intake among low-income households in the informal settlements of Sirajganj Municipality, Bangladesh. The study employed a mixed-methods approach, combining a household survey with Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), In-Depth Interviews (IDIs), geospatial analyses using Normalised Difference Vegetation Index (NDVI), Land Use and Land Cover (LULC), and exposure to flood, river erosion and drought. Food security was assessed using the Household Dietary Diversity Score (HDDS) and the Food Consumption Score (FCS). Geospatial and climate analyses showed that Sirajganj Municipality is highly climate-vulnerable, regularly exposed to flooding, riverbank erosion, heat stress, and seasonal drought. NDVI and LULC analysis found declining vegetation cover and expanding settlements, which further increased environmental pressures, while several wards remained exposed to moderate-to-severe risks of flooding, erosion, and drought. Households practising urban agriculture (rooftop gardening, sack and container gardening, raised-bed production, use of drought- and flood-tolerant vegetable varieties, small-space poultry and livestock rearing, vermicompost preparation, etc.) reported increased vegetable consumption (95%), while 58% reported greater consumption of home-grown vegetables. The average HDDS was 7.4, and 80% of households were within the acceptable FCS category. Household diets were mainly based on staple foods and vegetables, while consumption of fruits, meat, and fish remained comparatively low. Most households relied on market purchases for food, although home-grown vegetables contributed significantly to household diets. Overall, 79% of respondents reported improvements in dietary diversity and food consumption, while 81% reported improved nutrition awareness and food safety practices. The findings demonstrate that climate-adaptive urban agriculture can contribute to more resilient and sustainable urban food systems by improving dietary diversity, household food access, and adaptive capacity among vulnerable populations.

Keywords: Climate-adaptive urban agriculture; food security; dietary diversity; climate resilience; low-income households

This work was supported by the BRAC Urban Development Programme (UDP) and funded by the Climate Bridge Fund (CBF) through the endline evaluation of the project “Climate-Adaptive Urban Agriculture for Food Security for Low-Income Communities in the Sirajganj Municipality”.

Impact of Energy Efficiency on Industrial Pollution: Role of Financial Institutional Access

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Abstract Industrial pollution has become a critical environmental concern in South Asia due to rapid industrialization and rising energy consumption. Improving energy efficiency is widely recognized as a key strategy for reducing environmental degradation while sustaining economic growth. However, limited attention has been given to how access to financial institutions influences the effectiveness of energy efficiency in mitigating industrial pollution. This paper analyzes the impact of energy efficiency on industrial pollution in South Asian nations from 2000 to 2024 and explores the moderating role of access to financial institutions. We employ Panel Corrected Standard Errors (PCSE) and a two-stage least squares (2SLS) instrumental variable method. The results are as follows: (1) energy efficiency significantly reduces industrial pollution; (2) access to financial institutions strengthens the negative relationship between energy efficiency and industrial pollution; (3) mechanism analysis reveals that access to financial institutions enables energy efficiency to enhance clean energy access and renewable energy output; and (4) furthermore, asymmetric analysis using quantile regression shows that the effect of energy efficiency on industrial pollution is stronger at lower quantiles. These findings suggest that policymakers should promote energy efficiency initiatives alongside expanding access to financial institutions to achieve greater environmental benefits. Additionally, strengthening financial systems and facilitating green financing mechanisms can further accelerate the transition toward cleaner industrial production and sustainable development.



Quantifying Blue Carbon Potential and Payment-for-Ecosystem-Services Feasibility in Mangrove Agroforestry Systems: Evidence from the Green Bangle Project

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Coastal agroforestry initiatives are increasingly promoted for climate mitigation, yet the carbon sequestration performance of mixed-species mangrove agroforestry plantations remains empirically undocumented for community-led restoration efforts in Bangladesh, and no framework currently links such plantings to viable Payment-for-Ecosystem-Services (PES) mechanisms. This gap constrains both scientific validation of the Green Bangle Project's (GBP) restoration outcomes and its eligibility for climate-finance instruments. This study asks: what is the above- and below-ground blue carbon stock of GBP's established mangrove agroforestry plantations, and what design features would make a locally governed PES scheme financially and institutionally feasible as GBP scales to additional coastal sites? A mixed-methods design will be employed. Biomass carbon will be estimated using species-specific allometric equations applied to diameter-at-breast-height, height, and stem-density data from stratified plots at GBP's existing Guliakhali Beach in Sitakundo and AUW Main Campus in Bayezid Link Road, Chittagong plantation sites, complemented by soil organic carbon sampling at 0-30 cm depth to capture sediment-bound carbon characteristic of mangrove systems. Findings will inform sampling protocols for GBP's planned expansion into Cox's Bazar and the Chattogram Hill Tracts. In parallel, semi-structured interviews and contingent-valuation surveys with plantation stewards, local government representatives, and prospective buyers (e.g., corporate offset purchasers) will assess willingness-to-pay and governance preferences for benefit-sharing. Preliminary expectations, based on regional blue carbon analogues, suggest substantial soil carbon accumulation relative to biomass carbon and strong community interest in transparent, cooperative-based revenue distribution. Findings will generate GBP's first site-specific blue carbon baseline and a replicable PES design template, informing national carbon-market policy and strengthening GBP's positioning within Bangladesh's 250-million-tree plantation initiative.

Keywords: Blue carbon; payment for ecosystem services; mangrove agroforestry; coastal restoration; climate finance

This work was supported by The Swiss Philanthropy Foundation

Climate-Induced Inter-District Migration: An Anthropological Inquiry into the Displaced Communities of the Haor and Swamp Forest Regions of Sylhet

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This ethnographic study analyzes the crises surrounding traditional livelihoods, cultural memory, and spatial existence among local communities in northeastern Bangladesh, precipitated by the degradation of haor (wetland) basins and swamp forests like Ratargul. Moving beyond reductionist climate discourses that reify displaced individuals as "climate refugees" or statistics, this research uncovers the political-economic dynamics of environmental eviction and the dispossession of customary property rights driven by capitalist interests and state apparatuses.

Conducted across two field sites—the haor basins of Sunamganj/Sylhet and the urban slums of Sylhet city—this qualitative inquiry investigates three core dimensions of displacement: (1) Collapse of Coping Mechanisms: It identifies the socio-ecological breaking points that occur when traditional indigenous knowledge and adaptation strategies fracture under cascading floods and swamp forest degradation. (2) Spatial and Existential Transmutation: It explores the profound ontological shift experienced by communities migrating from open haors to precarious, unsanitary urban slums, detailing how they navigate new axes of social stigma, marginalization, and socio-psychological disenfranchisement. (3) Gendered Political Ecology: It examines the shifting configurations of space and power dynamics, alongside the socio-spatial vulnerability of women—both those left behind in the haors following male out-migration and those who relocate to urban slums.

Crucially, this study challenges colonial and institutional frameworks that depict displaced populations as mere victims. By documenting how these communities mobilize social capital, vernacular knowledge, and agency to reorganize and manifest subtle forms of resistance amid post-disaster realities and hostile urban environments, this research offers a nuanced critique of resilience. Ultimately, this study contributes an important theoretical and policy-oriented dimension to the anthropology of climate change, environmental justice, and human mobility.

A Survey of Artificial Intelligence for Climate Justice: Opportunities and Challenges in Climate-Vulnerable Communities of Bangladesh

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Bangladesh is widely recognized as one of the countries most vulnerable to the impacts of climate change. Recurring floods, cyclones, riverbank erosion, salinity intrusion, and extreme heat events continue to threaten livelihoods, public health, and sustainable development. In response to these challenges, artificial intelligence (AI) is increasingly being utilized in environmental monitoring and climate management through applications such as flood forecasting, air quality assessment, disaster early warning systems, and climate-risk mapping. While these technologies offer opportunities to strengthen climate adaptation and resilience, concerns remain regarding their accessibility, inclusivity, and potential implications for climate justice.

The study critically focuses on a qualitative analysis through academic literature, policy documents, government reports, and relevant case studies. The survey investigates issues related to data ownership, algorithmic bias, digital accessibility, transparency, accountability, and community participation in environmental decision-making. Across the surveyed literature, AI demonstrates considerable potential to improve climate resilience through more accurate forecasting, efficient resource management, and enhanced disaster preparedness. However, the literature also highlights persistent barriers, including unequal access to digital infrastructure, limited availability of high-quality local data, and insufficient involvement of vulnerable communities in AI development and implementation.

This study examines the opportunities and risks associated with AI-based environmental monitoring in Bangladesh, with particular attention to communities disproportionately affected by climate change. Grounded in the principles of climate justice and equitable environmental governance, the research explores whether AI-driven interventions can contribute to favourable climate outcomes or whether existing social, economic, and digital inequalities may limit their benefits.

Impact of Environmental Change on Monkey Habitats in Satchari National Park and Its Effects on Crop Raiding in Adjacent Tea Gardens

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Environmental changes have affected Bangladesh's forest ecosystems, which have also caused more human-wildlife contacts and conflicts. One of the main biodiversity centers of the country, Satchari National Park has lost habitat because of changes in land use, deforestation, more people working there, and pressure from tourists. Monkey species—including Rhesus macaques have lost their natural habitats. More cases of crop-raiding have thus had a significant negative influence on local farmers' financial results and food security as well as tea garden communities. This study examines how environmental change influences monkey habitats in and around Satchari National Park as well as their connection to crop-raiding activity in nearby tea estates. Field observations, plant variabilities, environmental quality analysis, and socioeconomic surveys all helped to define the degree of crop damage, monkey behavior, and habitat circumstances. The data indicate that habitat loss, less availability of natural food sources, and Human-caused disturbances are major causes of increased monkey visits into agricultural fields. This study explores the changes in the environment that have affected the monkeys' habitats which has led to their increased crop-raiding behavior in the neighboring tea gardens causing food insecurity and local tea workers facing economic problems. It reveals that the destruction of the habitat has forced monkeys to look for food in human settlements, and the feeding of tourists has further aggravated the situation. Ten sites were chosen for this study to evaluate the effects of habitat change on monkey behavior, with a focus on crop-raiding events in close-by agricultural and tea garden regions. The study highlights the significance of integrated management strategies and the socioeconomic and environmental consequences of crop predation. Sustainable tourism management, community-based crop protection strategies, and communication between tea estate managers, locals, and conservation organizations are all advised in order to minimize human-monkey conflict. These initiatives help tea community people, indigenous populations and wildlife coexist and preserve biodiversity.

A Comparative Analysis of WASA Water Quality at the Point of Supply and Point of Use and its Implications for Household Health in Chittagong: A Cross-Sectional Study

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In this paper the quality of the water supplied by WASA as assessed at the point of supply (POS) and the point of use (POU) and the impact on the health of households in Chittagong are studied. The study was designed as a cross-sectional study involving 24 households, which included both lab measurements of water samples and water handling and health-related outcomes of household surveys. Physicochemical (pH, turbidity, total dissolved solids, and electrical conductivity) and microbiological (total coliform) parameters were measured and compared with national and international parameters. The findings indicate that although every household used WASA as their main source of drinking water, only 36% reported regular daily supply. Despite a large proportion of households being water-stored (80%) and treated (66.7%), the confidence level in water safety was insignificant (33.3%). Physicochemical parameters of POS and POU were within the WHO and Bangladesh standards, which showed that the chemical quality was good. Nonetheless, there was a rise in microbial contamination between POS and POU by 31% and 54%, respectively, indicating degradation along the lines of distribution and household storage. Also, there were 41.7% of households that had at least one water-related illness, with diarrhea the most common, which could also be a source of health risks due to contaminated water. This study suggested that to achieve safe drinking water in Chittagong, the source-to-consumer approach is necessary because even when the water quality is at acceptable levels at the source, it still turns unsafe at the house level because of the infrastructural constraints and unhygienic handling procedures. It is crucial to reinforce both distribution systems and household water management to cut contamination and safeguard human health.

This study has been conducted and funded by the CATA-Earth Project of the European Union from the Center for Climate Change and Environmental Health (3CEH), Asian University for Women (AUW).

Early Ecological Outcomes of a Newly Established Mangrove Forest

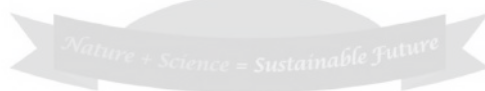
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The primary objective of the mangrove plantation in Mirsarai, Chattogram was to render the surrounding industrial area carbon neutral. In addition to its climate mitigation role, this nature-based solution has contributed significantly to biodiversity. Mangrove ecosystems are globally recognized as critical habitats for biodiversity conservation. This study evaluates the early ecological outcomes of a mangrove plantation established on newly accreted land within the Mirsarai Economic Zone, three years after afforestation. Field assessments conducted in February 2026 recorded 30 insects, 22 birds, 23 fishes and 16 plant species. Functional ecosystem complexity is promoted by multiple species plantation. Quantitative diversity analyses yielded a Simpson's Diversity Index ($D=0.876$), indicating relatively high species diversity. The insect community showed a Shannon-Wiener diversity index ($H' = 2.48$), reflecting moderate to high species diversity. For fish, the $D = 0.23$ suggests low dominance concentration, Pielou's evenness index ($E = 0.73$) indicates that the individuals are fairly evenly distributed, a positive indicator of diversity in a plantation setting. These findings demonstrate that strategic mangrove afforestation on reclaimed lands can rapidly enhance ecosystem value, support substantial biodiversity recovery, and function as an effective conservation reserve even within industrialized economic zones.

BRAC, with support from HSBC and BEZA established the mangrove in Mirsarai. The authors gratefully acknowledge their support.



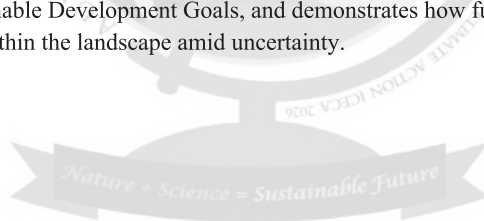
Amar Bon: Integrating Ecological Restoration and Livelihood Resilience in Climate-Affected Landscapes of Bangladesh

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Across Bangladesh, the influence of climate change and environmental stress is progressively driving the alteration of agricultural land, leading to waterlogging, salinity, irregular rainfall, and underuse, transforming its function without always resulting in immediate loss. In response to this condition, Amar bon is a mixed agroforestry system for underutilized and climate-change-impacted lands, incorporating both ecological restoration and practical everyday use. By integrating fruit, timber, and medicinal plants in a layered system, often complemented by intercropping with vegetables, herbs, and vines, this system enhances biodiversity, improves soil structure, retains moisture, and creates a microclimate. Besides, it supports climate adaptation and mitigation by providing habitat and capturing carbon, and by diversifying livelihoods through short- and long-term production and revenue generation, thereby improving household economic resilience and nutrition. Based on case studies collected from coastal and drought-prone Barind regions between January and June 2026, Amar Bon shows how a locally adapted system can restore land function even under challenging conditions. Additionally, it emphasizes the importance of farmers' knowledge and everyday care of their fields in shaping outcomes. Nevertheless, Amar Bon offers a place-based, scalable approach that integrates livelihood, climate response, and restoration in alignment with the principles of Nature-based Solutions and Sustainable Development Goals, and demonstrates how function and value can be gradually restored within the landscape amid uncertainty.



Invisible Vulnerability: Climate Risk and State Exclusion among the Manta Community of Bangladesh

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Bangladesh is a riverine delta where rivers have long shaped settlement patterns, livelihoods, and socio-economic life. Among the country's river-dependent populations, the Manta community, often called river gypsies, lives permanently on boats due to the absence of secure settlements. This unique way of life makes them highly vulnerable to increasingly frequent climate-related hazards, including cyclones, storms, and floods. At the same time, their lack of a permanent address excludes them from disaster management services and climate adaptation support. Despite these challenges, qualitative research on the climate vulnerabilities of the Manta community remains limited. This study explores how the climate-related vulnerabilities of the Manta community are overlooked within formal disaster management and adaptation systems. An exploratory qualitative design was employed to examine the lived experiences of Manta women aged 18-50 years. Data were collected through 17 in-depth interviews, three informal group discussions, and field observations in Laharhat and Charbaria, Barisal, Bangladesh. Interviews were audio-recorded, transcribed, translated, and analyzed thematically using inductively generated codes informed by the framework of structural inequality. Findings show that cyclones, heavy rainfall, and monsoon flooding have become normalized aspects of everyday life, threatening both livelihoods and survival. Participants described sudden storms that caused drowning, boat displacement, and the loss of family members. However, despite repeated exposure to climate hazards, their vulnerabilities remain largely invisible within state-led disaster management and climate adaptation frameworks because their nomadic lifestyle and lack of permanent residence exclude them from institutional support. Women face additional risks during the monsoon due to caregiving responsibilities. The findings demonstrate that climate vulnerability is shaped not only by environmental exposure but also by social and institutional exclusion. This study calls for climate adaptation policies that recognize the specific needs of mobile and nomadic communities, ensuring equitable access to disaster preparedness, relief, and long-term adaptation support.

Keywords: Climate vulnerability; structural inequality; Manta community; state exclusion; climate adaptation

Geospatial Analysis of Wetlands Based on Land Use / Land Cover Dynamics Using Remote Sensing and GIS in the North-Eastern Region of Bangladesh

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Wetlands in north-eastern Bangladesh, particularly the Hakaluki and Tanguar Haor areas of Sylhet and Sunamganj, are important ecosystems that support rich biodiversity and local livelihoods. These regions are increasingly threatened by rapid land use/land cover changes (LULC) driven by both natural and human influences. Regular monitoring of this crucial ecosystem is required to understand ecological changes and identify high-risk zones of the wetlands for conservation planning and policy formation. This study investigates the spatio-temporal dynamics of LULC in two significant wetland ecosystems in north-eastern Bangladesh: Hakaluki Haor and Tanguar Haor, over 35 years (1990-2025). Multispectral satellite imagery and geospatial techniques were used in this study to classify the LULC into distinct categories. Maximum likelihood classification algorithms were employed to classify images from the Landsat satellite series, and post-classification comparison techniques were used to detect LULC changes. The image classification resulted in overall accuracies of 83%, 85%, 86%, and 90% for the images from 1990, 2000, 2010, and 2025, respectively. Results indicate alarming ecological decline in the Hakaluki and Tanguar Haor wetlands of north-eastern Bangladesh from 1990 to 2025. From 1990 to 2025, agricultural land increased by 15.67% in Hakaluki Haor and 32.13% in Tanguar Haor, while waterbodies and vegetation experienced substantial declines due to population pressure, climatic variation, and unplanned development. The deep-water surface has decreased by 11358.1 hectares (-28.13%) in Hakaluki Haor and 7621.83 hectares (-47.91%) in Tanguar Haor from 1990 to 2025. This study provides essential insights, including spatially explicit information on the critical wetlands, to relevant stakeholders to implement sustainable land use practices and pursue community-based conservation measures.

Keywords: Wetland; Ecosystem; Land Use/Cover Change (LUCC); Remote Sensing; GIS; Landsat

Tube-well Water Quality and Its Health Impact on the People of Char Majherdiar, Rajshahi, Bangladesh

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This study was carried out to determine the water quality of tube-well and its health impact on the people of Char Majherdiar of Padma River in Rajshahi. Water samples were collected from six different locations of the study area. A questionnaire survey was conducted on 316 households to assess the health impact of tube-well water. Physicochemical parameters (pH, alkalinity, TDS, Cl, phosphate, EC, and TH), heavy metals (As, Fe, Mn, Cu, Zn, Cr, Cd, Ni and Pb) and fecal coliform bacteria of water were analyzed. The tube-well water was found slightly alkaline with hard in nature. The study observed that iron, manganese, chromium, cadmium, nickel, lead, alkalinity, phosphate, and fecal coliform bacteria exceeded the Bangladesh & WHO drinking water standard limits (Figure 1). The high cadmium exposure can damage to the kidneys, liver, bones and blood [1], nickel can increase the risk of lung and nasal cancer [2] and lead exposure linked to anemia, blood pressure, hypertension and heart disease [3]. The high contamination of heavy metals and microbial presence (75% people affected in dysentery and diarrhea) in tube-well water poses the potential health risks to the local people of Char Majherdiar in Rajshahi.

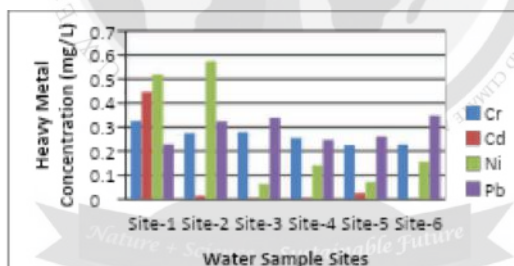


Figure 1. Concentration of Cr (chromium), Cd (cadmium), Ni (nickel), and Pb (lead) of tube-well water.

Keywords: tube-well; water quality; physiochemical; heavy metals; health impact.

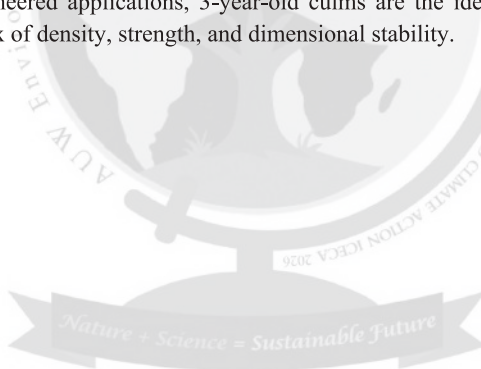
Variation of Physical and Mechanical Properties of *Dendrocalamus brandisii* with Age

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Dendrocalamus brandisii is a large-sized bamboo species characterized by thick culm walls and considerable potential for structural and engineering applications. This study used 2-, 3-, and 4-year-old culms sampled from the bottom, middle, and top positions to assess age-related variation in its mechanical and physical properties. The Bangladesh Forest Research Institute evaluated specimens taken from a plantation at University of Chittagong in accordance with ISO 22157:2019. Internode elongation with maturity was indicated by the increase in culm height from 13.41 m to 14.02 m and the decrease in node number from 16 to 13. Density rose, reaching a peak of 0.662 g/cm³ in 3-year-old culms, whereas moisture content dropped from 117.74% to 94.22%. MOR varied from 33.14 MPa to 54.82 MPa, with 4-year-old culms having the highest average (45.13 MPa). Compressive strength parallel to the grain ranged from 9.17 MPa to 39.5 MPa, with three-year-old culms achieving the highest average (30.96 MPa). MOE varied from 3.24 GPa to 10.16 GPa, reaching its maximum in the upper region of 4-year-old culms. For structural and engineered applications, 3-year-old culms are the ideal harvest age since they showed the best mix of density, strength, and dimensional stability.



Ecological Status and Socio-ecological Drivers of *Cycas pectinata* Persistence in Baroiyadhala National Park (BdNP)

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Cycas pectinata, Bangladesh's only native cycad, is experiencing a rapid decline in population due to poor natural regeneration and increasing anthropogenic disturbances, despite its ecological and conservation significance [1]. This study evaluated the ecological status, regeneration dynamics, morphological characteristics, and socio-ecological drivers influencing the persistence of *C. pectinata* in four areas (Amtola, Dottorichora, Fhulgazi, and Jambagan) of Baroiyadhala National Park through ecological field surveys and community questionnaires. A total of 23 circular plots recorded 71 mature individuals and 24 seedlings, with mature tree density (27.22 individuals ha⁻¹) substantially exceeding seedling density (9.20 individuals ha⁻¹), indicating a severe regeneration bottleneck. Mature tree abundance differed significantly among sites, whereas seedling abundance showed no significant spatial variation. A significant positive relationship between mature trees and seedlings suggests that adult populations strongly influence regeneration potential. Morphological analyses demonstrated that stem diameter was positively correlated with leaf production, while plant height showed no significant relationship with growth performance. Seedlings were spatially clustered near parent trees (mean distance 5.90 ± 4.45 m), reflecting limited seed dispersal. Regeneration health varied significantly with disturbance type, with soil erosion identified as a major constraint. Although 85% of respondents recognized the species, only 11.8% among them were aware of its conservation importance. These findings provide scientific evidence to support habitat restoration, disturbance mitigation, community awareness, and species-specific management strategies, thereby contributing to biodiversity conservation policy and the long-term persistence of this nationally threatened gymnosperm in Bangladesh.

Nature + Science = Sustainable Future

Impact of Peri-urban Mongla Port on Litter Pollution, Carbon Sequestration, and Water Quality Variations in the Sundarbans Mangrove Ecosystem, Bangladesh

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This study evaluated seasonal variations in surface water quality, anthropogenic marine debris (AMD), and sediment characteristics along a 10.8 km transect from Mongla Port to Joymoni in the Chandpai range of the Sundarbans. Field surveys were conducted across nine sampling stations during the monsoon, post-monsoon, and pre-monsoon seasons. Surface water quality was assessed using pH, salinity, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), alkalinity, and hardness analysis. Sediment samples were analyzed for pH, salinity, EC, soil organic carbon (SOC), soil organic carbon stock (SOCS), soil organic matter (SOM), bulk density, carbon sequestration, and sediment accretion rate. The AMD was quantified using the OSPAR quadrat-based approach. In surface water, the highest levels of salinity, EC, TDS, and hardness occurred during the pre-monsoon season, whereas the lowest DO levels were recorded in post-monsoon season. Sediment analyses revealed significant seasonal variations in salinity, EC, SOC, SOM, bulk density, and sediment accretion rate. The highest SOC concentrations occurred during the post-monsoon season, ranging from 0.31 to 26.32%. Out of 2,313 collected litter items, plastics accounted for 81.1% of the total. Mongla Port emerged as a significant pollution hotspot, while deeper forest areas remained comparatively less degraded. The lack of statistically significant seasonal variation in litter abundance indicates that waste deposition is a persistent, and ongoing threat for the study area. Multivariate analysis demonstrated that organic carbon accumulation is the primary driver of sediment properties and blue carbon storage. Overall, these findings reveal that blue carbon storage in the Sundarbans is primarily regulated by sediment biogeochemical processes, even though anthropogenic litter acts as a continuous environmental stressor. This study provides critical baseline data for coastal management, underscoring the urgent need for targeted waste management and sediment conservation strategies in the Mongla-Sundarbans region.

Keywords: Mangrove; anthropogenic debris; carbon sequestration; seasonal dynamics

Isolation, Molecular Characterization, and Evaluation of Plant Growth-Promoting Traits of Rhizobacteria Isolated from *Pongamia pinnata* (Koroch)

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Plant growth-promoting rhizobacteria (PGPR) are a promising alternative to chemical fertilizers due to their ability to enhance plant growth, development, and stress management. The goal of this study was to isolate, characterize, and functionally analyze rhizobacteria from the rhizosphere of *Pongamia pinnata*, a leguminous tree species grown dominantly in the Ratargul Swamp Forest, Sylhet. The isolation and biochemical characterization were carried out by using standard microbiological procedures, and molecular characterization was performed by full-length (V1-V9 regions) sequencing of the 16S rRNA gene followed by assaying twelve PGP activities. A total of 64 rhizobacterial isolates were obtained in initial screening, and based on morphological and biochemical studies, 34 were selected for further studies. PCR was performed, and the presence of approximately 1465 bp of amplicon was confirmed by agarose gel electrophoresis. Molecular identification was conducted by Sanger sequencing of the 16S rRNA gene, revealing the dominant bacterial genera, including *Bacillus* spp., *Enterobacter* spp., *Burkholderia* spp., *Serratia* spp., *Priestia* sp., and *Lysinibacillus* sp., highlighting substantial taxonomic diversity. Phylogenetic analysis further elucidated the evolutionary relationships among these isolates. Analysis of 12 PGP activities revealed a high prevalence of GA production (100%); phosphate solubilization, zinc solubilization, phytase production, and ammonia production (91.18%); and organic acid production (88.24%). Siderophore production (82.35%), proteolytic activity (85.29%), lipolytic activity (67.65%), and cellulolytic activity (64.71%) occurred at moderate frequencies, while IAA production (35.29%) and HCN production (26.47%) were less common. Efficacy of this PGPR was tested on the seedling growth of two test plants rice and mung bean. Both the test plants treated with consortium-based biochar showed significant growth promotion. Rice showed enhanced overall fresh biomass by 24% and overall dry biomass by 27% after 15 days of seeded in pots. Mung bean showed enhanced overall dry biomass by 28% after 10 days of seeded in pots. The multifunctional PGP profiles, particularly nutrient solubilization and phytohormone production, underscore their potential as biofertilizers to enhance sustainable agriculture, especially in nutrient-deficient ecosystems.

The authors are grateful to the Department of Genetic Engineering and Biotechnology, School of Life Science, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh.

Effect of Black Soldier Fly frass, Black Soldier dead flies, Vermicompost and Trico compost on the growth of radish.

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A study investigated the effects of black soldier fly (BSF) frass, BSF dead flies, vermicompost, and Trico-compost on radish (*Raphanus sativus*) growth over seven weeks. Amendments were applied to sandy loam soil at 0%–40% (v/v) and compared against standard chemical NPK fertilizer. Results indicated distinct differences in efficiency. While vermicompost and Trico-compost showed peak performance at 40%, BSF-based amendments reached maximum agronomic efficiency at 20%–30%, with a declining trend at 40%. Notably, the 20% BSF application significantly outperformed both 40% traditional composts and the recommended NPK dose in plant growth and phosphorus (P) accumulation. Soil analysis showed that 20% BSF treatments boosted available phosphorus to 148.03 ppm, far exceeding the control (12.93 ppm) and NPK treatment (78.87 ppm). Furthermore, shoot P concentrations reached 0.96% for BSF frass and 0.86% for BSF shells at the 20% dose, surpassing 40% vermicompost (0.70%), 40% Trico-compost (0.77%), and NPK (0.74%). Pearson correlation analysis confirmed a strong relationship between soil organic matter and available phosphorus ($r = 0.694$), indicating that efficient mineralization from BSF byproducts directly enhanced nutrient translocation. These findings establish BSF frass and shells as superior, nutrient-dense alternatives to conventional fertilizers. An optimal application rate of 20% (v/v) is recommended for organic agriculture and roof gardening; this rate maximizes nutrient availability and radish growth while reducing the required volumetric organic input by half compared to traditional composts, providing an efficient solution for modern crop production.

Keywords: Black soldier fly (BSF) frass; BSF dead flies (Shell); vermicompost; tricompost; soil available phosphorus; organic agriculture; nutrient translocation.

Substrate-Dependent Germination and Early Growth Performance of *Moringa oleifera* Under Four Soil Amendments: A Comparative Nursery Trial from the Green Bangle Project, AUW Main Campus

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Moringa oleifera is widely promoted for reforestation and nutritional livelihood programs in Bangladesh, yet nursery-stage guidance on optimal soil amendment for seedling establishment in coastal, resource-constrained institutional settings remains limited, particularly regarding non-conventional and circular-economy-derived substrates such as Black Soldier Fly (BSF) frass. This study compares germination height and survival of *Moringa oleifera* across four soil treatments, BSF frass-amended soil, cowdung-amended soil, synthetic potting mix, and unamended soil, to identify the substrate best suited for institutional-scale nursery propagation. Seeds were planted on 15 July 2026 at the AUW Green Bangle nursery, with four Green Bangle Project interns each managing 125 nursery bags per treatment (500 bags total), recording seedling height and survival over the growth period. Soil-only treatment produced the highest survival (108/125, 86.4%) and greatest maximum height (24 cm), followed by synthetic mix (101/125, 80.8%; max 20 cm), cowdung (95/125, 76%; max 19.5 cm), and BSF frass-amended soil, which showed the lowest survival (50/125, 40%) despite a comparable maximum height (19.7 cm), indicating high within-treatment growth variability. These results suggest that while BSF frass is valued as a circular, waste-derived soil amendment, its current formulation or application rate may be phytotoxic or nutrient-imbalanced for early-stage *Moringa* establishment, warranting dilution trials before scale-up. Unamended local soil, by contrast, performed most reliably, suggesting existing campus soil already meets *Moringa*'s early nutrient requirements without additional input cost. Findings offer GBP direct, actionable guidance for nursery resource allocation and raise a specific follow-up question regarding safe BSF frass concentration thresholds, with relevance to low-cost, circular-economy-aligned reforestation programs across similar coastal nurseries in Bangladesh.

Keywords: *Moringa oleifera*; nursery trial; soil amendment; Black Soldier Fly frass; seedling survival

This work was supported by The Swiss Philanthropy Foundation

Wound Healing Potential of Rosemary (*Salvia rosmarinus*) and Indian Rosewood (*Dalbergia sissoo*) Essential Oils in Human Dermal Fibroblasts

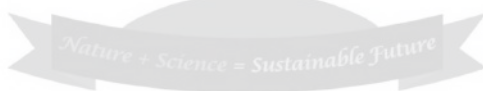
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Essential oils have attracted increasing attention as natural therapeutic agents because of their antimicrobial, anti-inflammatory, and regenerative properties. This study evaluated the wound-healing potential of rosemary (*Salvia rosmarinus*) and Indian rosewood (*Dalbergia sissoo*) essential oils using human dermal fibroblast (HDF-a) cells. Cytotoxicity was assessed by the MTT assay at concentrations ranging from 7.815 to 1000 µg/mL. Both oils significantly increased fibroblast viability at 250 and 500 µg/mL, and these concentrations were selected for subsequent analyses. Genotoxicity was examined using Hoechst 33258 staining, revealing no significant increase in micronuclei or other nuclear abnormalities compared with untreated controls. An in vitro scratch assay demonstrated significantly faster wound closure in essential oil-treated groups during the 48-h observation period, indicating enhanced fibroblast migration and proliferation. Overall, rosemary and Indian rosewood essential oils promoted wound repair without inducing cytotoxic or genotoxic effects, providing experimental evidence supporting their traditional use. These findings highlight their potential as promising natural candidates for wound management, although mechanistic investigations and in vivo validation are still required.

This work was supported by TÜBİTAK 2209-A Research Project Support Programme for Undergraduate Students (Project No. 1919B012318760).



Panel Discussion

Women in Environmental Science: An Alumnae Panel Session

This panel explores the diverse experiences of women navigating the field of environmental science—an area where gender disparities still exist, yet where women are increasingly emerging as powerful voices for change. The discussion will highlight the systemic barriers women face in research, leadership, and fieldwork, while also celebrating the unique perspectives, community-driven approaches, and resilience they bring to environmental problem-solving. Panelists will reflect on navigating academic and professional spaces, the importance of mentorship and representation, and the role of intersectionality in climate justice. This conversation is especially relevant as the world seeks inclusive, equitable solutions to environmental crises. Through their stories and insights, the session aims to inspire dialogue on how institutions and individuals can create space for women's leadership in science and sustainability.

Moderator

Tanusree Das Gupta

Master of Science and Engineering in Environmental Science; MSc in Wildlife and Conservation Management, University of South Wales

Alumnae Panelist

1. **Afla Musharrat**, MSc in Water Science, Policy and Management, University of Oxford
2. **Sidratun Nur Chowdhury**, MSc in Water Science, Policy and Management, University of Oxford; Program Coordinator, Asian University for Women
3. **Ms. Farzana Fayeza**, MA in Environment Development & Policy, University of Sussex
4. **Arpa Das**, MSc in Environmental Science, Banaras Hindi University
5. **Sal Sabila**, Master's in Environmental Science & Engineering, University of Science and Technology Beijing (USTB)

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