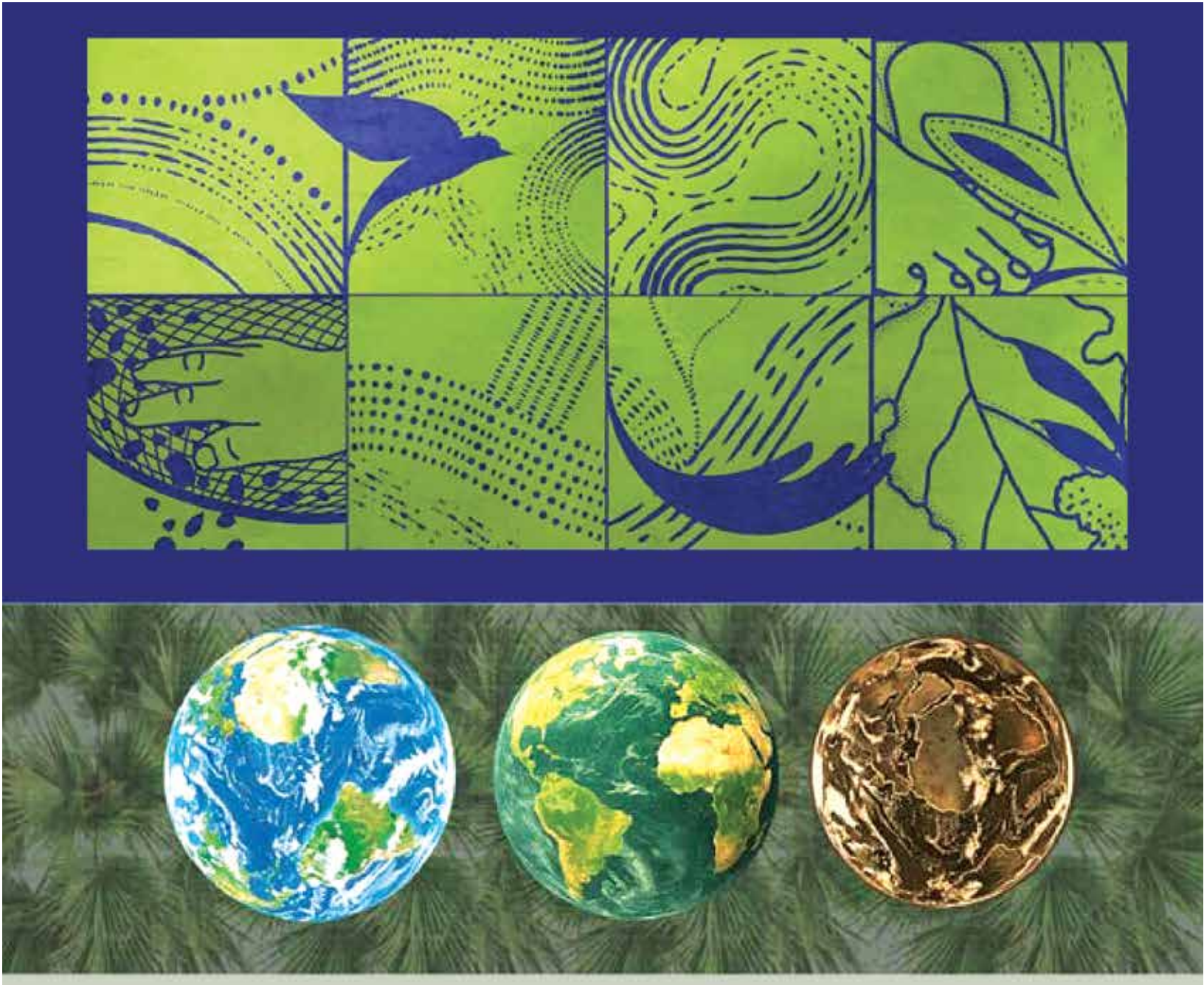

International Conference on Environment and Climate Action 2025

Organized by

Environmental Sciences Program, Asian University For Women, Chattogram, Bangladesh

International Conference on Environment and Climate Action

2025

Date: 2nd August, 2025
Location: Chittagong

About the Conference

The 1st International Conference on Environment and Climate Action (ICECA 2025), hosted by the Environmental Sciences Program and the Green Bangle Movement at the Asian University for Women, brings together over 200 participants from diverse countries across the globe. This student-led initiative, organized in partnership with the Environmental Sciences Club and AUW Student Government, serves as an inclusive platform for scholars, practitioners, and youth leaders to exchange ideas, research, and strategies addressing today's most pressing environmental issues.

The central theme of ICECA 2025 is "**আমি** (Ami, English translation: I) For A Greener World", which invites participants to reflect on their individual and collective responsibilities in shaping a more sustainable, just, and resilient world. By centering the self as an agent of change, the conference encourages deep engagement with the roles we each play in climate action and environmental stewardship.

ICECA features keynote addresses, invited expert panels, oral and poster presentations, and a field visit to observe local ecological practices and sustainability initiatives. The sessions span multiple subthemes, including ecofeminism, youth leadership, indigenous knowledge systems, climate mitigation, environmental justice, environmental chemistry biodiversity and ecosystems, and sustainable innovation. ICECA 2025 aspires to foster meaningful dialogue, interdisciplinary collaboration, and community-rooted action that transcends borders and empowers participants to act with intention and integrity.

Partners

Conference Themes

ROOTS AND REVOLUTIONS

Ecofeminism, Youth Leadership, Local Action & Environmental Education Women In Environmental Conservation & Leadership Youth Activism & Climate Movements Community-Based Adaptation & Local Solutions Environmental Education & Awareness
Traditional Knowledge & Cultural Resilience

WILD AND WELL

Biodiversity, Ecosystems, And Nature Conservation Biodiversity Hotspots & Species Protection Ecosystem Restoration & Rehabilitation
Planetary Health, Marine & Coastal Ecosystem Management
Freshwater Ecosystem & Pollution Control
Forest Conservation & Wildlife Corridors Sustainable Development Goals And Un Sdg

VOICES FOR EARTH

Environmental Justice, Governance & Community Empowerment Environmental Agreements & Negotiations Environmental Governance
Law & Policy Implementation
Climate Journalism & Public Communication
Justice, Equity & Indigenous Rights Environmental Ethics & Accountability

PLANET IN BALANCE

Climate Mitigation & Adaptation Climate-Induced Migration & Displacement Climate Smart Agriculture & Food Security Ecosystem-Based Adaptation & Nature-Based Solutions Urban Resilience & Heat Mitigation
Water Resource Management & Drought Resilience Palm And Mangrove Plantation Coastal Management

GREEN FUTURES

Sustainable Development & Green Economy Innovation Circular Economy & Resource Efficiency
Renewable Energy & Just Transition
Eco-Tourism, Ecopreneurship And Waste To Wealth
Remote Sensing & Geospatial Technologies
Ai & Big Data For Climate Action Nanotechnology, Biotechnology & Green / Environmental Chemistry

Organizing Committee

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Dr. Rubana Huq
Vice Chancellor, Asian University for Women, Bangladesh

Organizing Chair

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Director, Environmental Sciences Program & Associate Professor of Chemistry,
Asian University for Women, Bangladesh

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Environmental Sciences Program, Asian University for Women

Designer : Ramisa Maliyat, Green Bangle Movement, Asian University for Women

Messages

Patron
Dr. Rubana Huq

As the world grapples with climate challenges, the strides we've made in environmental research, climate action, and grassroots innovation call for both celebration and critical reflection. The drive for sustainability has never been more urgent, or more hopeful.
The International Conference on Environment and Climate Action (ICECA 2025) stands as a testament to this hope. It honors the vision and voices of students, researchers, and changemakers across disciplines who are daring to reimagine our future.

A special recognition goes to the Environmental Sciences Program at AUW for nurturing a generation of women committed to scientific inquiry and environmental justice, and the Green Bangle Movement (GBM) for its grassroots commitment to sustainability and social impact. Their contribu- tions have been instrumental in shaping the ethos and impact of this conference.

To all who made ICECA 2025 possible, organizers, participants, guests, speakers, sponsors, and partners, thank you for your dedication, energy, and belief in a better world.

Chief Guest
Sonia Sultana

It is a privilege to join the International Conference on Environment and Climate Action (ICECA), thoughtfully arranged by the Environmental Sciences Program at the Asian University for Women (AUW).

The environmental challenges we face today are interconnected, and overcoming them requires collective effort at every level of society. I am especially inspired by the energy of youth movements and grassroots initiatives that are driving change in Bangladesh and beyond. By fostering collaboration between local communities, academia, and industry, we can create solutions that are both practical and inclusive.

I hope ICECA 2025 inspires every participant to take forward actionable ideas, not only for discussion but for real-world implementation. Together, our combined efforts can pave the way for a sustainable and equitable future.

Organizing Chair
Dr. Mosae Selvakumar Paulraj

It is with immense pleasure that I welcome you all to the 1st International Conference on Environment and Climate Action (ICECA) 2025, hosted by the Environmental Sciences Program at the Asian University for Women (AUW). As a landmark initiative of AUW and a signature effort of the Environmental Sciences Program and the Green Bangle Project, ICECA serves as a vital platform for interdisciplinary exchange. We are excited to bring together students, scientists, faculty, women researchers, activists, NGOs, industry leaders, and policymakers committed to environmental sustainability. ICECA 2025 is a student-driven conference, organized in collaboration with the Green Bangle Movement, the AUW Environmental Science Club, and Student Government. In a world facing pollution and unsustainable growth, advanced research in environmental and climate action is more critical than ever. This year, we aim to create a space for urgent conversations and bold ideas on the climate crisis, spanning scientific innovation to community-driven adaptation strategies. Highlights include a special session on "Women in Environmental Science: Opportunities and Challenges," virtual speeches, and diverse themes. I believe every good work becomes great through networking. My sincere gratitude goes to the Organizing Committee, students, sponsors, attendees, presenters, reviewers, session chairs, judges, and distinguished speakers for making this event a success.

Co-Chair
Ahmedul Kabir

Co-Chair
Ms. Afrida Asad

It is a great pleasure for us to welcome you to the 1st International Conference on Environment and Climate Action (ICECA 2025), organized by the Environmental Sciences Program at Asian University for Women, Chattogram, Bangladesh.

ICECA 2025 aims to serve as a platform where local realities meet global perspectives, and where transformative conversations can unfold around environmental justice, gender equity, and sustainable development. We believe that tackling the climate crisis requires not only science-based strategies and policy shifts, but also rootedness in community resilience, indigenous knowledge, and the radical imagination of those who have historically been excluded from decision-making.

We are deeply grateful to all keynote speakers, presenters, participants, reviewers, and guests for enriching ICECA 2025 with your presence. This conference would not have been possible without the unwavering support of the student organizing team and the broader AUW community. Your dedication and teamwork have brought this vision to life.

We wish you a successful and memorable ICECA 2025.

Secretaries

Shaika Mohammad Chowdhury

Arap Jahan Nodi

Afra Nawar Rahman

Miftahul Jannat

Ayesha Shafika Bhuiyan

Mipru Marma

Organizing ICECA 2025 has meant pushing boundaries, and yes, at times, pushing buttons too. What you see today is not just the result of planning; it's the product of relentless dedication, teamwork, and a little bit of chaos. Behind every backdrop, every badge, and every minute of this conference stands a team of student secretaries who've worked tirelessly, through sleepless nights, juggling endless spreadsheets, answering at 3 a.m. WhatsApp pings, navigating last-minute curveballs, and sacrificing breaks, meals, and sometimes sanity, all to bring this vision to life. This journey has tested our limits, but it has also shown us what is possible when passion meets purpose. We've laughed, cried (a little), and grown through every obstacle and breakthrough. To all our participants, speakers, organizers, and distinguished guests: thank you for being here, for believing in the power of environmental action, and for bringing meaning to all our efforts. Your presence doesn't just fill a room, it completes the story we've worked so hard to tell. Let this conference be a celebration of collective effort, youth leadership, and the urgent hope we carry for our plane.

Keynote Speakers

Dr. Gawsia W. Chowdhury
Professor
Department of Zoology, University of Dhaka, Bangladesh

Dr. Nadia White
Associate Professor
Director
Environmental Science & Natural Resource Journalism graduate program,
University of Montana School of Journalism, University of Montana, USA

Dr. Sara Nowreen
Professor
Institute of Water and Flood Management, BUET, Bangladesh

Dr. Elizabeth Eklund
Lecturer
Purdue University
West Lafayette, Indiana, USA

Dr. Abu Syed
Principal Researcher and Managing Director
Centre for Research on Environment and People (C4RE), Dhaka, Bangladesh

Dr. Md. Mostafa Kamal Sarkar
Head of AI,
Technovative Solutions Limited, Manchester, UK.
Committee Member,
ISO/BSI at the British Standard Institution, UK.
Visiting Fellow
Nuffield Department of Medicine (NDM), University of Oxford, UK.

Dr. Nandini Rajamani
Associate Professor
Biology Department at IISR Tirupati, India.

Dr. Gawsia Wahidunnessa Chowdhury

The Chronicles of Plastic from Boon to Bane: Research and Outreach Activities for Sustainable Future in Bangladesh

Gawsia Wahidunnessa Chowdhury and the Plastic Pollution and Mitigation Research Team
Aquatic Zoology Research Group
Department of Zoology, University of Dhaka, Dhaka 1000, Bangladesh

Abstract

A global expedition, successfully implemented by the National Geographic Society, investigated the journey of plastic pollution from land to sea. The research emphasized the interconnected impacts of plastic pollution on water, air, and soil, with special focus on microplastics, waste management systems, and community involvement. Through GPS-enabled bottle tracking and rapid assessments, we demonstrated the daily discharge of billions of microplastics—primarily fibers—into the Bay of Bengal. This initiative included educational programs such as "Teachers for Planet Earth", capacity-building workshops, and policy dialogues to raise awareness and foster local solutions. The global initiative helped to form a local plastic pollution mitigation research team in Bangladesh.

The long-term ecological changes resulting from this pollution are likely irreversible. Developing countries in the Global South, including Bangladesh, are particularly vulnerable to the challenges of poorly managed plastic waste due to a lack of institutional, financial, and technical resources to combat plastic pollution. Aquatic Zoology Research Team's plastic pollution mitigation research unit revealed significant plastic pollution across aquatic ecosystems, including the Sundarbans, where we documented microplastic biomagnification through trophic levels, threatening top predators like the Ganges river dolphin. In parallel, our research examined gender-inclusive approaches to plastic waste recovery, particularly from abandoned fishing nets and multi-layered sachets. Studies in Cox's Bazar and Charfesson highlighted the challenges and opportunities of involving women in net recycling enterprises. Recommendations focused on creating equitable, economically viable value chains and aligning them with national waste mitigation efforts. We also assessed plastic accumulation along navigation routes in the Sundarbans and proposed an integrated waste management strategy using citizen science, aiming to scale this model across Bangladesh's coastal belt.

Our comprehensive research underscores the urgent need for coordinated scientific research, policy initiatives and community-driven responses to mitigate the ecological and social threats posed by the emerging plastic pollution in Bangladesh.

Dr. Nadia White

The fight for factual integrity

Nadia White
Environmental Science & Natural Resource Journalism graduate program,
University of Montana School of Journalism, University of Montana, Missoula, Montana.

Abstract

Denial has been baked into climate change discourse since the fossil fuel industry began perceiving climate science as a threat to the bottom line. Decades spent arguing for a shared factual reality in the climate realm slowly led to a dramatic reduction in the number of people who deny that anthropogenic climate change is happening. Today, the U.S. is leading a reversal of those efforts and applying denial as a strategic first response to a wide swath of inconvenient truths. The international community can forge ahead without the U.S. by reinforcing existing relationships.

Scientific researchers, advocates and journalists are on the front line defending against the emerging “fact- free” climate environment. This triad creates new knowledge, puts it into context and shares it with both the public and policy makers. In healthy democracies, this cycle allows civil society to recognize problems and craft and test solutions in the form of new policies and initiatives. When the cycle fails, it is often those who are most vulnerable to policy failure and climate change impacts who are affected.

To protect and strengthen these relationships journalists and scientists should both work to safeguard their reputation as honest brokers of factual information. That means recommitting to basic principles: Transparency, verification or repeatability, and a disinterested pursuit of accurate information. As long-standing funding mechanisms shift global climate change studies and responses it is important that those who are dedicated to creating a shared factual reality acknowledge the interconnected nature of their relationship. Scientists and journalists have different jobs in the climate sphere, but they can support each other in the work to keep verifiable facts at the forefront of climate policy.

Dr. Sara Nowreen

Impact of Anthropogenic Activities on Groundwater Surface Water Interaction in Chattogram Hill Forest

Sharfaraj Khdem, Sara Nowreen
Institute of Water and Flood Management,
Bangladesh University of Engineering and Technology, Dhaka -1000

Abstract

Forested watersheds are vital for regulating hydrological processes, sustaining water availability, and supporting ecosystems and livelihoods, especially in mountainous regions like the Chattogram Hill Tracts (CHT) of Bangladesh. This study investigates land use impacts on groundwater–surface water (GW–SW) interactions in two contrasting sub-watersheds: Bangalhalia (less forested) and Kamalachari (densely forested), using geo- physical surveys, hydrological monitoring, stable isotopes (δ18O, δ2H), and hydrochemical analysis. Canopy assessments revealed healthier forest structure in Kamalachari, with 15% of trees over 20 m tall, compared to just 4% in Bangalhalia. Land use analysis (2000-2024) showed forest decline in both areas, but Kamalachari is losing forest faster (0.07 m2/year vs. 0.019 m2/year), with a concurrent rise in agriculture and settlements. Hydrometeorological data (Feb 2024-Mar 2025) revealed higher humidity in Kamalachari, while Bangalhalia received more rainfall (227 mm more annually) and showed slightly warmer temperatures. Geophysical analysis identified three layers in the aquifer, with layer #1 and #3 being continuous and productive, and layer #2 discontinuous and limited. Recharge patterns varied with land use and topography. Forested uphill wells had the highest recharge (up to 74 mm), while agricultural downslope wells showed recharge driven by irrigation. Isotope data indicated rapid meteoric recharge in forests (depleted δ18O, high D-excess) and evaporative losses in agriculture. Water in Kamalachari remained geochemically natural, while Bangalhalia exhibited signs of agricultural contamination. Still, both had excellent water quality per Entropy-weighted water quality index- (EWQI). This study highlights the crucial role of forest cover in promoting infiltration, maintaining baseflow, and protecting water quality. Forest conservation is essential for securing long-term water sustainability in hilly watersheds.

Dr. Elizabeth Eklund

Climate Changes: Adaptation, Realities, and Imaginaries of Global Climate Shifts

Elizabeth Eklund

Lecturer
Purdue University, West Lafayette, Indiana, USA

Abstract

How do you adapt to climate change when you don't know exactly what will come? One of the challenges that faced climate change scientists decades ago was predicting what the possible outcomes of climate change could be. This lack of certainty resulted in envisioning a future based on extreme weather events, which shaped the imaginary of "Global Warming." The fact that global warming could lead to global cooling and overall greater variability has created unique adaptation challenges as new and unexpected hazards emerge. This paper looks at some of the unexpected climate and extreme weather phenomena to show that the way climate change has been envisioned has spurred action and inaction. Despite the unpredictability of annual climate change disasters hazards, patterns have emerged. The IPCC Sixth Assessment provides some insights: 896 million people live in low-lying coastal areas and island communities coastal erosion, sea level rise, sa- linity intrusion, and extreme weather events; agricultural productivity has been reduced overall as growing seasons and water availability is reduced; drought is causing dust storms and fire potential; glaciers are retreat- ing while flood events and landslides threaten mountain communities. The diverse range of possible outcomes require a diverse range of responses. Further, what are the hard limits to adaptation and what conditions lead to transformational adaptation, specifically climate migration? This paper shows that while some of the most dramatic and negative impacts of every day climate change are happening in the Global South, impacting the people least responsible, people in the Global North are spending on adaption strategies to maintain and rebuilt communities despite increasing costs.

Dr. Abu Syed

Advancing Flash Flood Risk Assessment: A GIS-Based Multi-Criteria Framework for Susceptibility Mapping in Vulnerable Hill Regions

Md. Abu Syed, PhD
Centre for Research on Environment and People (C4RE), Dhaka-1206

Abstract

Flash floods are a recurring natural disaster in the southeastern and northeastern hilly regions of Bangladesh, particularly in the Bandarban district. These events cause significant damage to homesteads, agricultural lands, infrastructure, and livelihoods. While previous studies have focused on flash flood incidence mapping, there remains a critical need for susceptibility mapping to enhance early warning systems (EWS) and reliable Decision Support System (DSS), disaster risk reduction (DRR), and disaster risk management (DRM) strategies. This study employs an integrated geospatial approach using ArcGIS Pro to analyze 11 key conditioning factors, including elevation, slope, aspect, stream power index (SPI), topographic wetness index (TWI), normalized difference vegetation index (NDVI), distance to drainage, rainfall intensity, soil characteristics, and geology. The study used primary field survey data, land use-land cover data, ground truth data along with time series satellite imageries as secondary data. Landsat 7 ETM+ data satellite images with spatial resolution of 15-30m for the years 2000 and 2010; for 2020 Sentinel-II with 13 Spectral bands with 10-60m spatial resolution were used. A weighted overlay technique was applied to classify susceptibility into high, moderate, and low-risk zones, achieving an overall accuracy of 90%. The results indicate that 46% of Bandarban is highly susceptible, 50% moderately susceptible, and only 4% low-risk These also contributed to climate resilient environment and natural resources management, conservation and infrastructure development investment planning for Bandarban district. The findings contribute to predictive flood modeling, climate resilience planning, and disaster preparedness, offering a replicable framework for similar regions.

Dr. Md. Mostafa Kamal Sarkar

Artificial Intelligence in Climate Adaptation: Women's Contributions in Research and Mitigation

Md. Mostafa Kamal Sarker
Head of AI, Technovative Solutions Limited, Manchester, UK.
Visiting Fellow, Nuffield Department of Medicine (NDM), University of Oxford, UK.

Abstract

Artificial Intelligence (AI) offers a transformative opportunity to tackle the global climate crisis, providing powerful tools for analysing big data from climate change and generating insights for adapting to climate impacts. AI is already being used effectively in areas such as predicting extreme weather events, optimising energy systems, improving environmental monitoring, and advancing technologies for carbon management. However, the success and fairness of these AI-driven solutions greatly depend on women's active and inclusive participation, who often bear a disproportionate burden from climate change but are essential leaders in driving climate action.

Women are making meaningful contributions across various AI and climate initiatives. These contributions include groundbreaking research, technological innovations, strategic policymaking, and practical implementations. For example, Kate Brandt, Google's Chief Sustainability Officer, leverages AI to enhance energy efficiency, notably reducing data centre cooling energy by 40% and preventing over 2.4 million metric tons of CO2 emissions through eco-friendly routing. Charlotte Wang, founder of EQuota Energy, exemplifies this by leveraging AI for grid stability, energy optimisation, and carbon management in energy-intensive manufacturing and utility sectors. Garima Raheja, a researcher at Columbia University, focuses on machine learning methods for measuring air pollution, particularly in marginalised communities globally, and developing strategies for decarbonising the energy grid. Christina Stavridi, a co-founder of Carbon Limit, is at the forefront of this, using AI to develop Capture Crete to capture and store CO2 directly from the air, contributing to industry decarbonisation. Sara Menker is another prominent figure applying AI to address global food security challenges. Programs like Technovation Girls also empower young women to develop AI-powered climate solutions.

Nevertheless, using AI for climate action faces significant challenges. These include its environmental foot- print due to high energy and water consumption, substantial gaps in data, digital divides, particularly prevalent in developing regions, and the potential to reinforce

existing biases if inclusivity is not prioritised in AI design. To mitigate these risks, ethical AI governance grounded in fairness, accountability, transparency, ethics, and sustainability (FATES) is crucial for ensuring equitable outcomes.
Strategically empowering women through targeted investments, inclusive AI development practices, robust STEM education, and embedding gender equality into climate policy frameworks are vital steps forward. Organisations like UNESCO's Women4Ethical AI and WECAN International are pivotal in advocating for women's leadership in this field. By actively addressing these challenges and ensuring inclusive participation, AI can significantly accelerate our transition toward a more resilient and sustainable future for everyone.

Dr. Nandini Rajamani

Small Mammal Adaptations to Climate Change: Lessons from South Asia

Nandini Rajamani, Swati Udayraj, Aravind PS, Aritro Bhattacharya, Rakesh Muni
IISER Tirupati, Tirupati, Andhra Pradesh, India 517619

Abstract

Small mammals, comprising rodents, insectivores, small carnivores, bats and other taxa, are remarkably diverse, and several species in South Asia have evolved unique adaptations to survive in the region's diverse ecosystems, ranging from tropical rainforests to high-altitude mountains. Squirrels are one such group, with 32 species occurring in various lifestyles (tree, ground and flying). In this talk, I will illustrate climate change adaptations of squirrels through three ongoing studies. A large-scale database built on novel data sources (traditional, citizen science, social media) shows that squirrel species differ in their adaptations to climate as well as in their tolerance to anthropogenic habitat change. Focusing on one genus of palm squirrels, we track populations of a lowland generalist species across altitudes and habitats in the Western Ghats, exploring behaviours that allow them to expand their novel range. Finally, we illustrate how two species of palm squirrels from different eco-climatic zones co-exist in narrow zones of sympatry, highlighting the importance of understanding how species adapt to change. Finally, I will end with a speculation on squirrel species in Bangladesh, to show how and where research and conservation efforts could be focused.

Invited Speakers

Dr. Anamika Barua
Professor
IIT Guwahati, Assam, India

Dr. Amrit Thapa
Senior lecturer
University of Pennsylvania, USA

Dr. Antony Stephen
Assistant Professor
Madras School of Social Work, Chennai, Tamil Nadu, India

Ms. Shanta Dutta
Postdoctoral Researcher
The Hong Kong Polytechnic University, Hong Kong, China

Mr. Shamsuddin Illius
Bureau Chief
The Business Standard, Chittagong & The Climate Watch, Bangladesh

Dr. Anamika Barua

Centering Justice and Equity in Climate Action: Lessons from Adaptation in Assam and Global Mitigation Policies

Anamika Barua
IIT Guwahati, Assam, India

Abstract

This paper argues that principles of equity, justice, and gender inclusion must be at the core of both climate adaptation and mitigation strategies. While mitigation is typically framed at national or global levels, and adaptation is more locally grounded, both approaches risk reinforcing existing social and gender inequalities if not designed inclusively. Using case studies from Assam, India—where communities face recurring climate-induced floods—we show how adaptation efforts that neglect social, economic, and gendered vulnerabilities can deepen marginalization. In the context of mitigation, we draw on global examples to demonstrate how top-down, technology-driven strategies often overlook gendered patterns of emissions and access, leading to unjust outcomes. The limited attention to these intersections highlights the need for more inclusive, participatory climate responses. By foregrounding gender and justice concerns, this paper calls for climate policies that not only reduce emissions or risks, but also actively advance fairness and inclusion for all.

Dr. Amrit Thapa

Flooding, schooling, community infrastructure and learning in rural India

Amrit Thapa, Nazar Khalid, Emily Hannum, Jere Behrman
University of Pennsylvania, USA

Abstract

Increasing frequency of flooding is one of the important manifestations of climatic change in many highly inhabited places around the world. Floods cause extensive damage, but problems are more severe in low-and-middle-income countries (LMICs) that lack preventative and mitigating infrastructure. Marginalized children's education in LMICs might be particularly vulnerable. Effects may vary across outcomes and may be immediate and/or persist over years. However, few studies have evaluated flooding effects on education and how they vary by various sub-populations. This study addresses this gap by using a mixed methods approach to investigate flood-exposure implications for Indian school-age rural children's education, particularly focusing on the type of school children attend. For the quantitative analysis, we use the Indian Human Development Survey (IHDS), India's first nationwide panel survey sampling over 40,000 households with interviews in 2004-5 and 2011-12. Qualitative approach comprises in-depth interviews and focus groups with key stakeholders (such as teachers, principals, village leaders) and is used to obtain deeper perspectives on the topic and complement findings from the quantitative analysis. Results from quantitative analysis show that marginalized and poorer children with less-educated parents in agricultural households are more likely to experience flooding; flood exposure is associated with disproportionately negative learning outcomes for girls and that economic resources may mitigate flood exposure effects on delayed school progress and children's learning. Furthermore, results show that community physical and social infrastructure components have heterogeneous effects, in some cases increasing, in most cases not affecting, and in other cases reducing disparities in learning between marginalized and other children in the presence of flood The results from qualitative data suggest that people with lesser stable economic conditions (for e.g., those relying on crops) get negatively affected and hence their livelihood and schooling of their children also get affected.

Dr. M. Antony Stephen

Conservation linked Enterprises - Alternative to climate change Address migration and provide livelihood in Tamil Nadu

Dr. M.Antony Stephen
Madras School of Social Work, Chennai, Tamil Nadu India.

Abstract

Forest Rights Act (FRA) legitimized the rights to reside, steward and benefit from their ancestral habitat to the forest dwelling tribes across India. The Indian State recognized the first rights to the forest resources to the Tribal community and their community traditions, collective action, knowledge and heritage through the common forest rights. Tamil Nadu has a tribal population of 1.1% as per the 2011 census belonging to over 37 different tribal communities spread over several districts in the state. FRA implementation in the state of Tamil Nadu commenced much later than the rest of the country due to legal challenges. As per the Government of India dashboard on FRA, currently (the cut of date in the dashboard is later part of 2023), 30% of the individual forest claims and 20% of the community forest claims that have been submitted have been distributed to date in the state.

Recent studies highlighted by the Intergovernmental Panel on Climate Change (IPCC) emphasize that preserving and restoring forests are among the most effective strategies for mitigating climate change. This underscores the economic benefits of maintaining stable climate conditions, which are essential for agricultural productivity, water resource management, and disaster risk reduction. This is apart from the potential monetising of the carbon stock in the forest.

The conservation of forests is not merely an environmental issue but a fundamental pillar of sustainable development that intersects with biodiversity conservation, climate change mitigation, economic prosperity, public health, and societal well-being.

This paper provides a livelihood framework on conservation along with a practical break-down of the framework into policy, and programme components that can be taken forward by the government in ensuring building of a sustainable livelihoods for the tribal communities in the state.

Dr. Shanta Dutta

The biorefinery approach toward climate change mitigation

Dr. Shanta Dutta
The Hong Kong Polytechnic University, Hong Kong, China

Abstract

The biorefinery approach presents a transformative strategy for climate change mitigation by integrating renewable biomass conversion into a sustainable framework. This approach focuses on converting biomass into broad-spectrum valuable products, including biofuels, chemicals, and materials. This integrated process maxi- mizes resource efficiency and minimizes waste, promoting a circular economy. Biorefineries utilize renewable biological resources, such as agricultural residues, forestry by-products, and organic wastes, to produce energy and materials. By replacing fossil-based resources with bio-based alternatives, biorefineries significantly reduce greenhouse gas emissions, which are responsible for climate change effects. Biorefinery technology employs thermochemical processes and enzymatic methods to efficiently convert biomass into biofuels and value-added chemicals. The biorefinery approach also supports carbon sequestration. By promoting sustainable land-use practices and ensuring that biomass is sourced from responsibly managed ecosystems, it can help maintain or improve carbon stocks in the environment. Moreover, biorefineries contribute to food security by utilizing non-food biomass and wastes as feedstock. In addition to environmental benefits, the biorefinery approach fosters economic growth by creating jobs in rural areas and reducing dependency on fossil fuel imports. However, biorefinery processes face challenges such as high initial production costs, a lack of efficient biomass processing, and scaling up enzymatic and thermochemical processes for commercialization. Nevertheless, the biorefinery approach represents a multifaceted solution to climate change, combining environmental sustainability with economic viability. By transforming how we produce and consume energy it offers a pathway toward a more resilient and sustainable future. Further attention should be focused on research, investment, and collaboration across sectors to leverage the full potential of biorefineries in combating climate change and achieving a sustainable future.

Mr. Shamsuddin Illius

Environment and Climate Journalism in Bangladesh

Shamsuddin Illius
The Business Standard, Chittagong & The Climate Watch, Bangladesh

Abstract

Environmental and climate journalism in Bangladesh has emerged as a critical field of reporting amid the country's escalating vulnerability to climate change. Positioned at the frontline of rising sea levels, extreme weather events, and environmental degradation, Bangladesh offers a compelling context for examining the evolution, challenges, and impacts of environmental journalism. According to Transparency International Bangladesh (TIB), at least 43 environmental and climate reporters in Bangladesh faced violence or threats in 2022–2023.

This study explores how Bangladeshi journalists report on climate change, biodiversity loss, pollution, and environmental justice, highlighting the roles of local narratives, scientific communication, and advocacy amid many challenges. Drawing on interviews with journalists, content analysis of leading newspapers, and a review of institutional practices, the research identifies major constraints such as political pressure, lack of access to data, limited training opportunities, and insufficient editorial support. It also highlights the resilience and innovation shown by journalists who navigate these barriers to bring critical environmental issues to public attention. The findings underscore the urgent need for institutional support, capacity building, and international collaboration to strengthen climate journalism in Bangladesh as a tool for accountability, public awareness, and policy engagement in the face of a growing environmental crisis.

Panel Discussion

Women in Environmental Science: Challenges and Opportunities.

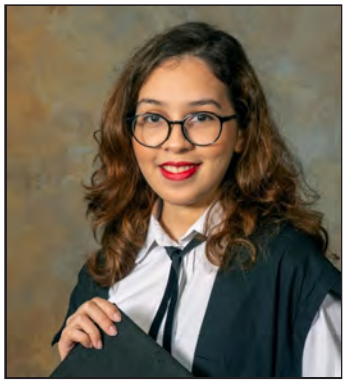
This panel explores the diverse experiences of women navigating the field of environmental science—an area where gender disparities still exist, yet where women are increasingly emerging as powerful voices for change. The discussion will highlight the systemic barriers women face in research, leadership, 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

Afrida Asad
Faculty, Asian University for Women

Invited Panelist

1. Ms. Muntasha Nahrin - Development Impact Consultant at the International Finance Corporation (IFC)- World Bank Group.
2. Ms. Pema Lhamo - WASH Consultant/Specialist, Aguaconsult Ltd.
3. Ms. Samiha Nuzhat - Incoming PhD Student in Geography, University of South Carolina, SC, USA
4. Ms. Tanusree Das Gupta - Master of Science & Engineering in Environmental Science Specialization in Sustainable Management of Pollution, Université Catholique de Lille, JUNIA ISA(Institut Supérieur d'Agriculture), Lille, France
5. Ms. Sinthuka Vivekananthan - Environmental Project Planner II at Texas Department of Transportation (TxDOT)
6. Ms. Sristi Shome - Research Assistant, icddrb
7. Ms. Asma Ulfath Easha - Master of Science in Industrial and Mining Engineering : Geosciences for the Energy System Transition, University of Strasbourg
8. Ms. Nuzaba Tasannum - MSc in Global Biodiversity Conservation, University of Sussex



Muntasha Nahrin

As You Walk, the Path Finds You: Women Leading Change in Environmental Science

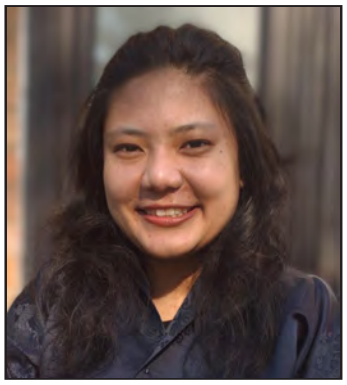
Muntasha Nahrin
M.S (Oxford University), Consultant - World Bank Group

Abstract

Studying Environmental Science with a minor in Mathematics at AUW sparked my passion for addressing global environmental challenges. A pivotal course, Environmental Challenges in Asia, deepened my understanding of issues like climate change and water scarcity, inspiring me to pursue this field professionally.Apart from coursework, through multiple internships and research projects I developed an interest to specialize in Water Science and later pursued my MSc in Water Science, Policy and Management at the University of Oxford in the United Kingdom. My demonstrated passion towards the development sector helped me become a Commonwealth Shared Scholar.

Currently I am working at IFC as a Development Impact Consultant. Working in the radius of the Private sector, I can make targeted efforts to reducing financing gaps for water infrastructure and technologies for vulnerable communities struggling with water security and sanitation challenges. My ambition has always been to build a career as a water manager or policy adviser, and AUW has immensely helped me unlock my leadership potential and advance my career in this direction.
The field of STEM is not always very welcoming to women. When I expressed my interest in pursuing Environmental Science some people discouraged saying it is a fieldwork extensive career and as a woman it might be difficult for me. Similar remarks came from women in my profession as well, pointing out that my introverted nature might be making it difficult to go to remote locations and talk to culturally reserved people. This is where we need to be extra confident. I always had unshakeable faith in my capabilities as a researcher and believed in myself that no matter how challenging the environment might be, I will do everything that is needed for my research to be of good quality. I have worked in a lot of remote and underdeveloped areas of Bangladesh- Displaced community camps in Cox's Bazar, Shipbreaking Yards, Buringanga and Dhaleswari river surroundings, and it was not always easy. One notable experience of gender bias I

faced was during my dissertation- when I was interviewing an engineer of a Govt agency, he would only talk to my Research Assistant because he is a male, even though I was the primary investigator and I shared my credentials that I am an Oxford researcher.
Such glass ceilings and misogynistic behaviours are often prevalent everywhere, but we have to keep pushing and move forward keeping our head high. This work can be exhausting, but it's never meaningless. Every data point, every tree planted, every woman who dares to lead — it all matters.



Pema Lhamo

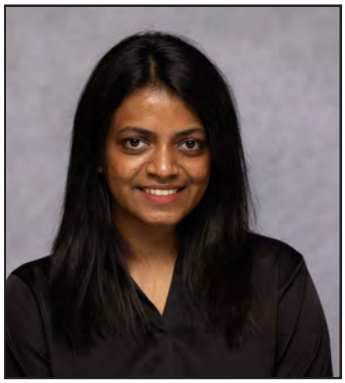
Nature Called, AUW Answered: How I Became an Environmentalist at AUW

Pema Lhamo
AUW Batch of 2019; Oxford Graduate 2024

Abstract

I come from Bhutan, a land known for its carbon-negative status and conservation efforts, and I am highly driven by values and insights that are centered on environmental conservation and its attributes. However, my environmental journey started with a simple yet pressing question: Why Bhutan, a "carbon-negative" country, still faces the brunt of climate change? I feel my interest in the environment subject started to take shape during one of my summer projects at AUW, where I learned how anthropogenic activities impacted plant diversity in a protected wetland setting in Bhutan. This was the start of my journey as an aspiring environmentalist.
As I navigated my coursework and projects at AUW, I came to understand that environmental science is deeply interdisciplinary, requiring collaboration across sectors and with diverse stakeholders. This realization strengthened my passion for the field and encouraged me to take it a step further. I worked for the water sector in Bhutan after graduating in 2019 and undertook various projects like conducting water quality assessments in remote districts, drafting national climate adaptation strategies and solving water disputes within communities. Following on, I recalled what my professors at AUW used to say about learning being a lifelong journey. With this in mind, I recently completed my MSc in Water Science, Policy, and Management at the University of Oxford. Currently, I am working as a Junior WASH Specialist at Aguaconsult in the UK with a focus in WASH systems strengthening, and increasingly on climate change and sustainability.
One thing AUW has taught me is to raise my voice, participate and take initiatives. Starting from a sustainability summer camp in Thailand to being a rising star and being the first ever delegate and country ambassador for Global youth energy network, I have been engaged in outreach activities that encourage youth participation and inspire them to bring about a change in their communities. All these experiences have well-prepared me to become versatile and adaptable in any role that I have played so far.

A few years down the line, I see myself leading the environmental sector in Bhutan. I believe that the hands-on training and critical thinking skills gained from my undergraduate journey through to my current workplace will be significant for me..



Samiha Nuzhat

Rewriting Narratives on Climate Actions

Samiha Nuzha
AUW Class of 2020, MSc in Geography, Missouri State University, MO, USA, Incoming PhD Student in Geography, University of South Carolina, SC, USA

Abstract

Growing up in Bangladesh—a country at the frontline of the climate crisis—I witnessed firsthand how environmental degradation and systemic inequalities collide. Yet it wasn't until my years at the Asian University for Women (AUW) that I began to envision my role in reshaping that narrative. I entered AUW with a fascination for life sciences, and left with an interdisciplinary lens forged through dual majors in Environmental Sciences and Bioinformatics, a thesis on urban land use change, and a deepening concern for climate justice.

AUW taught me that science is incomplete without community engagement. This insight stayed with me as I navigated professional roles in Bangladesh's climate-resilience and water sectors, where I designed participatory interventions, mapped vulnerable urban slums from scratch, and crafted climate change adaptation strategies as a development professional. Working at the intersection of research and grassroots development, I learned to center marginalized voices in climate adaptation—an approach I have carried into my current MS thesis at Missouri State University, where I study environmental injustice and social inequity through mixed methods and geospatial analysis. My passion for research led me to the NSF-funded I-GUIDE Summer School, where I explored the applications of artificial intelligence for environmental sustainability, further sharpening my technical and leadership skills.

Today, I am preparing for the next chapter: a PhD in Geography at the University of South Carolina as a Presidential Fellow, where I aim to explore how climate vulnerability shapes health outcomes. This journey would not be possible without the foundational training and learning environment I received at AUW that me to pursue research that is not just analytical but also accountable for social and environmental sustainability.

A few years from now, I envision myself as an interdisciplinary researcher and faculty member, committed to equity, collaboration, and transformative knowledge that helps build a more just and climate-resilient world.

Tanusree Das Gupta

Crossing borders, Breaking barriers: A Woman's Journey in Environmental Science from Local roots to Global reach

Tanusree Das Gupta
Bachelor of Science in Environmental Science & Minor in Mathematics, Asian University for Women, Chattogram, Bangladesh, Class of 2022, Master of Science & Engineering in Environmental Science, Specialization in Sustainable Management of Pollution, Université Catholique de Lille, JUNIA ISA(Institut Supérieur d'Agriculture), Lille, France

Abstract

Growing up in a conservative family in Bangladesh, I was raised with the belief that a woman's primary role is within the household. Women's ambitions were frequently constrained by these embedded social norms and for a significant amount of my early years, I thought I would have to give up my dreams in order to fit in. My perspective shifted drastically after I got admitted to AUW. The institution, which is known for encouraging young women throughout Asia, introduced me to a world full of opportunities. At AUW, I encountered a dynamic academic environment enriched by cultural diversity, intellectual freedom and powerful examples of women confidently pursuing careers in science, leadership and global change. This is where I gained the courage and the foundation of my personal transformation, allowing me to challenge traditional norms and envision a new future for myself.

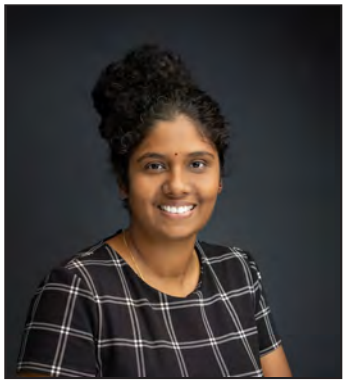
Following the successful completion of my undergraduate studies in 2022, I was awarded a prestigious French government scholarship to pursue my master's degree in France. Studying in France allowed me to not only expand my knowledge in environmental science but also develop the independence and resilience required to thrive in a global academic environment. Immersed in a culture of scientific innovation, I was able to broaden my understanding of environmental issues and explore sustainable solutions from a global perspective.

In 2023, I was selected for an internship as an Environmental Assistant Engineer at Lion Environmental, a Polish-based environmental consultancy. This role provided me with important hands-on experience in environmental site assessments, fieldwork, data collection, spatial analyses etc. I got the opportunity to work closely with a multidisciplinary team,

applying what I had learned in class to real-world environmental and industrial concerns. It was also an excellent opportunity for me to develop myself, as I adjusted to a new work environment in an entirely different country and moved outside of my comfort zone. Further in 2024, I was honored to be selected as a research intern in the Department of Agronomy and Horticulture at the University of Nebraska–Lincoln, USA. During this internship, I worked on research projects related to sustainable agriculture & climate resilience which required lots of field work. I also had the opportunity to work in the USDA lab, which helped me improve my analytical and laboratory skills. Additionally, I worked on projects that addressed significant environmental issues in the Midwest of the United States.

After overcoming cultural expectations, academic transitions, and international challenges, I am proud to have completed my Master's degree in Environmental Science. My journey from Bangladesh to France, Poland, and the United States has been one of growth, resilience, and determination. Along the way, I also had the chance to travel to over 20 countries, which helped me develop a broader view of the world and grow both personally and academically.

Today, as a woman who has studied and worked across different cultures and academic systems, I have come to truly understand the importance of believing in oneself and staying focused on one's goals - no matter what the obstacles are. My journey has taught me that with determination, education, and the right opportunities, women can rise above the limitations society often places on them. I hope to encourage young women - especially those from conservative backgrounds to believe that their dreams are valid. My journey is not just about personal achievement, it is a reflection of how education and courage can empower women to break barriers, redefine their paths and contribute meaningfully to a more equal and sustainable world.



Sinthuka Vivekananthan

From Classroom to Corridor of Power: A Journey in Environmental Science and Leadership

Sinthuka Vivekananthan
Pioneer of AUW, enrolled in 2008
Bachelor of Science in Environmental Science
Environmental Project Planner II at Texas Department of Transportation (TxDOT)

Abstract

My journey into environmental science began at the Asian University for Women (AUW) in Bangladesh, where I transformed from a girl from an underprivileged, single-mother family in Jaffna, Sri Lanka with only elementary-level English into a confident professional and project manager. AUW provided not only an academic degree in environmental science, but also a constructive, holistic learning environment supported by scholarships that nurtured empathy, critical thinking, and leadership rooted in community values. AUW's vision goes beyond producing graduates—it shapes resilient women who lead complex projects and drive social change.

Today, I am proud to serve as an Environmental Project Planner II at the Texas Department of Transportation (TxDOT) in Houston, the United States. TxDOT is one of the largest state-level agencies responsible for planning, designing, and overseeing major roadway infrastructure across Texas, a state roughly four times the size of Bangladesh. As part of this influential decision-making team, I coordinate National Environmental Policy Act (NEPA) clearances, manage multi-agency collaborations, and ensure that large-scale projects reflect both scientific integrity and community needs.

Since 2020, I have served as the President of Care for Education, an organization based in Houston, Texas that focuses on empowering communities through education by partnering with grassroots educational institutes in the Northern Province of Sri Lanka. As someone who benefitted from taxpayer and philanthropic support for my education, I see it as my responsibility to give back and support the next generation.

Before moving to the United States, I spent over six years in Sri Lanka's NGO sector, including roles as Senior-level program management positions. This work showed me how integrating environmental science with social justice and gender equity—and drawing on women's multitasking skills, empathy, and cultural awareness—can lead to more inclusive and sustainable decisions.

Reflecting on my journey, I see how AUW didn't just prepare me academically but helped me become a leader in project management who can navigate complex technical work while staying grounded in community impact. The scholarships and holistic education I received were vital, proving that investing in women—especially those from marginalized backgrounds—can unlock ripple effects far beyond individual success. Supporting women in science fosters holistic, equitable decision-making that benefits entire societies.

Finally, while this journey has been deeply rewarding, it has not been without obstacles — including moments of character assassination and doubt. Yet I believe every girl and woman must keep her eyes on the end goal: to overcome these challenges and use her knowledge, empathy, and resilience to make meaningful change in the world.

Sristi Shome

How I Became An Environmentalist at AUW

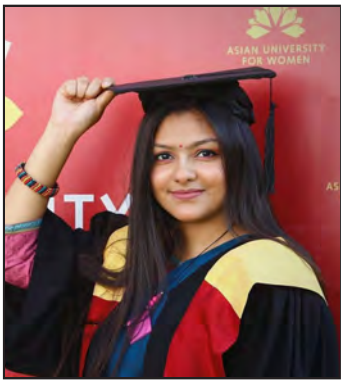
Sristi Shome
AUW Graduate Batch '23, Research Assistant at icddr.b, Emerging Environmental Health Researcher

Abstract

Driven by my passion for environmental health, I pursued a B.Sc. in Public Health and Environmental Sciences with a thesis focusing my thesis on the environmental and health impacts of lead-acid battery vehicles in Bangladesh. Choosing Environmental Sciences at the Asian University for Women was more than an academic decision. It was an act of claiming my roots in a field often inaccessible to women from the Global South. My academic journey at AUW was shaped by rigorous scientific inquiry and lived experience, including participating in faculty-led research environments to conducting fieldwork in vulnerable communities, to leading my thesis, which helped me work confidently in the most professional institutional settings.

For the past two years, I have been working as a Research Assistant at icddr,b, contributing to public health research that examines environmental exposures, contamination, and health outcomes in underserved populations. I combine field-based research experience, data, and laboratory analysis (e.g., ED-XRF, PCR) in publications co-authored alongside my supervisor. Our current project at icddr,b focuses on mapping food contamination and investigating its links with children's nutritional health and foodborne diseases. Previously, I have worked on projects aligned with my research interest in heavy metal exposure and its effect on infectious diseases among children in the low-and middle-income countries, including Bangladesh.

Despite personal and structural challenges, I remain committed to amplifying women's leadership in environmental science. I believe that science should not be confined only to labs but also incorporated into policy development and community voices. I plan to pursue graduate studies abroad in environmental health to deepen my understanding of the field, enhance my research skills, and contribute to evidence-based solutions addressing the need for environmental risk assessments, health risk mitigation, and climate vulnerability reduction in low-and middle-income communities. As a woman researcher from the South, I see no better platform than ICECA to inspire other young women to reclaim scientific spaces, build resilience, and lead change where it's most needed.



Asma Ulfath Easha

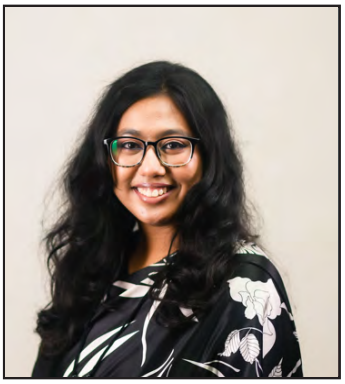
From Rocks to Renewables: A Researcher's View on Geoscience and Environmental Responsibility in the Energy Transition

Asma Ulfath Easha
Bachelor of Science in Environmental Science
Asian University for Women, Chattogram, Bangladesh, Class of 2022
Master of Science in Industrial and Mining Engineering : Geosciences for the Energy System Transition

Abstract

As the world strives toward net-zero emissions, Earth sciences play an increasingly important role in creating sustainable energy systems. This session follows a young researcher's transition from environmental science to applied geosciences, concentrating on two major research projects that illustrate the problems and potential at the intersection of energy and the environment.

The first research looks at the geomechanical behavior of limestone and sandstone under partial saturation, which is significant for carbon sequestration and subsurface energy storage. The findings show that even modest changes in saturation levels can have a major impact on rock stability, which has implications for building durable subsurface infrastructure.
The second study focuses on evaluating the environmental effect of serpentinite hydrogen production, a new and possibly carbon-negative hydrogen manufacturing method. While serpentinite-based geochemical processes present a promising clean energy option, this initiative emphasizes the importance of comprehensive lifecycle assessment in mitigating unforeseen environmental impacts such as land usage and water demand.
These studies show how geoscientific research may directly influence ecologically acceptable energy plans. As a speaker I will highlight my speech about the value of multidisciplinary learning, field-based science, and the necessity to critically evaluate even the most promising innovations.
This talk seeks to motivate young scientists and politicians by sharing ideas from academic research and personal drive to put environmental responsibility at the heart of energy innovation.



Nuzaba Tasannum

Threats Imposed by the Aluminum Utensil Manufacturing Industry: A Comprehensive Analysis of its Environment and Health Impacts through a Case Study at Chattogram, Bangladesh

Nuzaba Tasannum1* Sayed Mohammad Nazim Uddin1*2* Mukesh Gupta1*2* and Shams Forruque Ahmed3
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Abstract

Aluminium utensils are a daily necessity for cooking and related activities in the world. Consequently, the production of such items, particularly in the developing nations of South Asia and Africa, is extremely labour-intensive and poses immense threats to the workers' health due to an unsafe working environment.

However, no research has been carried out in South Asia to quantify the impact of such working conditions on the air quality index (AQI) and particulate matter (PM) in the aluminium cookware industry. Hence, in this study, AQI, PM2.5, and relative humidity were measured at a factory in Chattogram to analyse the threats imposed on the workers of the aluminium cookware manufacturing industries in the sub-continent. Moreover, structured questions and in-depth interviews were administered to the workers and owners in order to assess the gravity of the situation and policy drawbacks. However, most of the workers were found to have experienced severe accidents when the AQI was quite high. These issues were not addressed due to a lack of training for the owner's unawareness and gap in the policy execution. Results demonstrated that the AQI and PM levels exceed the WHO standard (101-150 = Caution) by more than 100 values and the workers are prone to different health issues. Hence, public intervention and policy implications are required to improve the working environment for aluminium cookware manufacturers, particularly through the provision of protective attire.

Keywords: *The Sundarbans, Land Use and Land Cover (LULC) Change, Forest Health Assessment, and Future Dynamics.*

Oral Presentation

Contents

OB1

1. Assessing Forest Health and Land Cover Dynamics in the Sundarbans Mangrove Ecosystem of Bangladesh: A Remote Sensing Based Geostatistical Analysis

M. N. H. Moral, M. K. Ghosh and M. M. Rahman
Department of Geography and Environmental Studies, University of Rajshahi, Bangladesh
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Abstract

The Sundarbans Mangrove Forest-recognized as a UNESCO World Heritage Site-is one of the world's most biodiverse and ecologically critical ecosystems. Located along the southwestern coast of Bangladesh, it serves as a natural shield against cyclones, sustains rich biodiversity, and supports millions of livelihoods. Despite its ecological and economic significance, the forest has experienced increasing degradation over the past decades due to both natural and anthropogenic pressures.

This study employs a remote sensing-based geostatistical approach to assess the spatio-temporal dynamics of Land Use and Land Cover (LULC) and forest health in the Sundarbans from 1980 to 2025. Using multitemporal Landsat imagery (MSS, TM, ETM+, OLI), LULC classification was performed for the years 1980, 1995, 2010, and 2025 using the Maximum Likelihood Classification (MLC) method. Forest health was assessed using three vegetation indices: Normalized Difference Vegetation Index (NDVI), Forest Discrimination Index (FDI), and Soil Adjusted Vegetation Index (SAVI)-validated through high-resolution Google Earth imagery, topographic maps, and ground truthing.

Results show a net forest cover decrease of 98.48 km2 over the 45-year period, with CA–Markov Chain modeling forecasting an additional gain of 16.3 km2 by 2040. Despite this apparent expansion, forest quality has severely declined. Very dense forest areas have completely disappeared, and most remaining zones exhibit degraded ecological conditions due to salinity intrusion, cyclonic events, shrimp farming, reduced freshwater inflow, and industrial encroachment.

This paradox of increasing area yet declining health underscores the urgency for targeted conservation strategies. The findings serve as a critical evidence base for sustainable land-use planning, coastal ecosystem management, and climate resilience initiatives. This study not only advances geospatial understanding of mangrove dynamics but also contributes to the broader discourse on planetary health and nature-based solutions for vulnerable coastal regions.

Keywords: *The Sundarbans, Land Use and Land Cover (LULC) Change, Forest Health Assessment, and Future Dynamics.*

OA1

2. Internally Displaced Workers (IDWs): A New Concept To Support Bangladesh's Climate-Forced Migrants

J. Chércoles-Blázquez[1], J. Sardina[2], R. Bennet Morales[1]
[1]University of Dhaka, Institute of Disaster Management and Vulnerability Studies (IDMVS)
[2]University of Santiago de Compostela, Department of Organic Chemistry, Spain
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Abstract

This paper introduces the concept of Internally Displaced Workers (IDWs) as a necessary and novel framework to discuss the concrete effects of climate change on people's lives. This terminology is related to the United Nations Guiding Principles on Internal Displacement's definition of Internally Displaced Persons (IDPs), but we deem it a necessary distinction to refer to those who are in a zone of dual vulnerability that combines displacement (e.g., caused by natural disasters) and labor marginalization.

This concept is particularly relevant to Bangladesh's internally displaced climate migrants who bear the brunt of climate change through frequent floods and riverbank erosion. In desperate need of income due to a loss of their homes and livelihoods, these IDWs turn to the Ready-Made Garment (RMG) industry for work as it promises steady employment and wages without requiring specialized skills or even a basic education. However, they tend to enter factory labor without urban support networks or legal awareness, compelling them to accept harsh working conditions, unfair contractual terms, and salaries below the living wage thresholds. The absence of an appropriate terminology to explore and discuss this phenomenon has made these climate migrants working in Bangladesh's RMG sector invisible to international labor protection initiatives and humanitarian displacement assistance as well as to global fashion retail brands' Sustainability and ESG compliance programs. Thus, we have established four interrelated lines of research to grasp the dire lives of these IDWs and to develop programs that respond to their ignored vulnerabilities: (1) understanding climate change's effects on Bangladesh's rural areas and communities, (2) mapping the migration process from departure to factory work, (3) assessing their skills and the labor integration process compared to their nondisplaced peers, and (4) documenting changes in financial behavior before and after migration as an indicator of vulnerability. Finally, we must state that this is both a research project and an invitation to collaborate. Academic institutions, government agencies, NGOs, factory owners, and labor rights groups must unite in order to most effectively support Bangladesh's climate-forced IDWs.

This work is supported by Associated British Foods Plc. in collaboration with the University of Dhaka's Institute of Disaster Management and Vulnerability Studies (IDMVS) and the University of Santiago de Compostela (Faculty of Mathematics; Department of Organic Chemistry).

OA2

3. A Framework for Rewilding Asian Elephant Habitats to Reduce Human-Elephant Conflicts

Fairuse Akter
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Abstract

Humans are continuously modifying nature for their own benefit. While every single being is impacted, the toll is increasing for migratory animals. According to the Living Planet Index estimation, an average decline of 15% of 1,710 migratory species is observed between 1970 and 2017 [1]. Asian Elephants, the gentle giants, are one of the wild animals that are constantly losing their home due to human settlement, agricultural practices and other developmental work along their corridors [2]. While agriculture is critical for food production, the colonized system of commercial farming and monoculture is destroying the habitats of elephants [3]. The 'Rewilding' method aims to restore the natural system by utilizing native animals and plants with minimal human intervention [4]. It also improves the health of the ecosystem. This study explores whether 'Rewilding' can be a solution for Human-Elephant Conflict (HEC) and develops a framework for rewilding in this context. The study location is Nalitabari of Sherpur district in Mymensingh division, where the indigenous Garo communities live (along with Bengalis) and are constantly facing HEC. The data were collected through focus group discussions, in-depth interviews, and key informant interviews. This study also attempted to understand the local people's history with elephants through narrative analysis.

OA4

4. Rooppur Nuclear Power Plant – A Tale of Exploitation of Women and Nature

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Abstract

This paper explores the intersection of women, nature, and development through the lens of ecofeminism in the context of mega-project – the Rooppur Nuclear Power Plant (RNPP) in Bangladesh. Drawing on ethnographic research and 10 qualitative interviews from my undergraduate monograph, the findings illustrate women's intimate relationships with land and nature, which are disrupted by state-led developmental initiative. In Rooppur area, the RNPP project has displaced people from their homes – an act that, for women, often results in deeper forms of confinement and marginalization. Women of Rooppur, whose livelihoods are affected by the RNPP project, mourn not only the loss of their ancestral homesteads but also their detachment from the environments in where they grew up and which carry deep personal and cultural memories. Grounded in the theoretical insights of Sherry Ortner [1995] and Vandana Shiva [1993], this paper argues that women's association with nature and their limited agency within patriarchal structures subjects them to unique forms of suffering in the face of environmental degradation and technocratic development. It concludes that in the shadow of nuclear ambition, it is women who carry the invisible weight of environmental grief, ecological dispossession, and socio-cultural erosion.

Finally, this research situates local women not only as those excluded from the promises of development, but also as vital bearers of memory, voices of resistance, and ecofeminist revolution.

Keywords: *Gender, Development, Environment, Agency, Ecofeminism*

OA7

5. Assessment Of Groundwater Storage And Recharge Potential Using Grace Satellite Data Of The Halda Watershed, Bangladesh

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Abstract

Groundwater is a critical resource for agricultural irrigation and domestic water supply in the densely populated Halda watershed of southeastern Bangladesh. Increasing demand and potential climate variability necessitate a comprehensive assessment of this vital resource. This study aims to assess the temporal dynamics of groundwater storage and spatially delineate recharge potential zones within the Halda watershed. An integrated approach was employed, combining satellite remote sensing, in-situ data, and Geographic Information System (GIS) based modeling. Temporal variations in Groundwater Storage (GWS) from 2004 to 2014 were quantified using data from the Gravity Recovery and Climate Experiment (GRACE) mission, which tracks changes in terrestrial water storage, and was refined with soil moisture data from the Global Land Data Assimilation System (GLDAS). These satellite-derived results were validated against historical well data from the Bangladesh Water Development Board (BWDB) and contemporary field surveys. Furthermore, a Groundwater Recharge Potential Zone (GWRPI) map was developed using a GIS-based Multi-Criteria Decision Analysis (MCDA) that integrated six thematic layers: geology, soil, slope, rainfall, drainage density, and land use/land cover. The results revealed a strong inverse correlation between satellite-derived GWS anomalies and in-situ well depths, with a consistent two-month lag time between precipitation and aquifer response, a phenomenon common in the region's monsoonal hydrological systems. Linear regression analysis of the GWS time-series indicated a declining trend across the study area, with depletion rates ranging from -0.11 to -0.14 cm/year during the study period. The recharge potential map revealed that zones with 'Good' to 'Very Good' potential are primarily confined to the alluvial deposits of the central river valley (the syncline), while the surrounding hilly structures (anticlines), composed of older sedimentary rocks, exhibit 'Poor' to 'Moderate' potential. In conclusion, the Halda watershed's groundwater resources experienced a net decline during the study period, and its natural recharge capacity is spatially limited to the floodplain areas. The findings highlight the vulnerability of the aquifer to sustained pressure and provide a scientifically grounded tool (the GWRPI map) for policymakers to target conservation efforts and implement managed aquifer recharge strategies, thereby promoting sustainable water resource management in this vital region.

This work was supported by National Science and Technology Fellowship

6. Pesticide Contamination in Vegetable Farms: Spatial Distribution and Human Health Risk in Middle-hill of Nepal

Buddhi Ram Kumal[1], Sajan Lal Shyaula[2], Rakshya Thapa[3], Bimalendu Kumar Mishra[4], Daya Ram Bhusal[5], Suraj Shrestha[6], Udhab Raj Khadka[1]
[1]Central Department of Environmental Science, [3]Amrit Campus, [4]Tri-Chandra Multiple Campus, [5]Central Department of Zoology,
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Abstract

Globally, chemical pesticides have been widely used for a long time. Nepal has introduced it for agriculture since 1956. Among the applied pesticides, organochlorine pesticides (OCPs) were the major insecticides used in agriculture, which have been banned since 2001 considering their adverse impact on human health and the environment. However, pesticide residues may still be prevalent in the applied soil. Among the agricultural practices, commercial vegetable farming is one of the major sectors using pesticides, including OCPs. However, there seem to be limited previous studies on understanding the prevalence of pesticide residues and their risk to human health. Hence, the present research was carried out with the aim of assessing pesticide residues in soil and their health risk in the Dhading District of Nepal. For this purpose, 36 soil samples were collected from the commercial vegetable farms. The modified Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) method [1-2] was applied for the sample preparation, and Gas Chromatography coupled with Mass Spectrometry (GC-MS) was used for the quantitation of pesticide residues. About 35.71% of the soil samples revealed one or more pesticide residues. Out of the total samples, fenvalerate was the most prevalent, accounting for 14.29% of the samples, whereas OCPs were found in 23.81% of the samples. Among the OCPs, DDT and its metabolites were predominant, accounting for 21.43% of the total samples. With respect to the pesticide residues in soil, p,p'-DDT was observed at the highest level, followed by fenvalerate, p,p'-DDD, lindane, and p,p'-DDE. Although DDT and its metabolites were prevalent in the soil, the non-dietary exposure revealed no cancer risk in the study area. However, the risk of other OCPs and pesticides may be prevalent. Thus, further studies including different OCPs and other pesticides are anticipated.

Keywords: *DDT, health risk, lindane, persistent pesticides, soil contamination*

This research work was supported by the University Grant Commission, Nepal.

OA8

7. Household Water Security and Traditional Water Technologies: A Mixed-Methods Exploration of Indigenous Practices in Three Remote creeks dependent Villages of Khagrachari, Bangladesh

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Abstract

This study explored the household water security of three isolated creeks dependent indigenous villages of Khagrachhari, Bangladesh, focusing on both current access issues from creeks and the decline of traditional water technologies. By using a mixed-method approach that includes home surveys (n=121), GIS mapping, water security testing(Coliform, DO, Hardness, TDS, pH, EC), and anthropological observation, the research aims to understand how residents meet their daily water needs and how these practices are changing over time. The study also created a user-friendly smartphone app that integrates physical and microbiological analysis, deep learning classifications, and WHO guideline interpretation to enable water quality to be monitored at more points. The findings indicate that a great distance is covered by most households in fetching water, which disrupts their day-to-day activities and leads to social as well as economic burdens. Water testing results showed notable differences in hardness and dissolved oxygen levels among sources, along with 71% samples of bacterial contamination, especially from Salmonella and E. coli. Despite these health hazards, community members continue to rely on unsafe water sources due to cultural beliefs, established habits, or simply a lack of alternatives.

The study also looks into the traditional water management systems of the indigenous people, which are now fading away due to lifestyle changes, shifts in infrastructure, and neglect in policy. This evidence underscores the pressing need for water policies that respect cultural practices while integrating modern scientific approaches. It provides a framework aimed at enhancing rural water systems by merging environmental data with the lived experiences of the community.

Keywords: *water security, indigenous practices, GIS mapping, traditional water technologies, Water quality monitoring App.*

This study is funded by Student research grant, Environmental Sciences program, Asian University for Women.

OB3

8. Animism as Environmental Justice: Indigenous Knowledge and Moral Responses to Climate Crisis

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Abstract

As climate change intensifies across South Asia, indigenous communities in Bangladesh offer powerful alternative ways of understanding and responding to environmental crisis. This paper explores how animistic cosmologies—worldviews that regard natural entities such as rivers, forests, and mountains as sentient beings with moral agency—constitute a form of environmental justice. This research draws from critical frame- works in moral ecology,

indigenous political ecology, and decolonial theory to show how animism, far from being a relic of the past, is a vital and evolving epistemology of care, justice, and resistance. Drawing on ethnographic fieldwork (during 2022 and 2023), among the indigenous communities (e.g., Mro, and Pangkhoa) of the Chittagong Hill Tracts (CHT), the study examines how ritual practices, spiritual taboos, and everyday ecological ethics serve as culturally embedded responses to environmental degradation.

The study shows that rather than viewing climate change merely as a scientific or technical problem, indigenous communities perceive it as a breakdown in reciprocal moral relationships between humans and the spiritual beings that inhabit the land. Forest destruction, water pollution, and extractive development are understood not just as environmental offenses but as moral transgressions that provoke spiritual imbalance, illness, and even social unrest. In this framework, climate resilience is inseparable from spiritual accountability and ethical comportment toward the more-than-human world. It challenges dominant technocratic and state-driven conservation models by foregrounding culture-specific moral systems rooted in relational ontologies. By centering indigenous spiritual ecologies in the conversation on climate justice, the paper argues for a holistic, more inclusive approach to environmental governance—one that values indigenous sovereignty, respects cultural difference, and redefines justice not just for humans, but for all beings. Recognizing animism as a moral and political force offers new pathways for just, inclusive, morally resonant, and sustainable climate action in the Anthropocene.

Keywords: *Animism, indigenous knowledge, environmental justice, spiritual ecology, decolonizing conser- vation*

OA3

9. Women's Empowerment and Household Fuel Use in South Asia: A Machine Learning Approach to Predicting Solid Fuel Use Based on Women's Empowerment

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Abstract

Access to clean and affordable household energy is essential for improving health outcomes, reducing environmental risks, and supporting sustainable development. However, the transition to clean cooking fuels remains uneven across South Asia, where a large proportion of households still rely on polluting energy sources such as firewood, dung, and kerosene. Women, who are disproportionately affected by household air pollution due to their primary role in cooking, also face systemic barriers to empowerment across economic, social, and decision-making domains. While previous studies1-4 have documented the health and developmental benefits of women's empowerment, limited evidence exists on its relationship with household energy choices in the South Asian context. This study investigates the cross-sectional associations between women's empowerment and household fuel use across six South Asian countries—Bangladesh, India5, Nepal, Pakistan, Maldives, and Myanmar—using nationally representative pooled cross-sectional Demographic and Health Survey (DHS) data collected across 2015-2022. Women's empowerment is measured through a composite index incorporating asset ownership, labour force participation, opposition to normative justifications of wife beating, household decision-making authority, and knowledge level derived from education and access to mass media. Fuel use is categorized into 'clean' (e.g., electricity, LPG, biogas) and 'polluting' (e.g., firewood, agricultural residue, kerosene) types.

This study addresses the knowledge gap by applying advanced machine learning (ML) methods to predict household fuel choice. ML algorithms, including random forest (RF), decision tree (DT), support vector machine (SVM), and logistic regression, are employed to evaluate the predic- tive strength of the empowerment dimensions and related socio-demographic factors. Model performance is assessed based on prediction accuracy and robustness across countries. The findings are expected to contribute to gender-sensitive energy policy design and provide insights into the role of women's empowerment in driving clean energy transitions in South Asia.

This study uses publicly available data from the Demographic and Health Surveys (DHS) conducted in Bangladesh, India, Nepal, Pakistan, Maldives, and Myanmar. The DHS Program is funded by the United States Agency for International Development (USAID) and implemented by ICF. All surveys were conducted with informed consent and adhere to strict ethical standards approved by relevant national and international re- view boards. The author is grateful to the DHS Program for granting access to the data.

OB4

10. Exploring the Potential of Community-Based Rural Tourism in Bangladesh through Existing Infrastructure and Local Resources

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Abstract

The study explores the feasibility and potential of Community-based Rural Tourism (CBT) in Bangladesh by leveraging existing infrastructure and local resources, without relying on large-scale external investment. The study is designed in an action research framework to examine tourism opportunities and challenges in Bangladesh. The purposive sampling procedure was used to select two distinct rural communities: a fishermen community and a community of traditional weavers (tati). To gain firsthand experiences and identify the tourism potential, the researchers stayed with the selected communities and collected data through observation, informal interviews, and collaborative exploration. The study found that the cultural, ecological, and livelihood-based assets could form the foundation of localized tourism models. The fishing communi- ty offered potential for ecotourism and experiential learning centered on river-based livelihoods, while the weavers' community presented opportunities for cultural tourism through craft demonstrations, storytelling, and hands-on workshops.

The findings suggest that both communities hold untapped potential to attract tourists seeking authentic and sustainable rural experiences. However, several challenges persist, including limited marketing access, seasonal income fluctuations, lack of capacity-building opportunities, and risks of cultural commodification. It highlights the importance of community ownership, inclusive planning, and small-scale infrastructure improvement in ensuring that CBRT initiatives are both sustainable and locally beneficial. This study underscores the role of participatory, place-based research and economic growth in rural communities without altering their unique cultural identity, offering a way to boost the local economy while also preserving heri- tage and tradition

Keywords: *Community-Based Rural Tourism, Sustainable Tourism, Action Research, Community Empowerment.*

11. Hydrodynamic Modeling for Flood Hazard Mapping in Kankai River Basin, Nepal

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Abstract

Flooding remains one of the most frequent and destructive natural hazards in Nepal, causing significant physical, economic, and environmental damage, particularly in downstream regions. In eastern Nepal, river basins such as the Kankai River Basin (KRB), which originates in the Lesser Himalaya and extends to the Terai plains, are highly susceptible to flooding due to steep topography and intense monsoonal rainfall. This study focuses on the KRB which spans the districts of Jhapa and Ilam, covering an area of 1,326.87 sq. km. Flood frequency was analyzed for three levels of flood scenarios based on return periods: 2-year return period (YRP), 10 YRP, 100 YRP [1]. Hazard zones within the KRB were identified using the Hydrological Engineering Centre's River Analysis System (HEC-RAS) version 6.4.1[3,4] and categorized into five classes, ranging from very low to very high hazard [2]. The maximum flood depth reached 9 m for the 2 YRP event and 23.2 m for the 100 YRP event. The highest flow velocity recorded was 5.7 m/s for the 2 YRP and 18.4 m/s for the 100 YRP.

High-hazard zones were more prevalent in Jhapa district compared to Ilam. The study concludes that the Kankai River Basin, particularly Jhapa district, is highly vulnerable to flooding, with increasing flood depth and velocity across return periods, emphasizing the urgent need for targeted flood risk management and resilience planning.

Keywords: *Flood, hazard, HEC-RAS, hydrodynamic modeling, Nepal*

12. Cultivating Futures: The Home Nursery Project with Sitakunda Women and Sugar Date Palm Saplings

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Abstract

Green Bangle Movement runs a Home Nursery Project under a group of rural women in Sitakunda, Bangladesh which provides women with a tool of empowerment to create home based nurseries that specialize in cultivation of sugar date palm (Phoenix sylvestris) saplings. The program will turn household environs into biodiversity centres and green microbusinesses. A sustainable agroforestry resource is the sugar date palm whose greatest source of ecological adaptability and economic value (as a sap, fruit, and timber) is suitable in climate-stressed areas. Women plant the upcycled materials, organic compost and low-water to cultivate saplings that are then sold to reforestation programmes and local residents. The project reflects ecofeminism because it helped to remoralize the feminine struggle with environmentalism, as the labor preserves nature and its stories of survival. These women are not only reversing the deforestation act but also shifting gender roles in the agriculture sector by engaging in

sustainable propagation. It helps in ecopreneurship through combining native plant growing with selling to the market thereby, creating a connection between environmental objectives and financial sustainability. The model promotes ecological sustainability as well as climate mitigation and empowers the economy without erasing indigenous ecological knowledge. Another item on the success list is the Home Nursery program that can be used as a blueprint in other coastal districts.

Keywords: *Ecofeminism, Home Nursery, Sugar Date Palm, Ecopreneurship, Community Forestry, Women Empowerment*

This work was supported by Swiss Philanthropy Foundation.

13. Climate Change, Agricultural Production and Labour Migration in Haor Areas of Ban- gladesh: A Mediation Analysis

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Abstract

Bangladesh's Haor region is highly vulnerable to climate variability, with rural households heavily dependent on seasonal agriculture. Climate-induced disruptions in rainfall and temperature patterns threaten agricultural productivity and rural incomes. While labor migration is widely recognized as an adaptive strategy, little is known about how climate conditions influence proactive migration decisions, especially through their effect on farm-based livelihoods. This study aims to (i) examine the direct impact of climatic anomalies on house- hold migration decisions, (ii) evaluate the indirect impact mediated through agricultural production, and (iii) quantify the relative contribution of this mediating pathway. We analyzed cross-sectional survey data from 600 households in the Haor region alongside 30 years of historical rainfall and temperature data derived from ArcGIS. A mediation framework was applied using generalized linear models (GLM) including logistic regression, with climate score as the predictor, agricultural production as the mediator, and labor migration as the outcome. Socioeconomic covariates were included for adjustment. The analysis shows that the climate score significantly increased agricultural production ($\beta = 28.36$, $p < 0.001$), while agricultural production significantly reduced migration probability ($\beta = -0.094$, $p = 0.013$). Climate score also had a strong direct negative effect on migration ($\beta = -12.06$, $p = 0.027$). The indirect effect through agriculture was -2.67, accounting for 18.1% of the total effect of climate on migration. Income positively influenced agriculture ($p < 0.001$), while education marginally increased migration likelihood ($p = 0.068$). Other variables were not significant. In conclusion, climate stress prompts both direct and indirect migration responses. Agricultural production serves as a key mediating factor, highlighting migration as a forward-looking adaptation strategy. Policies should focus on climate-resilient agriculture, rural finance, and social protection to enhance household resil- ience in climate-vulnerable areas.

Keywords: *Climate Change, Labor Migration, Agricultural Production, Haor Region, Mediation Analysis*

14. Socio-Ecological Cascades: Evaluating Prolonged Flooding's Impact on Socio-Environ- mental Loss and Damage in Noakhali

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Abstract

Prolonged flooding, intensified by climate change, has caused severe socio-ecological disruptions in coastal Bangladesh. This mixed-methods case study focuses on the 2024 flood event in Noakhali, Noakhali faced severe flash flooding that left large areas submerged and inaccessible. Thousands were displaced, with over 4,700 reported illness cases, including diarrhea and skin infections. Agricultural lands, fishponds, and sanitation facilities were heavily damaged, disrupting livelihoods and increasing health risks. The prolonged inundation caused widespread contamination of drinking water and degradation of soil and ecosystem health. Using qualitative and quantitative tools including key informant interviews, focus group discussions, field observations, and laboratory testing the study assesses the Environmental impacts on water quality, agriculture, and ecosystem services.
Findings reveal heightened disease risks, agricultural decline due to nutrient loss, and biodiversity reduction. Comparative analysis with global flood-prone zones supports adaptive strategies such as nature-based solutions and early warning systems. This research underscores the need for integrated, community-driven climate adaptation and disaster resilience planning. resilience planning.

Keywords: *Prolonged flooding, socio-ecological impact, Noakhali, biodiversity loss, water contamination, soil degradation, climate resilience, wetland ecosystems, agricultural damage, disaster preparedness, commu- nity adaptation.*

This work was supported by the student research grant, ENVS Program, AUW

15. Exploring the role of Palmyrah trees (Borassus flabelliber) in supporting the livelihood, and environment in the coastal area of Timor-Leste

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Abstract

Palmyrah tree (Borassus flabellifer), locally called Ai-Akadiru, found in coastal areas of Timor Leste, is a culturally significant and economically viable species. Though widely used in handicrafts, construction and food production, the ecological role of the tree, especially in the formation of soil stability and prevention of erosion, is underestimated. This paper will determine the importance of Palmyrah trees in sustaining the environment as well as the

livelihoods of the people in the Metinaru sub district of Dili Municipality. Field data coupled with laboratory analysis of soil samples in presence and absence of Palmyrah trees, household surveys (n=100) and spatial analysis with GIS were used to perform the field study. Lab analysis proves that Palmyrah tree grown soil lacked moisture (6.07%), had a higher pH (8.89), and the texture is silt that implies good drainage and soil structure. Conversely, the moisture content of the soil without Palmyrah trees was more (92.21%) and lower pH (7.66), having a silty clay loam texture, i.e., it is compact and is prone to excessive erosion. The above ecological functions were indeed confirmed in a survey in 26.8 percent of respondents cited the tree as a source of fresh air, 25.6 percent as an animal habitat supplier and 23.2 percent as one that boosts soil fertility. Economically, 53.2 percent of respondents claimed to have used Palmyrah income to cover daily needs, 37.8 percent income was used in kids education. The GIS mapping also presented the fact that there were less evidence of surface erosion in regions that had the Palmyrah trees. The paper ends by concluding that Palmyrah forests present livelihood and environmental advantages, which adds to coastal resilience and sustainable growth. It is advised that community-based covering and inclusion of Palmyrah planting into land used policy should be used to conserve biodiversity, locally based economy and climate adaptation.

This work was supported by the student research grant, ENVS Program, AUW

PGF1

16. Circular Economy for Plastic Waste Management in Chattogram: Enhancing Livelihoods of Waste Actors and Environmental Resilience

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Abstract

Plastic waste pollution has emerged as a critical global environmental challenge, posing serious threats to ecosystems, public health, and sustainable development. Bangladesh, like many developing nations, is significantly affected by this crisis. Chattogram is the second-largest city in Bangladesh. Every day, about 250 tons of plastic waste are generated, and some portions of it are managed informally. A major portion are mismanaged, littering surrounds contributing to pollution in air, land, water, water logging, and marine pollution. Although plastic is inherently recyclable and has value. This study explores how implementing a circular economy in plastic waste management improves waste management in Chattogram City, as well as improving the waste actors' livelihoods, and finally contributes to the environment. The study was conducted the across 41 wards under the Chattogram City Corporation area on waste actors such as waste pickers, bhangariwalas, recyclers, and householders who are involved in plastic waste management. Using a mixed methods management. Using a mixed methods approach. Stratified random sampling across 41 wards for the highest statistical standards and ensuring minimal bias. Combine surveys (quantitative) with KIIs and FGD to ensure comprehensive insights. The study reveals that the quality of life of waste collectors has improved, its percentage of 90%.

Similarly, the volume of trade and business scope of the bhangariwala has increased, its percentage of 100%. The production cost of recyclers has been reduced by about 30%. Considering the environment, this approach prevents additional carbon emis- sions from being added to the environment, brings unmanaged plastic waste under management, and it solves the city's environmental problems, such as reducing waterlogging in Chittagong. In this context, implementing a circular economic approach in plastic waste management offers a promising and sustainable solution to plastic pollution by emphasizing waste minimization, resource recovery, reintegration of materials into the production cycle, and improving the livelihoods of waste actors and the environment.

Keywords: *Circular Economy, Environment, Plastic Pollution, Climate Action, Livelihood,*

17. Toward Sustainable Ship Recycling in Bangladesh: Aligning with Environmental Agreements and Future Commitments.

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Abstract

Ship recycling in Bangladesh is the process of dismantling old ships to reuse their parts and materials, mainly done in coastal yards like those in Chattogram. Ship recycling plays a critical role in the circular economy by enabling the reuse of valuable materials; however, in countries like Bangladesh, it raises significant environmental, occupational, and regulatory concerns. As one of the world's leading destinations for end-of-life ships, Bangladesh faces increasing scrutiny under international environmental agreements such as the Basel Convention, the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (2009), and the ILO guidelines on safety and health in shipbreaking. These frameworks emphasize the importance of minimizing hazardous waste, protecting workers, and strengthening regulatory oversight.

Despite recent improvements—including policy reforms, yard upgrades, and training initiatives—many ship recycling yards in Bangladesh still operate under informal and unsafe conditions. Bangladesh's gradual alignment with the Hong Kong Convention, expected to enter into force in 2025, presents both an opportunity and a challenge. While this transition promises to improve compliance and environmental performance, it also demands significant investment in infrastructure, human capacity, and institutional coordination.

Recommendations for overcoming future challenges include:

1. Full ratification and implementation of the Hong Kong Convention through national legislation.
2. Establishment of independent monitoring and certification bodies to ensure transparency and accountability.
3. Investment in green infrastructure such as impermeable floors, waste treatment facilities, and emergency response systems.
4. Incentivizing compliance through subsidies, public-private partnerships, and preferential access to green financing.

Sustainable ship recycling in Bangladesh will depend on the ability to balance economic interests with environmental integrity and labor rights, guided by robust implementation of global agreements and informed national policies.

Keywords: *Sustainable Ship Recycling in Bangladesh*

Poster Presentation

Contents

1. Geo-Spatial Dynamics of Shrimp Aquaculture Expansion and Agricultural Land Conversion in Rupsha Upazila, Khulna(1990-2025): Assessing Environmental and Economic Prospects Using GIS and Remote Sensing

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Abstract

This research studies the spatial dynamics of shrimp aquaculture development and its corresponding agricultural land conversion in Rupsha Upazila, Khulna, Bangladesh, between 1990 and 2025. By employing all sophisticated remote sensing approaches, GIS analysis, and plenty of socio-economic information, the study maps changing dynamics of the landscape. Sequential LULC maps were created using support vector machine-based supervised classification of Landsat TM, ETM+, OLI, and Sentinel-2 MSI satellite images. Analysis of such maps suggests the drastic decrease of agricultural and natural vegetation, which went down from 24–26% in 1990 to 7–11% in 2025, since despite the aquaculture areas blooming rapidly, we can now find them covering nearly 46–49% of the total territory of the region. The research uses the Normalized Difference Salinity Index (NDSI) to find that extreme aquaculture techniques have increased soil and water salinity. The change from cool blue to warm red in the spectral pattern denotes improvement in salinity and may threaten agricultural sustainability over time because of worse soil fertility and freshwater composition. The socio-economic impact of shrimp aquaculture on the local farmers, fishers, and traders is that with increased income and export benefits. This research indicates that, despite the increased salinity of water in Rupsha Upazila due to shrimp farming, farmers are still able to successfully grow other crops, including rice, on the same land or nearby land during different seasons. Therefore, it would be inaccurate to claim that shrimp farming completely displaces farmers from other agricultural activities, such as rice cultivation. If effective regulations are implemented by the government and private organizations, certain areas in the southern region—Khulna, Shatkhira, and Bagerhat—could be designated as shrimp farming zones, allowing for the simultaneous cultivation of other crops using advanced technology and expertise support. Based on these all-encompassing observations, the research suggests the development of an adaptive coastal management system, including real-time high-resolution geospatial surveillance.

Keywords: *Land Use Land Cover (LULC), Normalized Difference Salinity Index (NDSI), LandSat-5 Thematic Mapper, Sentinel-2 Multispectral Instrument*

2. Circular Economy Adoption and Environmental Consideration: A Study on the Actors of Recycling in Bangladesh Apparel Industry and Plastic Industry

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Abstract

There has been a dearth of research related to the circular economy and its consequences in the context of rising economies [Khajuria et al., 2022], as the literature is centered around advanced economies [Jabbour et al., 2019]. This study intends to bridge this gap while making progress on CE research based on the evidence of emerging economies like Bangladesh. The apparel industry of Bangladesh is also actively being addressed by the circularity and sustainability related interventions of stakeholders as the country is in the second position after China in terms of global apparel trade, and holds 7.4 percent market share in the global apparel industry [Shajahan et al. 2023; Star Business Report, 2024]. In this industry, the transition toward circularity is often associated with environmental benefits, achieved by decoupling economic growth from environmental loss and replacing excessive resource extraction [Bukhari et al., 2018; Sandin & Peters, 2018]. Despite the 3R model of recycling, reduce, and reuse being the primary enabler of a circular economy, only the recycling component is widely practiced in Bangladesh [Ahmed et al., 2022]. The objective of the study is to identify what are the ways to circular economy adoption in terms of environmental considerations based on a comparative discussion of two interconnected industries of Bangladesh: apparel industry and plastic industry. Challenges of CE adoption in the context of the Bangladesh apparel industry by interviewing multiple stakeholders to explore the specific context of environmental consideration during CE adoption. To do so, the qualitative exploration of the study relies on in-depth interviews of the actors of both apparel industry and plastic industry while the quantitative orientation of the study leverages the secondary data of Mapped in Bangladesh database to visualize the certifications in apparel industry related to circular economy, plastic recycling, and environment.

3. Trends in forest tree and non-tree vegetation composition in Lawachara National Park, Bangladesh

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Abstract

Forests on Earth undergo tempo-spatial expansion and reduction due to natural and human activities. Calculating this change indicates the change in the areal extent. To understand the vegetation richness within a forest area, measurement of percent tree cover (PTC) is useful. This study aims to calculate the change in PTC within Lawachara National Park (LNP), for the first time, employing remote sensing data (acquired from NASA's Land Processes Distributed Active Archive Center - LP DAAC) of the Moderate Resolution Imaging Spectro- radiometer (MODIS) to assess changes in PTC within LNP, Bangladesh. Specifically, the analysis is based on the Vegetation Continuous Fields (VCF) product (MOD44B), which provides annual estimates of PTC. PTC images, spanning the period from 2003 to 2023, were utilized to calculate the changes within the forest. The analysis shows that about 56.82% of the LNP forest experienced growth in tree vegetation cover between 2003 and 2013, whereas 43.17% area experienced a decrease in percent tree vegetation cover. However, this trend reversed in the subsequent period (2013-2023), with 58.33% of the forest area experiencing a reduction in tree cover, and non-tree short vegetation share increasing. Despite this fluctuation, the overall trend from 2003 to 2023 reflects a positive change; 76.15% of the forest area was blessed with increased tree vegetation. Only 23.85% area faces a decrease in tree vegetation cover. The findings highlight the resilience of this forest ecosystem and the effectiveness of recent conservation efforts. The results of this study provide valuable insights for government agencies, conservation authorities and support target 15.1 of the Sustainable Development Goals (ensure the conservation, restoration and sustainable use of terrestrial ecosystems).

PGF5

4. Sustainable Reduction of Battery-Waste Graphene Oxide via Jute Leaf Extract for Tetracycline Elimination in Aqueous Systems

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Abstract

The contamination of aquatic environments by antibiotics, particularly tetracyclines (TCs), has become a significant environmental concern. This study presents the green synthesis of reduced graphene oxide (GrGO) using jute leaf extract as a natural reducing and stabilizing agent. Graphene oxide (GO) was synthesized from graphite derived from waste drycell batteries, offering a simple, sustainable, and costeffective approach. The adsorptive potential of GrGO for removing TCs from water was evaluated through batch experiments. Characterization of GO and GrGO by FTIR, FESEM, EDX, and XRD confirmed the successful reduction of GO.

Adsorption studies assessed the effects of GrGO dose, pH, contact time, and temperature on removal efficiency. Tetracycline (TEC), oxytetracycline (OTC), and chlortetracycline (CTC) were quantified before and after treatment using LC–MS/MS. Under optimal conditions, removal efficiencies reached 98% for TEC, 97% for OTC, and 97% for CTC. The adsorption data followed the Freundlich isotherm and pseudo-second-order kinetics, suggesting multilayer adsorption and chemisorption. The maximum adsorption capacities (qm) were 22.85 mg/g (TEC), 18.53 mg/g (OTC), and 22.23 mg/g (CTC). Thermodynamic analysis confirmed the process is spontaneous and endothermic. The GrGO adsorbent also demonstrated good reusability across multiple cycles. These results highlight the effectiveness of green-synthesized GrGO as a low-cost, eco-friendly adsorbent for removing tetracyclines from aqueous systems, offering a promising solution for water pollution caused by pharmaceutical contaminants.

PGF6

5. A Multidimensional Approach for Sustainable Seafood Management, Potential Substitute Validation and Ecological Impacts

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Abstract

The global demand for seafood is approximately valued at $143 billion (FAO, 2018) with international trade accounting for around 40% of this market where almost 4.5 billion people consider seafood as a critical source for nutrition and livelihood [1,2]. However, with an average risk of 8% worldwide, mislabeling persists as a major issue in Colombia, it is estimated to be 98% [3], in the USA, 77% [4], and in Brazil, 80% [5]. These fraudulent approaches endanger conservation efforts, distort market statistics, and provide significant health risks to the general public, such as allergic reactions and toxic exposures from mislabeled species like pufferfish and escolar. Despite the widespread use of mtCOI DNA barcoding for species identification, current methods lack consideration of ecological, morphological, and nutritional equivalency when recommending or assessing substitute species. This review identifies a major research gap in validation-based frameworks for substitute fish species, highlighting the absence of multi-criteria models that integrate ecological guilds, morphometric similarity, nutrient composition, toxicity profiles and genetic proximity. The paper proposes the foundation of a scientifically informed, integrated validation system that can be adopted as a scoring or grading tool by policymakers, regulatory bodies and seafood industry stakeholders to ensure accurate labeling, consumer safety and sustainable substitution in global fish markets.
Examining the Impact of Green Supply Chain Management (GSCM) on Reducing Operational Wastes in the Universities of Bangladesh

PGF7

6. Examining the Impact of Green Supply Chain Management (GSCM on Reducing Operational Wastes in the Universities of Bangladesh

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Abstract

This study aims to evaluate the impact of Green Supply Chain Management (GSCM) practices on reducing the operational wastes in the context of university campuses in Bangladesh.

The Green supply chain consists of Eco-Friendly Procurement, Waste Management and Sustainable Logistics. A quantitative, cross sectional approach has been used in this study. Random sampling technique has been used and the target population (N=310) including students, faculty members and administrative staff of different public and private universities of Bangladesh and National University in Bangladesh were reached with self-administered questionnaire containing a total 12 items and 4 different measurement scales for measuring the variables. SPSS 26.0 was used to analyze the dataset and evaluate the measurements along with structural models. The findings suggest that Eco-Friendly Procurement, Waste Management and Sustainable logistics positively influence on reducing operational wastes in university campuses in Bangladesh whereas the sustainable logistics impacts the most. This study is a pioneering research in the context of university level of Bangladesh to evaluate empirically the relationship between Green Supply Chain Practices on Reducing Operational Wastes, while previous literature have examined Green Supply Chain concept in industrial sectors. This study contains localized frameworks and validated measurement scales and contributing knowledge in the field of supply chain management.

Keywords: *Green Supply Chain Management, Eco-Friendly Procurement, Waste Management, Sustainable Logistics, Reducing Operational Waste*

PGF8

7. Sustainable NLP: A review on Integrating Climate Accountability into LLM Development

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Abstract

Natural Language Processing (NLP) has been revolutionized by the rapid progression of large language models (LLMs); however, their widespread use raises significant concerns. Their substantial computational reserves lead to mass energy consumption, carbon footprint, and broad lifecycle consequences that expand beyond hardware production, training, and inference, highlighting the urgent need for sustainable AI practices. Therefore, this review aims to investigate the impact of the complete lifecycle of LLMs, comprehending their cumulative carbon footprint and energy demands. So, a detailed methodological framework to assess the environmental impact and sustainability of training LLMs in NLP is applied in this study. We followed three methodologies, which include empirical experiments that involved fine-tuning prominent transformer-based language models (LLMs) like BERT, DistilBERT, and T5 using benchmark datasets such as SQuAD and AdversarialQA. Also, we extended the environmental impact assessment beyond operational emissions by including embodied emissions and resource usage related to hardware manufacturing and data center infrastructure. Furthermore, we incorporated a climate-aware reporting framework that aligns with best practices in transparency and reproducibility in NLP research. This paper identifies significant sustainability challenges caused by the development and implementation of AI models. Also, the lack of transparency in the existing reports about energy consumption results from the absence of widespread adoption of the benchmark for energy use, emissions, or sustainability.

Rather than limiting the analysis to final training runs, it can broaden the scope of existing studies by integrating the environmental implications of LLMs' entire development and deployment cycle. Overall, this review will combine key insights and recurring aspects, identifying strategies to reduce the environmental impact of LLM. It seeks to guide future research by highlighting common challenges and favorable practices that support sustainable design, reporting, and LLM usage, aiming to promote climate-conscious development of AI.

Keywords: *LLMs and environment, model efficiency, emission tracking, lifecycle impact, energy consumption.*

The research of Md. Kamrujjaman was partially funded by the University Grants Commission of Bangladesh.

PGF9

8. A Survey of Machine Learning Approaches for Environmental Assessment in Rohingya Refugee-Affected Areas of Bangladesh

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Abstract

Rohingya refugees have been fleeing to Bangladesh via Cox's Bazar since 1978. But things changed dramatically for the worse from August 2017 as a huge number of refugees started to stream in. This rapid and prolonged migration has put massive strain on the local environment and communities, resulting in deforestation, land and water degradation, shifts in local climate patterns, and escalating competition over natural resources. This first review work provides an overview of the current efforts using ML to understand and evaluate all these comprehensive impacts. We investigate the use of alternative ML techniques such as ANN, SVM, RF, fuzzy logic and hybrid econometrics models for analysing LULC, ecosystem health, landscape fragmentation, changes in LST and vulnerability to environmental hazards. High-resolution satellite imagery — from, for example, Sentinel-2 and Landsat 8 — augmented with field sample data, as well as socioeconomic indicators, has provided a way to observe and categorise the types of environmental changes brought on by the expansion of refugee settlements.

Aside from environmental analysis, ML tools have also been used to contextualise the social and economic impacts of the refugee crisis, like resource conflicts, employment opportunities, and social interaction between the refugees and the host communities.

The review illustrates the impactful role ML can play in managing big and heterogeneous data sets for policy-driven and informed decisions on environmental issues. There are even many more challenges to overcome, like scarce data, the applicability of certain models to other regions, and the need for a comprehensive integration of several fields.

Overall, the study suggests profound importance in approaches powered by ML to frame sustainable strategies and fact-based reactions to the humanitarian emergency being faced in Cox's Bazar.

Keywords: *Machine Learning, Environmental Impact Assessment, Rohingya Refugee Crisis, Remote Sens- ing, Land Use and Land Cover Change.*

PGF10

9. The Broken Green Loop: Supply Chain Transparency, Green Promises, and the Attitude-Behavior Gap in Bangladeshi Consumers

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Abstract

In the era of digital environmentalism, Bangladeshi consumers are increasingly engaging with sustainability content on social media—liking, sharing, and advocating for sustainable green causes. However, consumers are not seem to convert their social media activism into tangible purchases. Their online sentiments and actual behaviours frequently diverge, underscoring a persistent attitude-behavior gap. This study investigates the disconnect between consumers' eco-friendly social media engagement and their tangible purchasing behaviors, while examining how perceived supply chain transparency (or the lack thereof) shapes green purchase intentions. Grounded in the Theory of Planned Behavior (TPB), the research extends the TPB framework by integrating two critical constructs: social media and supply chain perception. Through a survey of 213 socially active Bangladeshi consumers which are collected via convenience sampling, the study employs Structural Equation Modeling (SEM) in SmartPLS4 to analyze the relationships between online environmental advocacy, supply chain perceptions, green purchasing intentions and green promises. This study contributes to identifying the gap between Green shoppers' behaviour for green purchase and social media activism. We also explore the variability between the green promises and supply chain disruption or lack of supply chain transparency. Theoretically, this research contributes by integrating digital activism and supply chain dynamics into the TPB, offering a contextualized model for developing economies. Practically, it urges policymakers and marketers to align green promises with transparent, resilient and effective supply chains to convert online engagement into offline behavior. The originality of this paper lies in its focus on Bangladesh—a market underrepresented in green consumption literature—and its critique of the "broken loop" between digital environmentalism, corporate promises, and tangible sustainability.

Keywords: *Digital activism, Supply Chain Transparency, Green Purchase Behavior, Environmentalism, Theory of Planned BehaviorThe research of Md Kamrujjaman was partially funded by University Grants Commission of Bangladesh.*

PGF11

10. Spatiotemporal Analysis of Vegetation Dynamics and Land Surface Temperature Change in Chittagong District (2014–2024): Climatic Trends, Health Impacts, and Urban Green Space Governance

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Abstract

Rapid vegetation loss and rising land surface temperature (LST) due to rapid urban expansion are increasing environmental and public health risks in Chittagong District. In this study, we explore the changes in vegetation cover using NDVI and variations in LST for the years 2014, 2019, and 2024. We compare satellite-derived data to measure spatiotemporal dynamics.

Furthermore, we analyze the seasonal and monthly averages of LST to identify warming trends and yearly changes. Previous studies in southeastern Bangladesh show significant increases in LST of up to about 6.5 °C over two decades (Islam et al., 2023). In several studies, a strong negative correlation has been found between NDVI and the expansion of builtup areas (Islam et al., 2023). Meanwhile, in another study, a trend analysis of Bangladesh's climate data shows that the average annual temperature is rising by approximately 0.27 °C per decade (Khan et al., 2019).

A secondary analysis looks at heat-related health issues in Chittagong's district and metropolitan health data. It examines the links between rising LST and more hospital admissions for heat exhaustion and heatstroke. These findings align with global research on vulnerable populations and urban heat island effects (WHO, 2023). The study also focused on the urban planning rules that require green space in new developments. In this paper, we argue that implementing these rules can significantly help reduce urban heat island effects and heat stress. This study combines remote sensing, climate trends, health data, and planning policy details. The objective of this study is to highlight the impact on public health and urban management in one of the fastest growing areas of Bangladesh due to the loss of vegetation and rising temperatures.

Keywords: *NDVI, Land Surface Temperature (LST), Urban Heat Island, Public Health, Chittagong, Remote Sensing, Vegetation Loss*

PGF12

11. Shrinking photic Zones in Guliakhali: A Remote Sensing-Based Comparative Study Linking Ocean Darkening with Agricultural and Industrial Pollution

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Abstract

The photic zone- where sunlight penetrates the ocean's surface to sustain marine life- is shrinking at an alarming rate. This is due to increasing light attenuation, a phenomenon now recognised as ocean darkening (Davies & Smyth, 2024). This study investigates the spatial correlation between ocean darkening and chemical run-offs in the coastal waters of Guliakhali, Bangladesh. Guliakhali was chosen as the study location due to its intersection of agricultural lands, heavy industrial activities like shipbreaking and a vulnerable coastal ecosystem.

Using 20 years of satellite data (2003, 2013, 2023), the study analyzes three key indicators: Kd(490) (a measure of light attenuation), chlorophyll-a (a proxy for nutrient-induced algal blooms), and turbidity/CDOM (indicating suspended pollutants and dissolved organic matter). Through comparative geospatial analysis, it is expected to reveal that fertilizer and pesticide runoff, coupled with industrial effluents, increases plankton density and water opacity. This also compresses marine biodiversity into shallower, high-risk habitats. Thus, this process threatens fisheries, ecological resilience, and the blue economy (Frigstad et al., 2023; Cael et al., 2023). As Davies and Smyth (2024) caution, this may be "one of the largest losses of habitat on the planet," yet one that remains largely invisible. This research provides much-needed spatial context to the narrative of climate change and consequences of human activities —shown

through the Global South, where economic development tends to overshadow environmental risk assessments. As a coastal nation confronting sea level rise and saltwater intrusion, Bangladesh needs to incorporate ocean light diminution into blue economy calculations and climate adaptation frameworks while improving research-based coastal management.

Keywords: *Ocean Darkening, Remote Sensing, Photic Zone Shrinkage, Coastal Pollution, GIS Mapping, Blue Economy*

PGF13

12. Tracking Vegetation Cover Change through Remote Sensing: A Case Study of Sustainable Campus Planning at the Asian University for Women Campus Site

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Abstract

The Asian University for Women (AUW), located along the Bayezid Link Road in Chattogram, Bangladesh, presents a unique case of environmentally responsive campus development. Drawing inspiration from the traditional hillside settlements of the Chittagong region, the 131.37-acre site is designed to work with the land's natural topography. The campus design incorporates a range of sustainable design strategies, including natural ventilation, daylighting, high thermal mass construction, hillside stabilization, and mass revegetation, to reduce energy consumption, conserve water, and serve as a regional model for sustainable development. This study applies Geographic Information Systems (GIS) and Normalized Difference Vegetation Index (NDVI) analysis using multi-temporal Landsat-5 and Landsat-8 satellite imagery to assess changes in vegetation cover since the inauguration of the construction in 2011 till the current year of 2025 on the AUW campus (22.38604°N, 91.79324°E). The analysis focuses on the ecological impacts of campus expansion and planned re-vegetation initiatives through unsupervised image classification with Google Earth Engine and NDVI Indices, along with super- vised image classification to assess Land Use and Land Cover (LULC) over the years. By evaluating the effectiveness of these interventions, the study offers insights into how large-scale institutional development can be aligned with sustainability goals.

Keywords: *GIS, NDVI, Remote sensing, Sustainable Institutional Design, LULC*

PGF14

13. Climate-Induced Internal Displacement in the Bay of Bengal: GIS-Based Assessment of Land Loss and Migration in Sandwip Island, Bangladesh

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Abstract

Climate change has increasingly become a major driver of displacement in the Bay of Bengal (BoB) region, where millions of people are exposed to sea-level rise, coastal erosion, and extreme weather events. This study investigates the socioenvironmental dimensions of climate-induced migration in Bangladesh through a mixed-method approach. The research combines Geographic Information System (GIS) analysis of Sandwip Island's land loss over the past two decades with field interviews of thirty internally displaced residents.

Satellite imagery and topographic data are used to quantify land erosion, while qualitative interviews explore com- munity narratives of displacement, livelihood loss, and adaptation. Findings reveal a significant correlation between environmental degradation and human mobility, underscoring the vulnerability of deltaic communities. The study further identifies key gaps in current migration policies and proposes community-informed strategies to strengthen climate resilience. By integrating spatial data with lived experiences, the research provides grounded insights to guide regional planning and transboundary cooperation for displacement-affected populations in the BoB region.

This work was supported by the student research grant, ENVS Program, AUW. We thank the residents of Sandwip Island for their time and insights, and the Department of Environmental Sciences for academic and technical guidance.

PGF15

14. Groundwater Depletion in Khagrachari: Investigating the Socio-Environmental Impacts of Irrigation-Induced Extraction through Deep Water Pumps

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Abstract

In Khagrachari, most people depend on rice and vegetable farming for their livelihoods, cultivating rice twice a year but face irrigation challenges during the dry season, especially in fields far from the river sources. Previously, rivers and small streams supported dryseason irrigation, but in recent years, declining water flow has made crop cultivation during these months increasingly difficult. Nowadays, in those regions, farmers are showing a growing tendency to rely on groundwater for agricultural purposes compared to earlier years, with a noticeable rise in the use of deep well water pumps during the dry season.

This study aims to analyze the correlation between the intensive use of deep-water pumps for agricultural irrigation and groundwater depletion in Khagrachari, identifying the mechanisms and impacts to substantiate the need for sustainable water management practices. A mixed-method approach was used, including field observation, a questionnaire-based study of 250 local participants using both open and closed-ended formats, and an interview with a DPHE engineer was conducted. Findings indicate that households relying on shallow tube wells without upgraded depths report consistent water shortage during dry periods, an issue not prevalent in earlier years. Additionally, many have adopted deep well pumps for domestic use, while farmers increasingly favor groundwater for irrigation due to the unreliability of river water and rainwater. Although groundwater depletion in Khagrachari is not yet severe, recent findings show a gradual increase and expanding reliance on deep well water pumps may pose long-term sustainability risks. These changes suggest a transition away from traditional water practices, raising concerns about aquifer stress, water equity, and ecological resilience. The study calls for locally grounded solutions enhancing rainwater harvesting, irrigation efficiency, and river-based drainage systems while also raising awareness about responsible groundwater management across Bangladesh. Such integrated approaches are crucial to securing sustainable livelihoods and longterm drinking water security in Khagrachari.

This work was supported by the student research grant, ENVS Program, AUW

PGF16

15. EcoMeter: A Smart Mobile App to Calculate and Improve Individual Eco-Friendliness

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Abstract

In today's climate-conscious world, understanding and reducing our personal environmental impact is essential. EcoMeter is a simple, intuitive mobile application designed to help individuals assess how eco-friendly or ego-friendly their lifestyle is, and inspire them to make more sustainable choices.

The app guides users through 25 carefully designed questions grouped into five key categories: Waste Management, Energy Consumption, Water Usage, Transportation, and Shopping Behavior. Each category contains five questions, and users must complete all questions to proceed. Based on their responses, the app calculates a personalized Eco-Friendliness Score out of 100, along with a category-wise breakdown. This breakdown allows users to understand which areas of their lifestyle need improvement.

To support positive change, EcoMeter also features a dedicated section for eco-friendly tips. These tips are tailored to each category and offer simple, practical suggestions for users to become more sustainable in their everyday choices.

The app's purpose is not only to calculate a score but also to educate, motivate, and inspire. By making environmental awareness interactive and personal, EcoMeter encourages small yet meaningful lifestyle changes that can contribute to a greener future. The application is aligned with the goals of the Green Bengle Movement, aiming to promote environmental responsibility among individuals, especially the younger generation.

The application was developed using Flutter, programmed in Dart, and the interface was designed using Figma to ensure a modern and seamless user experience across devices. The app was tested with students and faculty members at the Asian University for Women (AUW) to evaluate usability, language clarity, and overall user engagement. Feedback from this testing process helped refine the quiz flow, color choices, and tip presentation.

This app illustrates how accessible digital tools can raise environmental awareness and promote conscious living. In future iterations, we aim to introduce features such as progress tracking, habit reminders, and community-based green challenges to further help users turn awareness into consistent eco-friendly action.

PB1

16. Ecosystem-based Adaptation (EbA): Opportunities in Bangladesh

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Abstract

The Ecologically Critical Areas (ECAs) of Bangladesh are becoming increasingly exposed, sensitive, and vulnerable to climate change impacts. Ecosystem-based Adaptation (EbA) provides a holistic, cost-effective, and sustainable approach to addressing climate risks by leveraging ecosystem services and biodiversity. It contributes to climate resilience by

delivering co-benefits, including biodiversity conservation and livelihood enhancement, particularly for communities who are dependent on natural ecosystems. The project "Nature-Based Adaptation towards Prosperous and Adept Lives & Livelihoods in Bangladesh (NABA- PALLAB)," initiated under the Bangladesh - UK Accord on Climate Change. The project applies the EbA approach in two Ecologically Critical Areas (ECAs): the Sundarbans and Hakaluki Haor. NABAPALLAB promotes climate-resilient and nature-positive livelihoods, ensuring the principles of Locally Led Adaptation (LLA) are embedded in all aspects of project design and implementation through an ecosystem-centric approach. The primary objective of this project is to enhance the adaptive capacity and resilience of vulnerable communities through ecosystem restoration, sustainable livelihood, and community engagement. The project outcomes include improved ecosystem health, increased community awareness of EbA, strengthened institutional capacities, and alternative sources of livelihood for local communities. Through the EbA approach, project NABAPALLAB contributes to reducing climate change risks by restoring natural buffers, promoting adaptive livelihoods, and integrating EbA into community development planning. The project also supports the implementation of several national plans and policies, including the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), the ECA Rules, and the National Adaptation Plan, thereby reinforcing the role of EbA in long-term adaptation planning.

Keywords: *Ecosystem-based Adaptation (EbA), NABAPALLAB, Ecologically Critical Area (ECA), Sund- arban, Hakaluki Haor*

PB2

17. Integrated Floating Vegetable Garden cum Filter-Feeder Fish Culture - A Nature-based Solution to Eutrophication and Water Hyacinth Invasion in Bangladesh

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Abstract

The vast network of inland waters of Bangladesh, crucial for livelihoods and ecosystems, faces severe eutrophication and invasive water hyacinth (Eichhornia crassipes) proliferation due to high nutrient loads from transboundary rivers. This dual challenge renders significant freshwater bodies derelict, impacting agriculture, aquaculture and overall ecological health. This project proposes an innovative Nature-based Solution (NbS) to restore these degraded aquatic systems. Building upon the traditional 'Floating garden agriculture practice' in southern Bangladesh, our approach synergizes the cultivation of nutrient-rich vegetables on water hyacinth-based floating platforms with the culture of filter-feeder fish species (e.g., Silver Carp, Bighead Carp, Mola Carplet). The floating garden actively absorbs excess nutrients from the waterbody, while the filter-feeder fish continuously consume phytoplankton, further reducing nutrient loads and mitigating algal blooms. The purpose of the study is to find the removal efficiency of the water hyacinth floating bed as the main indicators of eutrophication, such as total nitrate (TN), total phosphorus (TP), ammonium nitrogen (NH4+), total organic carbon (TOC). Simultaneously nutritious vegetables (e.g., red amaranth, pumpkin) and high-protein fish are produced. Beyond ecological restoration, the project enhances food security, diversifies local diets, and creates livelihood opportunities for marginalized communities, particularly women and land- less farmers, by transforming environmental liabilities into productive assets.

Our ongoing work involves pilot testing within the Bangladesh Agricultural University campus and adjacent floodplain wetlands, monitoring water quality, biodiversity and yields. The results illustrate why this floating bed using water hyacinth holds the promise of becoming a low-cost yet sustainable method of managing eutrophication in small and medium-sized water bodies.

Keywords: *Nature-based Solutions, Eutrophication, Water Hyacinth, Floating Gardens, Filter-feeder Fish*

PB6

18. Exploring the Feasibility of Urban Green Spaces as Nature Based Cooling Solutions in Informal Settlements: A Case Study of Korail Slum, Dhaka, Bangladesh

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Abstract

Informal settlements are more susceptible to excessive urban heat due to dense construction, minimal greenery, inadequate infrastructure, and poor ventilation. The Urban Heat Island (UHI) effect, amplified by climate change, exacerbates heat stress in these regions, posing significant dangers to health, productivity, and general well-being. As urban areas expand and climate threats intensify, Urban Green Spaces (UGS)—comprising small parks, shaded communal zones, green corridors, and vertical greenery—are increasingly acknowledged as efficient, cost-effective nature-based solutions (NbS) for alleviating urban heat. However, their practicality and potential for application in high-density, lowresource informal settlements remain little examined. This study evaluates the viability of implementing urban green spaces as climate adaptation strategies in Korail, the biggest informal community in Dhaka. This study uses a mixed-methods approach, including mapping, temperature tracking, surveys of residents, and community involvement, to examine the effectiveness of small green solutions and how the community feels about them. These encompass small gardens, shaded seating zones, and community-maintained vegetation. The research explores the community's awareness and ability to sustain green areas within socio-economic and infrastructural limitations. Identified key challenges are restricted space, unstable land tenure, insufficient awareness, and financial or resource constraints. Opportunities are apparent, especially with robust community interest, youth involvement, and the presence of tiny unused areas conducive to greening initiatives. Research shows that green areas, when placed in the right spots and managed by the community, can help cool down the area and make it better able to handle climate changes, especially if they use simple, affordable, and suitable designs. The report proposes the creation of localized greening models, the incorporation of informal settlements into municipal heat action programs, and the establishment of institutional partnerships to provide technical and financial assistance. The research enhances inclusive climate adaptation planning by providing evidence-based ways to foster environmental resilience in lowincome urban settings.

Keywords: *Informal Settlements, Urban Green Spaces (UGS), Urban Heat Island (UHI), Nature-Based Solutions (NbS), Climate Adaptation.*

PB7

19. Trends of air quality and impacts of air pollution in the urban slum areas of Chittagong city, Bangladesh: An observational study

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Abstract

Air pollution is increasingly becoming an environmental and public health crisis in urban regions of Bangladesh, particularly impacting vulnerable communities residing in the slums of Chittagong city. Chittagong's air quality is poor, marked by air pollutants high PM2.5 levels and extensive slum areas contributing to pollution. This study aims to assess the trends of air quality and impacts of air pollution on residents in selected urban slum areas of Chittagong City, including Jhautola and Lalkhan Moti Jhorna. A mixed-methods approach was used, utilizing secondary data (AQI value from 01/01/2025 January to 22/06/2025 June) obtained from the Department of Environment, alongside primary data gathered through structured questionnaire surveys conducted through face-to-face interviews with 150 residents of the slum areas in Chittagong city. The data were analyzed using SPSS and R programs.

1. Trends: It highlights a clear declining in Daily AQI trend (figure-1), declining monthly average trend in AQI levels(figure-2) and declining linear trends in AQI value (figure-3), showing that air quality in Chittagong improves progressively from winter to early monsoon, shifting from mostly unhealthy/ very unhealthy conditions to moderate/good levels by June, indicating seasonal improvement in air quality. Percentage of Air Quality Conditions (Jan–June): unhealthy (48.6%), moderate (15.6%) and very unhealthy (13.3%), good (3.5%), and hazardous (0.5%), data not available (18.5%) [figure-4]. 2.Health responses from the 150 participants indicated a high prevalence of air pollution-related health conditions such as chronic respiratory symptoms – coughing and breathing problem (32%), headaches and fatigue (24%), asthma in children (14%), eye irritation / skin irritation (12%), general discomfort (10%) and no major issues (8%) [figure-5]. Environmental and household exposure indicated lack of proper ventilation (55%), 22% reported cooking smoke (poor indoor air), near industrial / traffic zones (15%), and better ventilation and lower exposure (8%) [figure-6].

It emphasizes the need of implementing routine air quality assessments, providing health education, enforcing pollution control strategies, promoting sustainable urban planning, mitigating health inequalities in vulnerable communities.

Keywords: *Trend, Air pollution, Urban slum areas, Chittagong city, observational study.*

PB8

20. Spatiotemporal Assessment of Urban Hotspots (UHS) and Land Use Indices Influence on LST Using Random Forest Algorithm in Chattogram City Corporation (1990 -2023)

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Abstract

Urban Hotspots (UHS) are spatial phenomena that highlight areas experiencing significantly higher temperatures compared to their surrounding regions, typically classified into binary categories such as "Hotspot" or "Non-Hotspot". Chattogram City Corporation (CCC) is

experiencing rapid population growth, leading to significant land cover changes. The primary focus of this study is to analyze the spatiotemporal transformation of Urban Hotspots (UHS) from 1990 to 2023 at 10-year intervals. To enhance this analysis, statistical relationships among four land use indices – Normalized Difference Vegetation Index (NDVI), Normalized Dif- ference Builtup Index (NDBI), Normalized Difference Bareness Index (NDBaI), and Modified Normalized Difference Water Index (MNDWI) were examined using the Random Forest Algorithm. To achieve this, Land Surface Temperature (LST), UHS, NDVI, NDBI, NDBaI, and MNDWI were analyzed, and changes between UHS and Non-UHS were detected using GIS and remote sensing techniques. Findings indicate that the situation is not as critical as it appears, and timely mitigation strategies can significantly improve urban liability. Statistical analysis reveals that from 1990 to 2023, 4.04 km2 of Hotspot transitioned to Non-Hotspot, while 3.374 km2 shifted from Non-Hotspot to Hotspot. Ground truthing using satellite images from 2000 to 2023 shows that most Non-UHS to UHS transformations occurred from vegetated or water bodies to bare lands, industries, or urbanized areas, whereas UHS to Non-UHS changes resulted from bare land and hilly open areas transitioning to vegetation. Even minimal vegetation within urbanized zones contributes to reducing Urban Heat Island (UHI) effects, highlighting urban greening as a key mitigation strategy. Results from the Random Forest algorithm reveal a clear hierarchy in the influence of land use indices on temperature rise, ranked as NDBaI > NDBI > MNDWI > NDVI. Given CCC's limited space, rooftop gardening and balcony gardening could be effective. These findings provide valuable insights into urban planning and heat mitigation strategies.

PB5

21. Climate-smart agricultural activities play a crucial role in fostering a resilient community and empowering women.

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Abstract

The impacts of climate change in Bangladesh will be severe, as the country is among the most vulnerable to its global climate change in the coming decades. While climate vulnerability impacts everyone, it primarily impacts women's health and wellbeing. The "Advancing the Leadership of Women and Girls Towards Better Health and Climate Change" project, initiated by Pathfinder International Bangladesh, aims to empower women and girls as change agents to foster the development of climate-resilient communities. The evaluation of the intervention was conducted through a small-scale mixedmethods study. By June 2025, the project had established approximately 954 women's groups across five districts, reaching a total of 23, 546 women who participated in sessions on climate-smart agricultural practices. From these groups, 808 selected women were linked with the Department of Agricultural Extension's climate-resilient livelihood program, where they learned climate adaptive techniques such as tower gardens and sack gardens to protect plants from being washed away during disasters like flash floods and cyclones. Additionally, they learned methods for cultivating vegetables in sandy soil, producing compost fertilizer. As a result, 2,760 women have started climate-resilient livelihood opportunities. Despite the limited number of women receiving training and incentives, the initiative inspired other group members and women in the wider community to start vegetable cultivation.

Vegetable cultivation provided women with not only subsistence food but also a way to generate income, allowing them to achieve financial independence. The women in the group reported having autonomy over their spending, which created a stronger sense of selfworth and responsibility within their households. Additionally, this financial independence contributed to increased self confidence and independence, highlighting an essential aspect of empowerment. Ultimately, this newfound independence has enhanced their status within the family, leading to their spouses valuing their opinions more and resulting in greater involvement in household decision-making.

Key words: *Climate, Smart, Livelihood, Income, Empowerment*

22. Bridging Heat Resilience and Water Security: A Framework for Integrated Urban Climate Adaptation in Narayanganj

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Abstract

The increasing frequency and intensity of heatwaves and water stress in urban Bangladesh pose critical challenges for sustainable development and climate adaptation. While urban heat resilience and water security are often addressed separately, their interlinkages, especially in the context of secondary cities, remain underexplored. This research proposes an integrated framework that bridges heat resilience strategies with water resource management to advance holistic urban climate adaptation.

Drawing on field-level experiences in Narayanganj, this research analyses how heat mitigation efforts, such as reflective roofing, green cover expansion, urban planning, and innovative infrastructural mechanisms, can be harmonized with water-sensitive urban design (WSUD), rainwater harvesting, and integrated water governance. Using a combination of GIS based heat mapping, community surveys, and policy analysis, the research identifies spatial and governance based synergies between heat risk zones and water-insecure neighbourhoods. The research further evaluates the alignment of current urban planning practices with the principles of Integrated Water Resources Management (IWRM) and Locally Led Adaptation (LLA), emphasizing equity, participation, and climate justice. Based on these insights, a context-specific adaptation framework is proposed to guide decision-makers in designing resilient and inclusive urban systems. In the rapidly growing cities and urban industrial contexts, balancing is quite tricky and requires interdisciplinary intervention. The methodology used in this research combines qualitative and quantitative data to identify bottlenecks, assess gas, and provide guidelines for climate-resilient interventions. The proposed framework addresses not only climate risks but also contributes to co benefits, including public health, urban biodiversity, and social equity. This interdisciplinary approach is particularly relevant for climate-vulnerable urban industrial corridors in South Asia and offers replicable insights for secondary cities globally.

Keywords: *Urban Heat Resilience, Water Security, Integrated Adaptation, Integrated Water Resources Management (IWRM), Climate Justice*

PB10

23. GIS-Based Assessment of Community Adaptation for Nature-Led Coastal Resilience and Climate-Induced Migration in Kuakata Upazila, Southern Bangladesh

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Abstract

This study conducts a GIS-based evaluation of community adaptation initiatives in Kuakata Upazila, Southern Bangladesh, focusing on enhancing natureled coastal resilience and mitigating climate-induced migration. Utilizing multitemporal Landsat 5 (2004) and Landsat 8 (2024) Surface Reflectance imagery processed through Google Earth Engine (GEE), the research quantifies changes in mangrove cover using NDVI thresholding. Results indicate a net mangrove gain of approximately huge hectares alongside localized losses, reflecting the effectiveness of restoration efforts amidst ongoing environmental challenges.
Socioeconomic surveys combined with spatial analysis reveal that local communities have adopted adaptive livelihood strategies such as sustainable aquaculture and agroforestry that contribute to reducing vulnerability and migration pressure. Vulnerability mapping further identifies highrisk populations disproportionately affected by coastal hazards and salinity intrusion. The integration of remote sensing data and community-based insights underscores the importance of holistic approaches in fostering resilient coastal ecosystems. Findings provide actionable recommendations for policymakers to support scalable mangrove restoration and inclusive adaptation frameworks aimed at sustaining livelihoods and mitigating climate impacts in vulnerable coastal zones.

Keywords: *Mangrove Restoration, GIS, Google Earth Engine, Coastal Resilience, NDVI.*

PB4

24. Biochar-Based Closed-Loop Systems: Integrating Pyrolysis, Carbon Sequestration, and Regenerative Farming for Zero-Waste Agriculture

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Abstract

Climate-smart agriculture (CSA) is essential for reducing greenhouse gas emissions, improving soil health, and boosting agricultural productivity. Biochar, made from crop residues through pyrolysis, provides a sustainable way to capture carbon and enhance soil quality. However, high costs for pyrolysis equipment and weak carbon credit policies limit adoption by small-scale farmers. This study examines a closedloop biochar system that combines pyrolysis, regenerative farming, and waste recycling to create a zerowaste agricultural model.

The research looks at (1) the economic and environmental viability of small-scale pyrolysis systems, (2) how biochar affects soil health (water retention, microbial activity, crop yield), and (3) the creation of a closed-loop farm model that integrates biochar production, energy recovery, and waste reuse. The methods include (i) pyrolysis trials (300–600°C) using maize stalks and rice husks, with field tests applying biochar (5–20 t/ha) to study its effects on soil pH, organic carbon, and crop productivity; (ii) energy analysis of syngas and biooil for onfarm use; (iii) economic assessment of small-scale pyrolysis units and carbon credit potential; and (iv) farmer surveys to understand barriers to adoption.

Preliminary findings show significant benefits: a carbon sequestration potential of 2–5 t CO2/ha/year, a 15– 30% increase in soil water retention, and a 10–25% rise in crop yields. Recovering energy from syngas could supply 20–40% of farm energy needs, improving system sustainability. The economic analysis indicates that lowering pyrolysis unit costs and introducing carbon credit incentives could help smallholders gain access. This study shows that biochar-based closed-loop systems can improve climate resilience, soil fertility, and farm productivity while cutting down waste. Policy changes and affordable technologies are vital for encouraging adoption among small-scale farmers. The results support sustainable agriculture practices by confirming biochar's role in carbonneutral farming and circular bioeconomy models.

Keywords: *Biochar, pyrolysis, carbon sequestration, soil health, closed-loop agriculture, small scale farming.*

PB11

25. Blue Carbon Finance: The Next Frontier for Localized Climate Bonds in the Bay of Bengal

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Abstract

As global attention to climate finance grows, nature-based solutions like blue carbon ecosystems particularly the mangroves present great potential for both carbon sequestration and coastal resilience. Based on the Chowdhury et al. (2024) AGC/BGC figures and typical SOC values, the total ecosystem carbon storage in the Bangladesh Sundarbans is estimated to be between 141 and 184 million tons [1]. Yet, these valuable ecosystems are largely absent in major climate finance systems. This study proposes a breakthrough mechanism that is to introduce localized climate bonds backed by verified blue carbon credits from communityled mangrove restoration projects. These bonds would allow local authorities or government to raise money from investors, with repayments linked to revenues from carbon credits and benefits like stronger coastal protection valued at over $400 per hectare annually in avoided flood damage, according to global estimates [2-3]. Using a mixed-methods approach that integrates policy analysis, carbon stock valuation, and similar financial instrument design drawing on models such as the Seychelles' Blue Bond and Belize's debt-for-nature swap, this study presents a replicable model for embedding blue carbon ecosystems into subnational climate finance frameworks [4-5]. Preliminary modeling suggests that, at a conservative carbon price of $10–15 per ton, Bangladesh's mangroves could generate $1.4–2.7 billion in credit value over a 30-year period [6]. The paper also outlines enabling conditions such as

valuation benchmarks, institutional coordination, and inclusive community engagement strategies. By turning undervalued ecosystems into bankable climate assets, this approach offers a triple dividend of emission reductions, local resilience, and innovative climate finance – positioning Bangladesh as a global frontrunner in naturebased and equitable climate solutions.

Keywords: *Blue Carbon, Climate Finance, Mangroves, Nature-based Solutions, Coastal Resilience*

PB12

26. Protection Mechanisms for Climate-Induced Internal Displacement: A Comparative Analysis of Legal and Policy Response of Bangladesh with Human Rights Standards

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Abstract

Due to the adverse impact of climate change, internal displacement poses a significant challenge for climate-vulnerable countries such as Bangladesh. By midcentury, climate change could forcibly internally displace over 19.9 million Bangladeshi people. It is the primary duty of the Government to protect the internally displaced persons (IDPs), as states have constitutional obligations to ensure the fundamental human rights of their citizens. Moreover, developed countries have several commitments to protect IDPs under the obligations of several international human rights and other legal instruments. This paper aims to explore the extent to which Bangladesh complies with the international human rights standards in its domestic laws and policies to ensure the human rights of IDPs. It will further identify the legal gaps in existing laws and policies and will review how efficient are current human rights protection measures of Bangladesh to protecting its IDPs. This paper uses a doctrinal methodology and compares legal and policy responses of Bangladesh, including the constitution, statutes, and policies against international human rights treaties and the UN Guiding Principles on Internal Displacement. The findings reveal that the domestic laws and policies of Bangladesh do not properly contain the protection of IDPs, and also do not comply with the international human rights standard for the protection of IDPs. Through rigorously comparing domestic legal and policy frameworks with international human rights standards, this paper identifies the current protection gap of IDPs. These findings are significant for developing evidence-based policy reforms and legal development. By developing an evidence-based legal and policy framework following international human rights standards, Bangladesh can ensure the human rights of its IDPs.

Keywords: *Climate Change, IDPs, Protection and Human Rights*

PB14

27. Prevalence of water-borne disease morbidity and association with water quality in a flood prone coastal island 'Charandwip' of Chattogram: A cross-sectional study

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Abstract

Water-borne diseases (WBDs) present a critical public health challenge in flood-prone coastal areas, particularly in vulnerable regions in Bangladesh. This crosssectional study examined the prevalence of WBDs and their association with water quality parameters following recent flooding events in the river island 'Charandwip' of Chattogram. Data were collected from 385 residents using semistructured questionnaires to assess the incidence of diarrhea, dysentery, skin diseases, and cardiovascular symptoms within three months post-flood. Concurrently, 10 water samples (8 tube wells, and 2 ponds) were analyzed for microbiological (E. coli) and physicochemical (pH, salinity, TDS, EC, DO) parameters. The results demonstrated a high burden of WBDs, with diarrhea being most prevalent (8.22% in children aged 0-5 years, 6.94% in adolescents, and 5.00-5.83% in adults). Dysentery showed gender disparities, affecting 5.32% of males compared to 1.23% of females. Skin diseases disproportionately impacted children (38.20% in 0-5 years, 22.02% in 6-18 years). Cardiovascular symptoms included chest pain (3.90%, higher in females) and neck pain (8.31%, higher in males). Water quality analysis revealed significant E. coli contamination in 62.5% of tube wells and 50% of ponds. While pH levels (6.5-8.5) met WHO standards, extreme variations were observed in TDS (81-5216 mg/L), salinity (0.06-4.54 ppt), and EC (125-8025 µS/cm). DO levels (6.37-7.22 mg/L) remained suitable for aquatic life. Study found strong correlations between WBDs and environmental factors. Diarrhea prevalence correlated negatively with water treatment access (r=-0.41), while dysentery showed stronger associations with poor sanitation (r=-0.55). Skin infections increased significantly with floodwater exposure (r=-0.66), and respiratory symptoms correlated with mold/dust (r=0.54) and flood duration (r=0.52). These findings highlight the complex interplay between flood-induced water contamination and disease patterns in coastal communities. The study underscores the need for improved water treatment infrastructure, flood resilient sanitation systems, and targeted public health education to reduce WBD transmission in vulnerable populations.

Keywords: *Water-borne diseases; Water quality; Flood; Coastal health; Hygiene*
This work was supported by the student research grant, ENVS Program, AUW

PB16

28. The Impact of Water Quality Variations on Environmental and Public Health in Chittagong, Bangladesh

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Abstract

The study examines the physicochemical changes in surface water bodies in Chittagong, Bangladesh and their implication concerning the environment and people.

The study started focusing on acidification of the ocean caused by soil erosion and nutrient leakages, but it shifted direction following results indicating that majority of water bodies were alkaline, not acidic, with temperature levels ranging between 7.7 to 8.8. Ten targeted sites as the Karnaphuli River, Kaptai Lake, Patenga, and others, it was discovered that the level of total dissolved solids was high (up to 9111 ppm) and electrical conductivity exceeded (2000+ 1S/cm) which can be attributed to a potential role of industrial discharge, saline intrusion, and other anthropogenic factors.

In order to cover the human aspect, more than 100 people from 50 household surveys were performed with specific gender vulnerabilities marked as far as access to water, its use, and exposure to possible contaminants. Two months were devoted to the settling of Sediment samples that were collected and observed. The continued testing is conducted in the form of checking the pH buffering capacity, differentiating between nitratephosphates, observation of texture and turbidity, and the detection of basic heavy metals through spot kits. Such lowcost analyses are meant to show signs of pollution and the ecological effects.

The research adds to the small regional literature on inland alkalinity and its influence on health and ecosystem services in fastgrowing urbanised coastal areas. Based on these frameworks by Gattuso et al. [3] and Weatherdon et al. [4], it points out that the combination of socio-economicand water chemistry data is necessary to establish fair evidence-based policy on water management, pollution mitigation and climate resilience.

This work was supported by the student research grant, ENVS Program, AUW, and made possible by the participation of local communities in Chittagong.

PB17

29. Women-Led Ecopreneurship Using Palmyra Leaf Products in Coastal Bangladesh

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Abstract

The project focuses on the ingenious use of Palmyra (Borassus flabellifer) leaves by research assistants of the Green Bangle Project (GBP), in collaboration with the women of coastal village of Guliakhali, Bangladesh, as a means of creating sustainable and biodegradable products. The project targets two main products (1) ecobags to carry saplings and fresh food and (2) Cards of palmyra print to be used in small businesses, weddings, and campaigns towards the environment. These products are handdone by weaving and block-printing in the traditional way used by generation but updated with new and fresh styles and marketing perceptions. The initiative is a combination of inheritance of life, ecological awareness, and financial self-sufficiency. Renewable Palmyra leaves are naturally available, compostable, and quite tough, which serves as an alternative to plastic and artificial materials. The ecobags will be used to substitute the plastic revolution-bags in order to achieve zero-waste plantation. In the meantime, the cards themselves, created in a layered dried leaves and natural dyes, offer an artisanal replacement to the chemically-bleached paper products. The two products have been promoted in competition fairs and sustainable campaigns. The Guliakhali women artisans have been specially trained on how to make ecocrafts, such as, how to process the leaves, how to use dye and how to brand them. They have also attended market access activities and storytelling seminars in order to publicize their products through Green Bangle Movement.

This project represents and integrates ecofeminism with landscaping environmentalism and gender justice as a representation of ecopreneurship due to low capital/ high impact green startups. The project can add to the green approaches to rural resilience, replace plastic and the wider circular economy by valorising local materials and traditional skills.

Keywords: *Palmyra Leaf, Ecofeminism, Ecopreneurship, Guliakhali, Sustainable Packaging, Biodegradable Crafts, Women's Empowerment*

This work is supported by the faculty research grant, Asian University for Women

PB16

30. From Wild Tuber to Culinary Treasure: Introducing Palmyrah Sprout in Bengali Cuisine

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Abstract

This paper will discuss culinary innovation and food security potential of Palmyra (Borassus flabellifer) tubers. By applying the conventional steaming technique and solar drying techniques, the tuber was boiled and also then powdered whereby a mixture of both types was experimented and utilized in the common Bengali food delicacies including bharta (mashed), bhaaji (stirfried), and torkari (vegetable curry). And the tuber, which did not only resist draught but boasted plenty of fiber, potassium, antioxidants et al, has untapped potential in food sustainability. A research assistant of GBP worked on experimenting their recipes, they added or removed the quantity of oil and spices to enhance their taste and their digestibility. The last meals were tested by the AUW community by means of tastes and it was determined that they could be healthy substitutes of carbohydrate staple such as potatoes. This project contributes to ecofeminism by reinstating indigenous knowledge about food and introducing alternative and climateproof agriculture to ensure that women can be independent in food production and ecopreneurship activities. The innovation brings back to life a forgotten species and offers a pattern not only of localized and zero-waste food systems but also fuses sustainability with the cultural cuisine.

Keywords: *Palmyrah Tuber, Bengali Cuisine, Ecofeminism, Food Security, Indigenous Knowledge, Ecopreneurship*

This work was supported by the Swiss philanthropy Foundation.

PWW2

31. A Green Criminological Perspective on the Legal Reform and Technological Innovation of Wildlife Conservation Laws in Bangladesh

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Abstract

This paper highlights the need for a comprehensive approach to wildlife preservation in Bangladesh by examining how green criminology has influenced the wildlife conservation related Bangladeshi. The efficiency of conservation initiatives is neglected by issues including

illicit poaching, habitat loss, and human-wildlife conflict, despite Bangladesh's legislative frameworks such as the Wildlife (Conservation and Security) Act and the Forest Act. The research questions the current legal frameworks and exhibits a more elaborated view of environmental crimes via the perspective of green criminology, which incorporates ecojustice and the rights of nonhuman animals. In addition to focusing on unlawful activities, these offenses ought to address profitable yet detrimental practices that put species at risk. The study also demonstrates the efficacy of cuttingedge methods in animal conservation, such as creative monitoring strategies and predictive models that include AI and other technology, to identify illegal activities and lessen conflict between people and wildlife. These techniques can greatly improve enforcement actions and offer sustainable solutions for biodiversity conservation in Bangladesh's vital areas, such as the Hill Tracts and the Sundarbans. The advanced techniques have been effectively used in developed nations, where it has improved ecosystem management, wildlife tracking, and the detection of illicit activity. According to the report, Bangladesh can strengthen its conservation efforts by using these strategies.

PWW3

32. Ecosystem Service Dynamics in Response to Shoreline and Land Use Changes on Sandwip Island, Bangladesh (1993–2023

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Abstract

Deltaic islands, such as Sandwip in Bangladesh, undergo continuous changes under the influence of sedimentation, tides, and anthropogenic interventions. The present research investigates the spatial and temporal variations in shoreline and landcover dynamics on Sandwip Island from 1993 to 2023, and evaluates their effects on ecosystem service values (ESV). Sediment-based land gain estimated from satellite imagery analysis using the End Point Rate (EPR) and Net Shoreline Movement (NSM) method indicates a substantial 9620 ha. The hydrological response, as assessed by the Normalized Difference Water Index (NDWI), showed considerable loss of wetland habitat (mean NDWI dropped significantly from +0.34 to +0.06) due to decreased tidal inputs and fragmentation of the ecosystem.

Landuse estimates showed marked declines in riverine areas (−77.5%), inland water bodies (−48.4%), and considerable increases in agriculture (122.0%) and newly formed char lands (225.9%). These changes led to substantial ecosystem service trade-offs, as total annual ESV decreased from 124.10 to 112.21 million USD, while agricultural productivity increased. The significant ESV losses were due to reduced regulatory roles of the aquatic systems. Vegetation and land use expansion contributed to an increase in carbon sequestration (25,594 tC/year); however, this was insufficient to compensate for the greater ecological losses.

The study highlights the intricate relationships between natural sediment dynamics, human-induced changes in land use, and the supply of ecosystem services. It has drawn attention to the harsh tradeoffs between economic growth and environmental sustainability, promoting the adoption of integrated coastal management approaches. Sediment-sensitive zoning, NDWI-based hydrological monitoring, and ESV-based land-use planning are recommended. These observations are crucial for policy and coastal resource planning practitioners, as they contribute to understanding how to achieve resilience, equilibrium in ecosystem services, and sustainable management of dynamic deltaic landscapes.

Keywords: *Ecosystem Service Valuation (ESV), Hydrogeomorphic Dynamics, Carbon Sequestration, Coast- al Resilience, Deltaic Island Management*

PWW4

33. Quantifying Mangrove Degradation and Its Influence on Southern Regional Climate in Bangladesh

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Abstract

Mangroves are highly diverse ecosystems that serve as natural barriers against coastal erosion and storm surges, thereby minimizing environmental degradation and reducing greenhouse gas emissions. Over the past thirty years, these dense forests have suffered significant degradation due to climate change and human activities. The mangrove ecosystem in southern Bangladesh has been steadily declining due to upstream agricultural activities, commercial crab farming, harvesting, alterations in water flow, and physical challenges such as erosion, severe weather, and tropical cyclones. This study examines the rate of mangrove forest degradation over time concerning land surface temperature (LST). Using Landsat imagery, the study assesses the extent of damage to mangrove ecosystems from 1990 to 2020 in the Google Earth Engine platform. The analysis revealed cumulative deforestation areas of 455.90 km2, 2,547.60 km2, 420.68 km2, and 1,643.43 km2 for 1990, 2000, 2010, and 2020, respectively. A strong correlation was found between deforestation and changes in land use and land cover (LULC). In 2000, the builtup area peaked at 46.16 km2, coinciding with significant deforestation, while the lowest deforestation in built-up areas was 13.45 km2. The study also found that deforestation is associated with an increase in LST. The maximum LST recorded was 27.37°C in 2000, while in 2010, during a period of reduced deforestation, the minimum LST dropped to 25.96°C. The findings highlight the extensive deforestation and development driven by population growth. Strategies aimed at reducing deforestation in the Sundarbans mangrove forest should consider the impact of such destruction on the ecosystem.

PWW7

34. Geo-Spatial Assessment of Urban Ecological Vulnerability : A Remote Sensing-Based RSEI Approach in Gazipur District

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Abstract

Climate change and unplanned urbanization are intensifying ecological degradation, particularly in rapidly urbanizing periurban areas of the Global South. Accurate and scalable methods to quantify urban ecological vulnerability are essential for sustainable landuse planning and resilient ecosystem management. This study presents a geospatial spatiotemporal assessment of ecological and environmental vulnerability in Gazipur District, Bangladesh, one of the country's most rapidly urbanizing zones. Using multitemporal satellite imagery from 2014 and 2024, this research employs the Remote Sensing Ecological Index (RSEI) to analyze changes in ecological health over a decade. The analysis integrates six critical biophysical indicators: Normalized Difference Vegetation Index (NDVI), Land Surface Temperature (LST), Normalized Difference Built-up Index (NDBI), Soil-Adjusted Vegetation Index (SAVI), and two moisturerelated indices (NDMI and NDWI), all derived from Landsat 8 and 9 surface reflectance data. Each index was standardized and weighted

using the Entropy Weight Method (EWM) to construct the composite RSEI, ensuring an objective representa- tion of ecological conditions.Temporal comparison reveals a significant decline in ecological quality between 2014 and 2024, particularly in central and southern upazilas where urban heat island effects, vegetation loss, and surface sealing have become more pronounced. Spatial hotspot mapping further highlights regions under acute ecological stress due to land-use transformation and diminishing green and water cover. The findings underscore the value of RSEI as a significant potential for guiding policy decisions related to biodiversity conservation, urban resilience, and climate adaptation in fast-growing urban regions like Gazipur.

PWW5

35. Reviving Chattogram's Canals : Urban Wetlands as Biodiversity Hotspots

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Abstract

Urban waterways are so much more than just channels for stormwater—they're vibrant ecosystems woven into the cultural and ecological tapestry of our cities. Take Chattogram, for instance, a bustling coastal city in Bangladesh where a once-thriving network of canals was essential for managing monsoon runoff, supporting biodiversity, and shaping the urban experience. Unfortunately, over the years, these canals have faced neglect, encroachment, pollution, and decay. Now, they stand as degraded wetlands, leading to frequent flooding, loss of habitats, and growing public frustration with environmental management.

We dive into the current state and ecological potential of selected canal segments in Chattogram, aiming to explore their revival as small-scale urban wetlands and biodiversity havens. Using a mixedmethods approach that includes field observations, water quality testing, interviews, spatial mapping, and design analysis, the study looks at how the degradation of these canals impacts both ecosystems and local communities. Locations like Chaktai Khal reveal issues like sediment buildup, informal encroachment, and diminishing ecological health, but they also present chances for thoughtful intervention. In response, the research suggests context-sensitive architectural strategies such as terraced bioswales, canal promenades, floating wetlands, and modular decks that blend flood management with community engagement. These solutions utilize lowcost, adaptable materials that can handle seasonal water changes while prioritizing space for riparian plants and wildlife.

Instead of pushing for large-scale infrastructure, the study focuses on practical, replicable solutions. Educational institutions, local design studios, and planners can team up on pilot projects that showcase how architecture, ecology, and public involvement can come together. Ideas like studentled biodiversity surveys, canal mapping, and participatory design workshops are proposed as tools for fostering longterm stewardship. The research defends a position on genuine struggles, including fragmented governance, informal settlements, and weak enforcement, claiming that even small, purposeful interventions can transform the perceived value of urban wetlands. The aim is to provide a scalable solution for the reclamation of degraded ecosystems for biodiversity, climate resilience, and inclusive design by reconceptualizing Chattogram's canals as hybrid ecologicalurban corridors. Urban wetlands are redefined as crucial for the construction of a sustainable and livable city, instead of treated as leftover spaces.

PWW8

36. Determination of Pollution Level of Karnaphuli River in Bangladesh and Associated Human Health Risk

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Abstract

The Karnaphuli River is the most important and lifeline of the Chattogram Region in Bangladesh. Recently, the river has become increasingly vulnerable to pollution due to rapid industrial development, urban expansion, and unregulated waste discharge. This study aims to assess the pollution level of the Karnaphuli River and identify its possible health risks to the surrounding population. Water samples were collected in December 2024 from 24 sampling stations along both sides of the river, and 4 heavy metals were analyzed. The data indicate that most parameters exceed Environmental Conservation Rules (2023) and WHO (2023) standards, especially in nearby industrial areas. The pollution levels were assessed with the Heavy Metal Pollution Index (HPI). Additionally, Inverse Distance Weighting (IDW) techniques were employed to visualize pollutant concentration patterns across sampling sites, helping to identify pollution hotspots and highrisk zones along the river. A health risk survey involving 40 respondents, selected through snowball sampling, was conducted to detect signs and exposurerelated illnesses among residents who depend on river water. Results of HPI values ranging from 80.694 to 450.451, where all sampling stations showed slightly to strongly affected, except for one station (R1). Field survey data revealed that most communities experience skin diseases and that the surface water of the Karnaphuli River is unsuitable for drinking, irrigation, or daily use. The findings underscore the need for strict enforcement of the ECR (2023), improved wastewater treatment, and routine monitoring to safeguard environmental and public health in the Karnaphuli River basin.

Keywords: *Heavy metal, Health exposure, IDW, Pollution and Skin diseases.*

PWW16

37. Environmental Factors for the Declination of Urban Birds in Chittagong

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Abstract

The consistent decline of common bird species, including crows (Corvus spp.), sparrows (Passer domesticus), and starlings (Sturnidae), in Bangladesh has raised serious concerns regarding the health of rural and urban ecosystems. Such species are ecologically significant, yet they have been inadequately studied in South Asia. The following study is focused on the population status and pattern of distribution of these birds in the selected urban localities of Chittagong to confirm the environmental reasons that have led to their decrease in population. Mixed methods consisting of a point count survey and indepth interviews with the local people were used for the study. Satellite data is also used in GIS to measure the rate of loss of habitat and deforestation in the study areas. For functional analysis, avian activity was surveyed over a specified time.

The study also examines how avian habitats and populations are affected by urbanization. Incorporating spatial analysis, local community knowledge, and direct survey, this study creates a specific and localized perspective that describes the population dynamics of the birds. It encourages the formulation of a specific conservation action plan and policy recommendation for Bangladesh.

This work was supported by the student research grant, ENVS Program, AUW

PWW9

38. Morphometric and Molecular identification and phylogenetic relationship among some selected butterflies in an urban city of Bangladesh

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Abstract

Butterflies, pollinators from conservation biology perspective, also serves as vital bio-indicator to response to the changes of their environment and climate change. On the other hand, phenotypic variation and evolutionary relationships offer valuable insights into the taxonomy, ecology, adaptive strategies and environmental factors of butterfly families when investigated through morphometric and molecular analysis. Therefore, five species of the families Papilionidae, Pieridae and Lycaenidae from Dhaka, Bangladesh have been analyzed. The considered species were Papillio demoleus, Pachliopta aristolochiae, Leptosia nina, Eurema hecabe and Pseudozizeeria maha. For morphometric analysis, 10 landmarks interconnected to yield 61 variables were selected manually for Analysis of Variance (ANOVA), Tukey Posthoc Test, Principal component analysis (PCA), Discriminant function analysis (DFA), Cluster analysis (CA) and Multidimensional scaling (MDS). DFA correctly classified 100% of the grouped variance (jackknife crossvalidated 98.36%). Twelve principal components were extracted where the first two explained 93.17% of the total variance. MDS presented separate clusters of 3 families. The comparative study of mitochondrial COI sequences across three butterfly families reveals a total of 37 sequences representing 13 genera (5 samples and others from NCBI) were analyzed over a 657 bp region, uncovering 228 segregating sites and 291 mutations. Within-family diversity in Papilionidae genera such as Papilio and Pachliopta exhibited moderate intraspecific distances (0.0145 and 0.0179, respectively), while Pieridae genera like Eurema and Leptosia showed lower diversity (0.002) and Lycaenidae genera displayed close clustering, with Pseudozizeeria showing a minimal divergence of just 0.0025. However, Neutrality tests (Tajima's D, Fu's Fs, Fu & Li's D, F) were statistically nonsignificant. The present study provides useful information on three butterfly families based on morphometric modeling, complemented by molecular analysis.

We sincerely acknowledge the Environmental Biology and Biodiversity Laboratory from the Department of Zoology, University of Dhaka, Dhaka-1000, for assisting in sampling. We extend our gratitude to the Advanced Biotechnology Research Laboratory from the Department of Genetic Engineering and Biotechnology, University of Dhaka, Dhaka-1000, for providing technical support on molecular analysis. The Germplasm Center of Zoological Garden, Curzon Hall, University of Dhaka, Dhaka-1000, is also a stakeholder in our gratitude for providing butterfly samples. We gratefully acknowledge the financial support for conducting the research by the Ministry of Science and Technology, Government of the People's Republic of Bangladesh.

PWW10

39. Neglecting climate change in conservation initiatives inadequate to prevent extinction of threatened amphibians in Bangladesh

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Abstract

Bangladesh, with its subtropical monsoon climate and rich biodiversity, harbours several amphibian species currently listed as threatened. Due to their ectothermic physiology, amphibians are particularly sensitive to temperature fluctuations and thus highly vulnerable to climate change. However, limited research has addressed how climate change might impact their future distribution and survival in Bangladesh. We assessed the potential climate change impacts on ten threatened amphibian species using species distribution models (SDMs). Species occurrence data were extracted from scientific publications. After addressing multicollinearity, 19 bioclimatic and 7 environmental predictors were selected. For each species, 100 random occurrence points were generated, and the bioclim() function in R was used to model suitable habitats under current and projected 2080 climate scenarios. The overlap between suitable habitats and 49 terrestrial protected areas (PAs), totalling 9,699 km2, was also analysed using spatial data from the World Database on Protected Areas. Currently, 50% of the species are restricted to the Eastern Hills and Hill Tracts in the southeast and northeast. Other regions support only 1–2 species in isolated habitat patches. By 2080, nine species are projected to lose all suitable habitat, with the remaining species retaining only 18.67% of its current range. Presently, just 3–5% of Bangladesh offers climatically suitable habitat for these and only one species —Kaloula taprobanica—is expected to retain 11.04% habitat suitability across both timeframes. However, most of this habitat remains outside PAs. While Chikila fulleri and Philautus andersoni show the highest protection coverage despite limited habitat, Pterorana khare appears especially vulnerable, with no overlap between suitable habitat and protected areas. Overall, the findings forecast a dramatic decline in suitable habitats by 2080, significantly elevating extinction risks. Immediate conservation interventions, including refined modelling and expansion of protected areas into projected future habitats, are crucial to safeguard Bangladesh's amphibian biodiversity against climate-driven losses.

PWW11

40. From Fragmentation to Integration: Policy-Ready Standardization for Freshwater Micro Plastic Research in developing economies

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Abstract

Micro plastic pollution in the freshwater systems of developing countries indicates a critical environmental issue, heightened by divided evaluation methodologies (e.g., inconsistent sampling protocols, variable size-detection limits) and legal gaps (e.g., absent micro plastic-specific thresholds).

After filtering five relevant, existing studies from a pool of 268 in ScienceDirect, this systematic review records three interconnected barriers: Technical-resource gaps, where advanced detection methods (e.g., Pyr-GC/MS, FPA-μFTIR) are still inaccessible because of infrastructure voids, forcing dependence on low-sensitivity techniques, methodological divisions, proved by 10x concentration differences from incompatible protocols (e.g., H2O2 vs. KOH digestion, variable filtration sizes); and policy-implementation voids, where micro plastics are excluded from frameworks like SDGs in spite of ecological urgency. To connect these voids, I propose tiered, resource-driven standardization integrating basic screening (visual/Nile Red) for low-resource settings into advanced quantification (portable FTIR/Raman) for regional hubs, policy alignment through SDG 6.3/14.1 monitoring indicators and Extended Producer Responsibility (EPR) schemes funding shared laboratories and citizen science and simplified QA/QC protocols to improve data granularity. These frameworks convert scientific rigor into implementable governance, leveraging circular economy financing (e.g., textile industry EPR fees) and regional collaboration (e.g., SAARC labs) to exceed cost/technical barriers. The analysis demonstrates the imperative for harmonized legal frameworks embedding micro plastic metrics in national policies (e.g., Bangladesh's Environmental Court Act), ensuring science translates into actionable contamination controls. This paradigm shifts—from fragmented data to integrated, policy-ready standardization—provides a scalable model for equitable environmental governance in resource-limited situations(1–17).

PVR5

41. Temporal Trends in Shoreline Dynamics with Forecasting and Coastal Vulnerability Assessment of Kuakata Area, Bangladesh

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Abstract

This study examines the spatiotemporal dynamics of shoreline changes along the Kuakata coast, Bangladesh, over a 30-year period (1991–2021), using geospatial techniques and remote sensing data. Multi-temporal Landsat imagery, including Landsat 7ETM, Landsat7ETM+, Landsat8, and 9(OLI), and the Digital Shoreline Analysis System (DSAS) were employed to quantify rates of erosion, accretion, and overall shoreline movement [1-3]. The highest erosion rate was observed in the central BC part (-13.8 m/year), while the southeastern zone exhibited the highest accretion rate (+25.58 m/year). The total land loss and gain during the study period were calculated at 8 km2 and 4.7 km2, respectively. Temporal analysis revealed average shoreline movements of -9.68 m/year (1991–2000), -0.98 m/year (2000–2010), and +2.1 m/year (2010–2021). Erosional rates for these periods averaged -13.11 m/year, -6.42 m/year, and -8.38 m/year, while accretion rates were 15.09 m/year, 14.73 m/year, and 18.56 m/year, respectively. Our findings provide actionable insights into erosion mitigation and sustainable coastal management strategies for one of Bangladesh's most dynamic and vulnerable shorelines.

PWW12

42. Freshwater Ecosystem Management Through Sustainable Aquaculture Practices

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Abstract

This study examines the impact of environmentally sustainable practices on freshwater ecosystem management and pollution control, based on a survey of 250 microentrepreneurs (MEs) involved in aquaculture under the YPSA-SEP in Mirsharai, Bangladesh. The majority of MEs (over 70%) operate in Mirsharai, with 62% of enterprises owned by women, reflecting strong female participation. Educationally, 57% of respondents completed high school, while 22% did not complete primary education. A significant portion of aquaculture land (78%) is leased, primarily from the Muhuri Project area, where improved traditional (55%) and extensive (41%) systems dominate. One of the critical findings of the study is the growing concern over environmental challenges, particularly disease outbreaks and water pollution in aquaculture zones. These issues threaten freshwater ecosystems and aquatic biodiversity. Despite these risks, 54% of MEs report avoiding antibiotic use in their farms, while 68% have reduced antibiotic application. Notably, over 90% now apply probiotics as safer alternatives to manage fish health and water quality. These shifts demonstrate a move toward ecological aquaculture that reduces chemical dependence and minimizes the environmental footprint. YPSA-SEP has promoted 20 Environmentally Sustainable Practices (ESPs), of which 12 are currently being adopted in the field. Among them, ESP No. 17 (use of signs and symbols for awareness) has seen full adoption across all MEs. Other notable practices include ESP No. 1 (use of PPE to safeguard worker health), ESP No. 4 (provision of safe drinking water and hygiene facilities), and ESP No. 12 (use of organic inputs and probiotics to replace chemical fertilizers and harmful medications). These practices collectively contribute to cleaner water, healthier farm environments, and safer fish products—key outcomes in freshwater ecosystem protection.

PWW14

43. Evaluation of Plant Diversity and Basic Features Along Road Dividers in Bogura Municipality, Bangladesh

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Abstract

The roadside plant landscape in urban areas can be considered a visual representation of the urban environment. This study focuses on assessing the plant diversity, species richness, dominant species, key characteristics, and overall health status of vegetation found in the road dividers of Bogura Municipality, Bangladesh. Field investigations were conducted along major roads, with plant data systematically collected using quadrats and expert consultations. Species diversity was analyzed using the Shannon-Wiener Diversity Index. The findings reveal the presence of 3,865 individual plants across 49 species, representing 29 families, within 12,456 square meters of road divider area across three major roads. Notably, 83% of these species belong to just eight plant families. The family Annonaceae was identified as the most dominant. In terms of plant structure, 76% of the specimens are trees, while only 18%

are native species. Interestingly, 97% of the plants serve ornamental purposes; however, the vast majority (97.5%) are exotic rather than indigenous. The diversity index ranges between 2.14 and 2.62, indicating a relatively low level of species diversity. Concerning plant health, 34% exhibit partial canopy coverage, and 27% show signs of stunted growth, largely attributed to dust pollution within the urban area. A pressing issue is the frequent attachment of commercial and political banners and festoons to the plants, which poses a threat to their growth and health. There is a clear need for protective measures, such as the installation of fencing along road dividers. To enhance plant diversity and align with both aesthetic and biodiversity conservation goals, expert input and comprehensive management strategies are essential.

PWW13

44. Isolation and Identification of Marine Fungi from Intertidal Sediments in Cox's Bazar, Bangladesh

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Abstract

Marine fungi are crucial yet inadequately explored components of coastal ecosystems, significantly influencing the processes of organic matter decomposition, nutrient cycling, and the maintenance of marine food webs. This research aimed to isolate and identify marine fungi from intertidal sediments of Cox's Bazar, Bangladesh, employing culture-dependent techniques. Sampling was conducted in December 2023 across ten intertidal locations, where key environmental parameters were recorded to understand habitat influences on fungal diversity. Fungi were isolated using serial dilution (10−1 to 10−3) and spread plate methods on Potato Dextrose Agar (PDA) supplemented with 3.2% NaCl and antibiotics to suppress bacterial proliferation. Plates were incubated at 28 ± 2 °C for 7-14 days, followed by subculturing to obtain pure isolates. Fungal identifica- tion was based on colony morphology and microscopic features according to standard taxonomic protocols. A total of 21 purified fungal isolates representing 7 genera, including Saksenaea, Fusarium, Aspergillus, Eurotium, Trichophyton, Rhizopus, and Penicillium, were identified from the intertidal sediments of Cox's Ba- zar, reflecting a diverse and well-adapted fungal community in this coastal region. The average fungal spore count was 4.0 × 104 CFU/g of sediment, indicating a moderate fungal biomass consistent with a nutrient rich and relatively unpolluted intertidal environment. The recorded environmental parameters were water salinity 32 ± 3 ppt, water pH 8.35 ± 0.5, temperature 24.95 ± 2.35 °C, electrical conductivity 17.22 ± 2.8 mS/cm, sediment pH 6.6 ± 0.2, and air temperature 25.5 ± 2.5 °C. These values suggest favorable but variable conditions influencing fungal colonization, survival, and physiological adaptation. The results provide important initial information about the mostly ignored fungal diversity in Bangladesh's intertidal zones, highlighting their ecological importance and laying the groundwork for future studies in both ecology and biotechnology. Enhancing our understanding of these microorganisms supports broader conservation efforts and promotes ecosystem resilience, which is vital for sustaining healthy coastal environments in the face of environmental change.

Keywords: *Marine fungi, Cox's Bazar, Intertidal sediments, Fungal diversity, Coastal ecosystems*

PWW15

45. 3C; Carbon, Culture, Conservation: Reimagining mangrove through Gender and Ecosystem services lense

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Abstract

The Sundarban, the world's largest mangrove forest, is a valuable ecological, socioeconomic, and cultural region of South Asia. The study examines ecosystem restoration and valuation in the Bangladesh Sundarban, highlighting carbon sequestration, biodiversity conservation, and human dimensions of environmental management—such as gender roles and indigenous ecological knowledge. Using the InVEST model, the study estimates that the Sundarban contains over 834 million tons of CO2 equivalent, with enormous potential for climate mitigation and engagement with global carbon markets. The ecosystem, however, is under threat from heightened salinity intrusion, unsustainable shrimp aquaculture, and anthropogenic stress. These stressors have undermined forest cover, imperiled biodiversity—including keystone species like the Royal Bengal Tiger —and jeopardized the livelihood of over two million people. Tiger widows and female-headed households are some of the worst off and suffer economic exclusion and social marginalization despite their traditional reliance on and knowledge of the mangrove ecosystem. An anthropological and gendered analysis illustrates that women's roles—in fisheries, dry fish processing, and resource management—become systematically undervalued in formal conservation planning. The top down management approach in Bangladesh is criticized in this research, and it suggests participatory and community-based measures with attention to social equity alongside ecological goals. Aligned with SDGs 1 (No Poverty), 5 (Gender Equality), 8 (Decent Work), 13 (Climate Action), and 15 (Life on Land), this study calls for ecosystem restoration models that capacitate grassroots stakeholders, particularly women, as co-stewards of nature. Integrating ecological economics, gender analysis, and cultural anthropology, this research presents a holistic model of rehabilitation that is not only scientifically appropriate but socially inclusive. Last, the future of the Sundarban hangs not so much on policy or modeling, but on the empowerment and recognition of the very peoples who have long protected its shores.

Keyword: *Mangrove Ecosystem Restoration, Sustainable ecosystem services, Tiger widow and women em- powermentCultural Anthropology, Carbon Sequestration and Valuation*

PVR1

46. Climate Justice in Bangladesh: Role of the Judiciary in Addressing Climate Change

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Abstract

Bangladesh is one of the most vulnerable countries confronting the adverse impacts of climate change and is also experiencing growing concerns about environmental equity and justice.

The discourse on climate justice—which emphasizes the equal distribution of climate impacts, human rights, and the protection of vulnerable communities—has increasingly gained prominence globally. However, despite constitutional safeguards and legislative measures, the understanding of climate justice in Bangladesh remains limited. This paper critically evaluates the evolving role of the judiciary in addressing climate change issues and explores the legal challenges faced by the judiciary in enforcing climate justice.

Using a doctrinal and descriptive analytical legal approach, this study examines key laws, including the Environmental Conservation Act of 1995, the Environment Court Act of 2010, and relevant public interest lawsuits filed by various environmental organizations. The paper highlights ongoing institutional weaknesses, such as limited access to Environment courts, a lack of technical expertise in climate science within the judiciary, and the absence of a rights-based climate legal framework. Additionally, it finds that judicial conservatism and the restricted application of international climate principles in domestic rulings.

The analysis also draws comparative insights from landmark decisions in Pakistan, India, and the Philippines to contextualize the judicial trajectory of Bangladesh within the broader Global South jurisprudence on climate justice. The findings reveal that while the judiciary in Bangladesh hasc ontributed to environmental governance, its engagement with climate justice remains cautious and lacks coherence. The paper argues for a more transformative judicial role, advocating reforms to enhance judicial capacity, integrate climate science into legal reasoning, and ensure community participation in climate litigation.

In conclusion, this paper advocates for an integrated legal and institutional frame work designed to enhance the judiciary's ability to serve as a proactive and central player in promoting climate justice in Bangladesh.

Keywords: *Climate Justice, Climate Governance, Climate Litigation, Judicial Activism, LegalFramework*

PVR3

47. Community-Driven Reforestation for Environmental Justice and Ecosystem Resilience in Cox's Bazar

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Abstract

Community-driven reforestation (CDR) empowers local communities by involving them in every step of the process from planning and planting to managing and benefiting from restored forests. In Bangladesh, a country already facing the brunt of climate change, CDR offers a critical pathway not just for ecological recovery, but also for fostering social equity. This is particularly evident in Cox's Bazar, a coastal district renowned for its biodiversity yet severely impacted by natural disasters, such as cyclones, floods, and landslides. The 2017 Rohingya refugee influx triggered an unprecedented environmental crisis, with over 8,000 acres of forest cleared for settlements and fuel, contributing to a 9.58% decline in forest cover (UNHCR, 2020; Bangladesh Forest Department, 2021). This widespread deforestation has led to the loss of ecosystem services, compromised biodiversity, and heightened disaster risks, impacting both refugees and host communities.

In response, international organizations, NGOs, and the Bangladesh government have launched several initiatives, including hillside restoration, buffer zone creation, fuelwood lot management, and homestead plantations, involving both refugee and host communities.

These efforts have shown promise, with some signs of increased social capital, improved community security, and especially for empowering the women. However, challenges such as ongoing poverty, nutrient depletion, and the scale of environmental degradation persist. This qualitative study assessed how community-driven reforestation contributes to environmental justice and ecosystem resilience in Cox's Bazar. Using in-depth Interviews (IDIs), Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs), the research explored how local involvement in reforestation has helped improve climate adaptation, livelihoods, and social cohesion in the area. The study is vital as it fills a research gap in understanding how community-driven environmental restoration can address both environmental degradation and socio-economic vulnerabilities in conflict affected regions. The findings will offer actionable recommendations for future reforestation efforts in similar contexts globally.

Keyword: *Community-driven reforestation, Environmental Justice, Ecosystem Resilience*

PVR4

48. Identifying Problems and Potentials of the Development of Indigenous Entrepreneur- ship in Bangladesh

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Abstract

The purpose of this study is to identify the various problems that hinder the development of indigenous entrepreneurship and the potentials that lie in this domain in Bangladesh. Structural, economic, and socio-cultural obstacles are encountered by indigenous entrepreneurs, such as limited access to capital, inadequate infrastructure, and insufficient policy regarding the development of indigenous entrepreneurship. Concurrently, it explores opportunities for indigenous communities to utilize entrepreneurship for economic independence and evolution, including innovative ventures, cultural branding, ecotourism, and digital integration. This study used a cross-sectional, mixed-methods design, emphasizing quantitative analysis. Data were gathered from 315 indigenous participants throughout several regions in Bangladesh, specifically the Chittagong Hill Tracts, through a structured questionnaire using convenience sampling. SPSS and Excel were utilized for reliability and validity tests, descriptive statistics, and factor analysis (PCA). The findings indicate that indigenous entrepreneurs encounter significant obstacles such as restricted access to financial services, inadequate entrepreneurial education, market impediments, and insufficient governmental support. Nonetheless, significant promise resides in community-oriented initiatives, cultural entrepreneurship, youth-led firms, and sustainable land-based ventures and eco-tourism. Factor analysis validates the importance of these variables, affirming their impact on indigenous entrepreneurial development. This study will encourage more investment in indigenous businesses, recognizing that there is potential for sustainable development and inclusive growth. As well as the government to create inclusive and impactful policies for protecting the rights of indigenous entrepreneurs. A broader view of their economic potential will help indigenous communities to increase their quality of life and preserve their culture with the help of innovative ventures. The research faced challenges in acquiring data from remote locations, including participants digital access, time, and expertise of the researchers.
Keywords: Indigenous Entrepreneurship Development, Inclusive development, Eco-tourism, Sustainable Development, Indigenous Rights and Prospects.

49. Urbanites' Perception based Assessment of Environmental Justice at Municipal Level in Bangladesh

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Abstract

Environmental justice has become a pressing concern as vulnerable communities disproportionately bear the burden of environmental degradation. This situation is found acute in intensely urbanized areas of Bangladesh identical to the urban areas of global south. This study explores the environmental justice scenario of Savar Municipality, a rapidly urbanized, industrial hub near Dhaka, Bangladesh. Literature review, legal frameworks, household surveys (n=111) and field observations across three aspects e.g., impacts of industrial development, waste management, and availability and access of open spaces were employed to conduct this research. Results show that rapid industrialization emerged as a significant health threat, with households reporting respiratory diseases (20.72%), hearing loss, and skin diseases. Regulatory failures including inadequate monitoring, poor implementation of industrial regulation, and corruption enable industries to operate with limited accountability. Besides, informal waste dumping practices, which account for 74% of waste disposal in the municipality, have led to the contamination of soil and water bodies, particularly affecting marginalized populations. It also contributed to health risks with 49.02% of the respondents were suffering from asthma (37.25%) and skin diseases (27.45%).

Furthermore, spatial inequities in access to open spaces was observed, with 50% of respondents reporting no access to open spaces. Additionally, awareness of environmental justice is notably low; nearly 40% of respondents were unfamiliar with the concept, which hampers public participation in sustainable practices. Though Bangladesh possesses a comprehensive legal framework for environmental protection, there remain substantial implementation gaps at the municipal level. Strategies like- stronger enforcement of laws, sustainable waste management, equitable access to open spaces and increased community awareness are critical to enhance environmental justice in Savar Municipality. Effective implementation of these strategies is crucial for achieving environmental justice and ensuring a healthy, equitable and sustainable environment for the residents at municipal level, thereby enhancing community resilience and ecological sustainability.

Keywords: *Environmental justice, urbanization, industrial pollution, waste management, policy enforcement.*

PVR7

50. Impact of climate challenges on child and forced marriages in Bangladesh

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Abstract

Child marriage (marriage before the age of 18) is a global issue affecting millions of adolescent girls, particularly in Asia and Africa. Every year, about 15 million girls under 18 years old marry worldwide. Bangladesh is home to nearly 38 million child brides, with approximately one out of every two girls aged 20–24 marrying before turning 18. This review paper examines the influence of climate-induced hazards on child and forced marriages in Bangladesh. This study is based on nine relevant studies. The climate-related events examined include floods, droughts, cyclones, salinity intrusion, riverbank erosion, and sea-level rise. The literature studied several climate-vulnerable districts such as Satkhira, Barguna, Bhola, Rajshahi, Gaibandha, and Manikganj. The reviewed articles highlighted how the climate shock effects such as disrupted agricultural livelihoods, family displacements, poverty, and food insecurity, disproportionately affecting girls. As a response to these pressures, families often stop girls' schooling and marry them off early to reduce financial burdens, avoid inflated dowry costs, and protect family honour. Emerging evidence shows that extreme weather variability (such as prolonged dry spells or suddenonset disasters) significantly increases the likelihood of early mar- riage, especially in rural and marginalized communities. These events not only trigger economic hardship but also heighten insecurity leading to early marriage as a coping mechanism against the perceived risks of gender-based violence or social instability. Additionally, school closures, displacement, and limited access to reproductive healthcare contribute to the rise in early and forced marriages in climate-vulnerable regions. To address this issue, gender-responsive climate adaptation strategies are essential. These may include enforcing child marriage and dowry laws, expanding education and financial support for girls, promoting female participation in disaster management, and improving access to healthcare and livelihood services. A new study on modeling the association between climate challenges and child and forced marriages could be productive.

Keywords: *Climate challenge, climate change, child marriage, forced marriage, Bangladesh*

PVR8

51. Empowered Women of Barind: Bridging Leadership Gaps for Climate Resilience and Sustainable Conservation

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Abstract:

In Bangladesh's Rajshahi zone, the Barind region grapples with the harsh realities of climate change—facing relentless water scarcity, severe droughts, and erratic rainfall that threaten not only its fragile environment but the livelihoods of its resilient people. These climate challenges have profound socio-economic and cultural consequences, particularly for women, whose central roles in agriculture, resource management, and community resilience are pivotal to the region's sustainability. Women, often the primary stewards of agricultural biodiversity, draw

upon centuries- old traditional ecological wisdom—especially in seed preservation and natural pesticide use—to navigate the adverse impacts of climate change. This indigenous knowledge, passed down through generations, empowers women in Barind, particularly from marginalized communities such as the Santal, to lead grassroots efforts in maintaining seed banks and employing sustainable farming practices like composting, bio pesticide production, and rainwater collection. Their active participation in these practices is essential for both environmental sustainability and community health. However, despite their critical contributions, women in the Barind region face systemic barriers that restrict their participation in formal environmental leadership and decision-making. Socio-cultural norms, limited land ownership, and gender biases hinder their access to essential resources and recognition within governance structures, preventing them from influencing higher-level policies. Moreover, the increasing pressures of climate change, such as deforestation and resource scarcity, expose women to greater risks, including gender-based violence, further exacerbating their vulnerabilities. Regional ecological experience plays a crucial role in promoting sustainable practices, such as the preservation of local seed varieties and the use of eco-friendly pesticides. Women's active participation in communityled initiatives, like seed banks, exemplifies resilience and underscores the importance of integrating indigenous knowledge into formal climate adaptation strategies. This article calls for gender-inclusive policies that not only recognize women's leadership in environmental conservation but also empower them to drive sustainable agricultural practices, ensuring long-term ecological health and climate resilience for the Barind region.

Keywords: Barind region, Climate change adaptation, Sustainable agriculture, Environmental conservation, Seed preservation.

PVR9

52. Empowering Change: Youth and Women's Participation in Local Climate Adaptation Practices in Chattogram and Cox's Bazar

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Abstract

Bangladesh, the 7th most climate-affected country globally, is experiencing climate-induced disasters that disproportionately impact its coastal regions. Chattogram and Cox's Bazar are climate hotspot areas of Bangladesh that face severe environmental threats such as rising sea levels, salinity intrusion, erratic rainfall, landslides, waterlogging, and extreme weather events. In response to these challenges, local communities are adopting various climate adaptation strategies to build resilience. In recent years, there has been a noticeable increase in the participation of youth as well as young women in these local climate actions. This research explores the evolving role of youth and women in local climate adaptation efforts, focusing on their increasing engagement in community-based initiatives. The research design is cross-sectional. A mixed-methods approach was employed, combining survey and interview with climate victims and climate initiative takers in Chattogram and Cox's Bazar. Research incorporates quantitative analysis of survey responses and qualitative insights from documentation, interviews, and observational data to assess the scope, impact, and inclusivity of youth-led climate efforts. The study finds that the number of female and youth participants in local climate action has notably increased over the past few years. About 68% of young females have taken local climatic adaptation to tackle climate change. This statistic indicates a

strong presence of young women in climate leadership roles. 81% of participants reported being involved in more than one climate initiative in the past year. The study also finds that youths are actively participating in ecofriendly practices such as rooftop gardening, plastic waste management, salttolerant crop cultivation, mangrove restoration, and sustainable agriculture to combat climate-induced challenges. 72% of female respondents stated that their participation in climate response action has increased their confidence and decision-making capacity in family and community spaces due to NGO actions and capacity building. These initiatives not only contribute to environmental resilience but also empower marginalized groups socially and economically. However, the research also identifies significant barriers, including lack of institutional support, limited access to climate finance, and inadequate recognition of grassroots innovations. The study concludes by recommending inclusive policy measures, sustainable infrastructure development, and capacity-building programs to further strengthen the role of youth and women in building climate-resilient communities in Bangladesh's coastal belt.

Keywords: *Climate Adaptation, Youth Participation, Women Empowerment, Coastal Area, Eco-friendly Practices*

PVR10

53. Climate-Induced Challenges and Gendered Vulnerabilities in Bangladesh

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Abstract

Climate vulnerability in Bangladesh continues to disproportionately impact marginalized communities, particularly women. This study, conducted in the three climate hotspot districts, Satkhira, Naogaon, and Kurigram, highlights the gender-differentiated vulnerabilities and adaptive capacities related to climate change. The aim of the study is to explore the differentiated impacts of climate change on women, highlighting their limited participation, and access in adaptive practices. The study applied a mixed-method approach, combining household surveys (n=562) with 18 FGDs, and 17 KIIs. The findings reveal that only 7.5% of households are female- headed, and merely 8% of respondents reported that female members were affected by climate-induced disasters. Women's participation in both agriculture and livelihood adaptation remained significantly low, below 5% across all districts. Access to training was also limited, with only 0.89% of female household members receiving climate change-related training and just 0.18% receiving training on farming. Although the access of female household members to shelters (93%), health services and education (92% each), and basic services (87%) was high, access to decision-making (57%), social safety nets (53%), and income-generating activities (53%) was lower. Accessibility was even more limited for land cultivation (47%) and markets (41%). This indicates that while access to basic needs is high, women still face barriers in economic empowerment and agricultural engagement. Women's ownership of productive assets remains largely concentrated in small-scale, household-level resources like as poultry (80%) and cattle (47%), with negligible ownership of agro-businesses (3%), agricultural land (2%), or principal residences (3%).

These disparities reflect persistent gender inequalities in access to and control over valuable productive resources across the districts. The study highlights the urgent need to enhance women's access to training, productive assets, and institutional support, while promoting inclusive environments that challenge and
transform systemic gender inequities.

Key words: *Gender, climate change, adaptation, mixed-method research, access and participation*

PVR11

54. Women and River: An Ecofeminist Study of Tauquir Ahmed's Film Haldaa

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Abstract

As the largest and only natural fish-breeding river in Bangladesh, the Halda River has long played a vital role in the preservation and continuation of various fish species. The lives of the communities residing along its banks are deeply intertwined with the river, as many depend on fishing for their livelihood. Moreover, women play a crucial role in the fishing process, contributing significantly to both the economy and the sustainability of river-based life. This study examines the award-winning film Haldaa by Tauquir Ahmed through the lens of ecofeminism, highlighting the marginalization of both women and the environment. The structures of patriarchy and capitalism act as driving forces behind both gender inequality and environmental degradation. Ecofeminism interprets the exploitation of women and nature as deeply interconnected. Using qualitative thematic analysis, the research draws on the theories of Vandana Shiva and Maria Mies to emphasize the parallel oppression of women and nature, arguing that environmental sustainability is inseparable from women's emancipation. Haldaa exemplifies ecofeminist principles by depicting the Halda river and the female protagonist, Hasu, as parallel victims of exploitation—both nurturing sources of life and resilient agents resisting ecological and social domination. The river's degradation due to pollution from brick kilns threatens its fish-breeding cycle, serving as a metaphor for Hasu's struggle with motherhood. The study's key findings show that the film criticizes patriarchal and capitalist systems while celebrating the resilience of both women and nature. Ultimately, the research highlights the importance of ecofeminism in interpreting gender and environmental narratives in Bangladeshi cinema and advocates for a societal shift in attitudes towards women and the natural world.

Keyword: *Cinematic Ecofeminism, Ecological Exploitation, Intersectionality, Exploitation, Environmental Patriarchy*

PVR12

55. There is no Climate Justice without Social Justice: Greta Thunberg's Activism and the Environmental Consequences of War in Palestine

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Abstract

This study examines the intersection of climate justice and social justice through the lens of Greta Thunberg's activism and the environmental consequences of the Gaza war. Climate justice is defined as centering equity and human rights in climate action (UNDP, 2023), suggesting that conflicts or wars affecting vulnerable populations are also climate concerns. In June 2025, Thunberg joined a pro Palestinian aid flotilla bound for Gaza to raise awareness of the humanitarian crisis, directly linking environmental and social causes (Balmer & Amichay, 2025). At the same time the Gaza conflict has raised an environmental emergency: a UN assessment reports soil, water, and air pollution from bombardment debris, with sanitation and power systems largely destroyed (Dickie & Withers, 2024). Waste collection infrastructure has collapsed and a lot of waste pose toxic hazards, while water scarcity worsened by blockade threatens public health (Pathak & Chowdhury, 2025; Reuters, 2025). A recent climate study finds that Israel's 15-month war emissions exceed the combined annual output of approximately 100 countries (McKie, 2025). The analysis employs qualitative discourse and thematic analysis of media reports, speeches, and environmental assessments. Key findings suggest Thunberg's Gaza mission exemplifies how climate activism increasingly incorporates social and human rights issues. For example the aid mission highlighted solidarity and justice while official reports document some 39 million tons of war debris in Gaza (Dickie & Withers, 2024). Her involvement made stronger attention to Gaza's ecological and humanitarian toll, showing that peace is connected to justice and environmental health. These results suggest that effective climate advocacy must address conflict driven ecological damage. The study demonstrates that "no climate justice without social justice" requires integrating conflict contexts into climate policy, as recognized by affected communities and researchers (Balmer & Cornwell, 2025; McKie, 2025).

This work was supported by Swiss Philanthropy Foundation.

PVR13

56. The Influence of Crafting Methods, Weak Sustainability Practices, and Minimum Market on the Success of Palmyra Palm Waste Handicraft Production in Behau and Hera, Timor-Leste

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Abstract

Palmyra palm production is such a source that needs to be promoted. Since the environment affects a lot, sustainable practices are crucial. To be a part of a contribution on reducing the environmental issue, the writer came up with the question, what are the factors that are limiting local eco-friendly Palmyra palm products? There might be a number of reasons for predicting the reason. However, the writer raises up three variables and the hypothesis. The hypothesis predicts that there is an influence of Crafting Methods, Weak Sustainability Practices, and Minimum Market on the Success of Palmyra Palm Waste Handicraft Production in Behau and Hera, Timor-Leste. The aim of this research is to know some other major factors that limit the product in the market. The method for this research is quantitative and collecting data online.

The survey was distributed to 85 participants randomly collected. Majority of them are students. The question survey included methods of crafting, practical sustainability that apply, and how sufficient the Market supports their product. Therefore, the result is mostly based on the student perspective. These students represent these old women who are actually working as artisant. The collected data analyzed by IBM SPSS and by the help of the theoretical book instructed based on the standard given, the writing tries to analyse whether the questions are valid or invalid and reliable or unreliable. Ultimately, the overall result shows as follows: As the value of Sig. is Sig. 0.394>0.05 weak sustainability practices has a positive influence but not an important factor to be considered. And, the result also shown in the minimum market, 0.961>0.05 has a positive influence but not a significant issue to be raised, while crafting methods 0.00<0.05 has a fully powered of influence to every production of goods of palmyra palm in Behau and Hera, Timor-Leste.

This work was supported by the student research grant, ENVS Program, AUW

PVR14

57. An Assessment of Soil Quality, Methane Emissions, and Ecological Impacts of Jhum Cultivation in the Chittagong Hill Tracts: A Comparative Analysis of Agricultural Practices

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Abstract

This study looks at the socioeconomic and environmental effects of jhum cultivation, a traditional slash-and-burn farming technique used in Bangladesh's mountainous Chittagong Hill Tracts (CHT). The study assesses soil quality, methane emissions, and ecological effects in three chosen villages using a mixed-methods approach that includes landscape observation, household questionnaires (n = 115), focus groups, in situ gas detection, and GIS assessment. Significant pyrogenic emissions from pre-cultivation biomass burning under high-temperature and high-humidity conditions were indicated by methane concentrations surpassing 500 ppm in many plots measured with a flammable gas detector. The lack of waterlogging in the upland areas indicates localized microclimatic impacts that are frequently disregarded in emission inventories, making these findings noteworthy. During fieldwork, samples of soil and water were gathered, pH was tested, and further laboratory analysis of soil organic matter (SOM) was carried out. Preliminary field observations indicate that regularly burned plots may be experiencing soil acidity and nutrient loss. The investigation discovered the use of herbicides (glyphosate) and intense chemical fertilizers (urea, TSP/DAP, and MOP) in jhum during the vegetation phase. These highlight the intricate compromises between immediate production and long-term environmental sustainability. According to community viewpoints, jhum continues to be a low-input, culturally based subsistence strategy for indigenous populations despite environmental concerns. The study provides a grounded understanding of changing agricultural dynamics in a vulnerable ecological zone by combining atmospheric data, participatory rural evaluation, and geospatial indices (such as Sentinel-2's fire area analysis). The results emphasize the necessity of region-specific policy approaches that take into account indigenous agricultural knowledge systems as well as environmental thresholds.

This work was supported by the student research grant, ENVS Program, AUW

PVR15

58. Tertiary Students' Perceptions of Sustainability Through Informal Learning in Universities in Chittagong, Bangladesh

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Abstract

Bangladesh has been facing various environmental issues, highlighting the need for effective sustainability education. While there has been an increasing focus in the field of formal environmental education in recent years, research on informal learning opportunities, including student-led and extracurricular initiatives is limited, particularly in the context of tertiary education in Bangladesh. This study looks into how informal learning helps tertiary students in Chittagong perceive sustainability and affect their awareness and involvement with sustainable activities. The research includes students from public, private and international universities, reflecting the city's diverse educational settings.

This is an ongoing study using a mixed-methods approach, integrating qualitative interviews with quantitative surveys. A minimum of 400 students from selected universities would take part in an online survey that would assess their views on sustainability, involvement in extracurricular activities, and degree of engagement with various topics. In order to investigate institutional viewpoints, interviews with university administrators and professors will be conducted.

So far, data from institutions with no sustainable clubs show that 71% of the students have shown little to no awareness about any ongoing local sustainable projects and 68% of the participants are unaware of any in the Chittagong region. However, the majority of the respondents (93%) expressed willingness to participate in environmental initiatives if given the opportunity by their university. Additional data will help identify existing gaps, barriers, and opportunities for strengthening sustainability education through extracurricular activities. Data from institutions with environmental clubs will enable comparisons between the perception levels of students who are involved in these clubs and those who are not. Findings are expected to provide insights for universities and policymakers to enhance student-led sustainability initiatives, promote environmental awareness, and support the development of ecologically responsible graduates. This research contributes to understanding how informal learning complements formal education in advancing sustainability, with implications for higher education policy and practice in Bangladesh.

Keywords: *sustainability, awareness, education, informal learning, university students*

PVR17

59. Green Futures: Bringing Together Innovation, Justice and Ecology for Planetary Resilience

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Abstract

As climate crises grow more severe, this abstract presents a Green Futures framework where sustainable development, circular economies and technological innovation come together to build resilience. We highlight renewable energy breakthroughs (solar, wind, geothermal) and AI-driven resource optimization as key factors in reducing carbon emissions, which is

essential to reach net-zero targets by 2050.
Wild & Well principles are included through biodiversity-focused design: revitalizing urban areas and using blockchain-enabled conservation finance to protect 30% of land and marine ecosystems by 2030. Planet in Balance combines efforts to reduce carbon through capturing materials and adapt to changes, like using AI to predict flood barriers, thereby lowering climate risks for 500 million at-risk people.
Voices for Earth centers this shift on fairness. Case studies from communities in the Global South show how participatory climate budgeting and green job creation can make sure Indigenous knowledge and environmental justice guide policy. Roots and Revolutions expands the impact: youth-led digital activism campaigns (#GreenGen2030) and ecofeminist cooperatives support a 40% increase in women's clean energy entrepreneurship.
Our combined analysis shows:
1. Green Economy Growth: Circular business models (like plastic-to-fuel conversion) could reduce waste by 70% and generate $4.5 trillion in economic value by 2035. 2. Policy-Innovation Connection: National carbon taxes can fund community solar microgrids, merging top-down governance with local engagement.
A Green Future is not only technically possible but also morally necessary. By connecting ecological recovery, climate resilience and inclusive empowerment, we create a just transition where planetary health and human well-being go hand in hand.

Keywords: *Green economy, Sustainable Transitions, Climate Innovation, Environmental Justice, Ecosystem Resilience.*

PVR18

60. Development and Fabrication of Biodegradable Disposable Plates from Rice Husk: A Sustainable Solution for Reducing Single-Use Plastic Waste in Chattogram, Bangladesh

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Abstract

In the urban setting of Chattogram, Bangladesh, the proliferation of single-use plastic (SUP) waste has become a critical environmental issue. This research addresses this issue by designing biodegradable disposable plates from rice husk, an agricultural byproduct of rice milling that is abundant in this area. This study investigates the technical feasibility, environmental implications, and social acceptance of rice husk-based plates through community-based surveys with a detailed literature review and hands-on experimental fabrication. A series of trials optimized the plate formulation to achieve appropriate strength, durability, and biodegradability through controlled baking using natural binders such as cornstarch, flour, etc. The plates were formed through molding and curing using a staged baking process, optimized between 80°C and 110°C to enhance strength and durability. Mechanical and chemical testing confirmed that the rice-husk-based disposable plates have good water resistance and structural integrity, alongside a low ecological footprint. A community perception survey involving more than 130 participants revealed widespread concern about plastic waste and a strong willingness to adopt eco-friendly alternatives to traditional disposable plates, provided they are affordable and easily available. As the study indicates, rice husk-based plates are socially acceptable, environmentally friendly, and technically feasible with scale-up potential accessible via automated heat-press manufacturing.

In this study, rice husk-based products are shown to potentially align with several UN Sustainable Development Goals: SDG 8 (Economic Growth), SDG 12 (Responsible Consumption), and SDG 13 (Climate Action). Although there are issues about durability, market adoption, and production scalability, the study endorses heat-press mechanized production as a solution to these challenges. This research concludes that the plates made from rice husks offer an environmentally sustainable and economically affordable option for reducing plastic pollution in Bangladesh.

Keywords: *Rice Husk, Biodegradable Plates, Single-Use Plastic (SUP), Heat-Press Manufacturing.*

This work was supported by the student research grant, ENVS Program, AUW

PB18

61. Water Resource Management and Climate Adaptation in Coastal Bangladesh: Policy Gaps and Long-Term Socioeconomic Consequences

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Abstract

Bangladesh's coastal regions are at the forefront of the nation's climate crisis, confronting increasing sea-level rise, saline intrusion, erratic rainfall, and extreme weather events. These challenges significantly impact water resource availability, agricultural productivity, public health, and economic stability across 19 coastal districts that are home to nearly 35 million people. This paper examines the existing policy landscape and adaptive practices to assess how water resource management strategies are addressing the evolving climate vulnerabilities of coastal Bangladesh. The study reviews key national frameworks, including the Water Rule 2018, Coastal Zone Policy 2005, and the Bangladesh Delta Plan 2100, highlighting their emphasis on decentralization, climate-resilient infrastructure, and community engagement. Despite these initiatives, critical gaps remain in institutional coordination, policy integration, and sustainable implementation. Through a synthesis of policy evaluations, the paper identifies significant risks associated with water mismanagement, including health burdens from consuming saline water, loss of agricultural and aquaculture productivity, forced migration, and industrial disruptions. These cascading effects not only threaten local livelihoods but also carry long-term macroeconomic consequences for the nation. Recommendations focus on strengthening institutional capacity, mainstreaming climate adaptation into water governance, expanding the use of nature-based solutions, improving irrigation efficiency, and enhancing community participation in water planning. Without decisive and sustained action, coastal Bangladesh faces a cycle of environmental degradation, public health crises, and socioeconomic decline. This paper highlights the importance of developing integrated and forward-looking water resource strategies to enhance climate resilience and promote sustainable development in one of the world's most vulnerable coastal zones.

Keywords: *Coastal Bangladesh, Water Crisis, Climate Change, Salinity Intrusion, Water Resource Management*

PB19

62. Water Crisis and Management Strategies in Chittagong Hill Tracts (CHT) Area: A Case Study on Chimbuk Upazila, Bandarban.

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Abstract

The water crisis encompasses water stress, shortages, deficits, and overall scarcity, indicating a lack of sufficient water resources to meet regional demands. This study aims to investigate the causes and impacts of water scarcity in the study area, particularly during crisis periods, with a focus on sustainable upland water management. The research examines the water crisis in Chimbuk area of Bandarban by analyzing the characteristics of existing water bodies and their availability.

Primary data collection involved a field survey consisting of two key components: a questionnaire survey and in-depth interviews. The questionnaire survey employed a stratified random sampling technique, gathering data from 100 representative samples across four specific study areas. The findings indicate that residents of this region have limited access to clean water and primarily rely on nearby springs and tube wells. The study reveals that approximately 60% of the population faces severe water shortages during winter and the hot summer months.

Although many conscious residents store water in pitchers or aluminum pots, a significant portion lacks proper water storage facilities during crisis periods. The construction of deep tube wells and water reservoir dams could be highly beneficial in addressing the issue. Additionally, the implementation of a community-based water supply system and the provision of basic electricity infrastructure in remote areas are essential for sustainable upland water management, particularly in Chimbuk area of Bandarban District.

Keywords: *Management, Water scarcity, Adaptation, Indigenous Communities.*

PWW17

63. Microplastic Distribution in Water, Sediment, And Fish from Three Major Rivers near Dhaka: A Spatiotemporal Study

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Abstract

Microplastic pollution (MP) is a global environmental concern, particularly in developing countries like Bangladesh, where rapid urban and industrial expansion is closely linked to increasing levels of pollutants in freshwater systems due to inadequate waste management and regulation. This study explores the cross-compartmental (water, sediment, and Labeo rohita, a vital fish species common in the local diet) analysis of microplastic concentration in the three major rivers of Bangladesh, namely Buriganga, Dhaleshwari, and Meghna, over a three-month sampling period to highlight the distribution of microplastics during the post-monsoon season, as most rivers in Bangladesh are monsoon-influenced. The spatiotemporal distribution, polymer-specific bioaccumulation in fish (Labeo rohita), and polymer composition across the three compartments were analyzed using multidisciplinary techniques such as microscopic

analysis, Fourier Transform Infrared Spectroscopy (FTIR), GIS spatial mapping considering land-use patterns, and multivariate statistical analysis using K-means Clustering and Principal Component Analysis (PCA). This study confirms the pervasive distribution of microplastics with fibers (50%) and fragments (28%) as the dominant types. Furthermore, polymers such as polyethylene terephthalate (PET) and polyethylene (PE) were detected in Labeo rohita, confirming polymer-specific bioaccumulation and bioconcentration, with recorded BAF and BCF values of 0.21 and 0.19, respectively. These findings highlight waterborne microplastics as a primary exposure pathway and indicate their potential transfer into the human food chain. PCA explained 97.98% of the variance in polymer profiles; LDA achieved 100% classification accuracy. These findings offer evidence-based guidance for focused interventions in urban river areas. To ensure aquatic food security, future initiatives must prioritise enhancing waste discharge restrictions and incorporating microplastic monitoring into national water quality standards.

Keywords: *Microplastic pollution, cross-compartment, FTIR, K-means Cluster, LDA*

PWW18

64. Waste Composition Analysis Of Plastic: A Case Study On Downstream Side Of Mahesh Canal, Chittagong, Bangladesh

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Abstract

Plastic pollution has become a critical environmental issue globally, particularly in big cities like Chittagong, Bangladesh. This study focuses on analyzing the composition and distribution of plastic waste along the downstream side of the Mahesh Canal to understand the extent of pollution and inform effective waste management strategies. A total of 10 sampling sites were selected based on proximity to residential areas, commercial zones. The findings indicate that polypropylene (PP and low-density polyethylene (LDPE are the dominant plastic types, comprising 30.8% and 23% of total waste respectively. Using linear projection based on a 4% annual growth rate, the study estimates total plastic waste generation will increase from 195.82 tons in 2023 to 257.69 tons by 2030, 381.43 tons by 2040, and 564.42 tons by 2050. The study also finds that per capita plastic waste generation in the canal vicinity is approximately 22.5 grams per day, slightly lower than the citywide average of 28.7 grams. This variation is attributed to localized demographics, waste practices, and awareness levels. The results highlight the urgent need for better waste management through improved collection, public awareness, and regulations. This study provides valuable data to guide policies and promote sustainable plastic waste management in urban water systems.

Keywords: *Plastic Waste Composition, Pollution Control, Sustainability Urban Water Pollution, Waste Management Strategies*

65. Adaptation and Evaluation of Soil and Water Quality for Sustainable Cocoa Cultivation in Bangladesh

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Abstract

Cocoa (Theobroma cacao) is mostly cultivated in humid tropical regions such as West Africa, Latin America, and Southeast Asia. The production of cocoa is in a decline due to socioeconomic and environmental factors though the demand has surged by the expanding chocolate and confectionery industries. This work aimed at examining the ecological adaptability of cocoa in Bangladesh considering the climatic nature, also the physicochemical and environmental factors. The study was conducted on the cocoa research plots at the Asian University for Women (AUW) campus in Chattogram where three distinct varieties are planted in a multilayered agroforestry model. Soil analysis, biodiversity surveys, and climate assessments were the key areas of focus. The soil pH, moisture content and nutrient cycling analysis in addition to environmental factors such as temperature and humidity results were positive considering the standard cocoa growing conditions. The biodiversity study also showed adaptability with multiple species including partial shade providing betel nut (Areca catechu) and Krishnachura (Delonix regia). Overall, this research offers a framework for the adaptation and enhancement of cocoa cultivation which may contribute to the sustainable agriculture, biodiversity conservation, and climate-resilient farming systems.

This work was supported by the student research grant, ENVS Program, AUW

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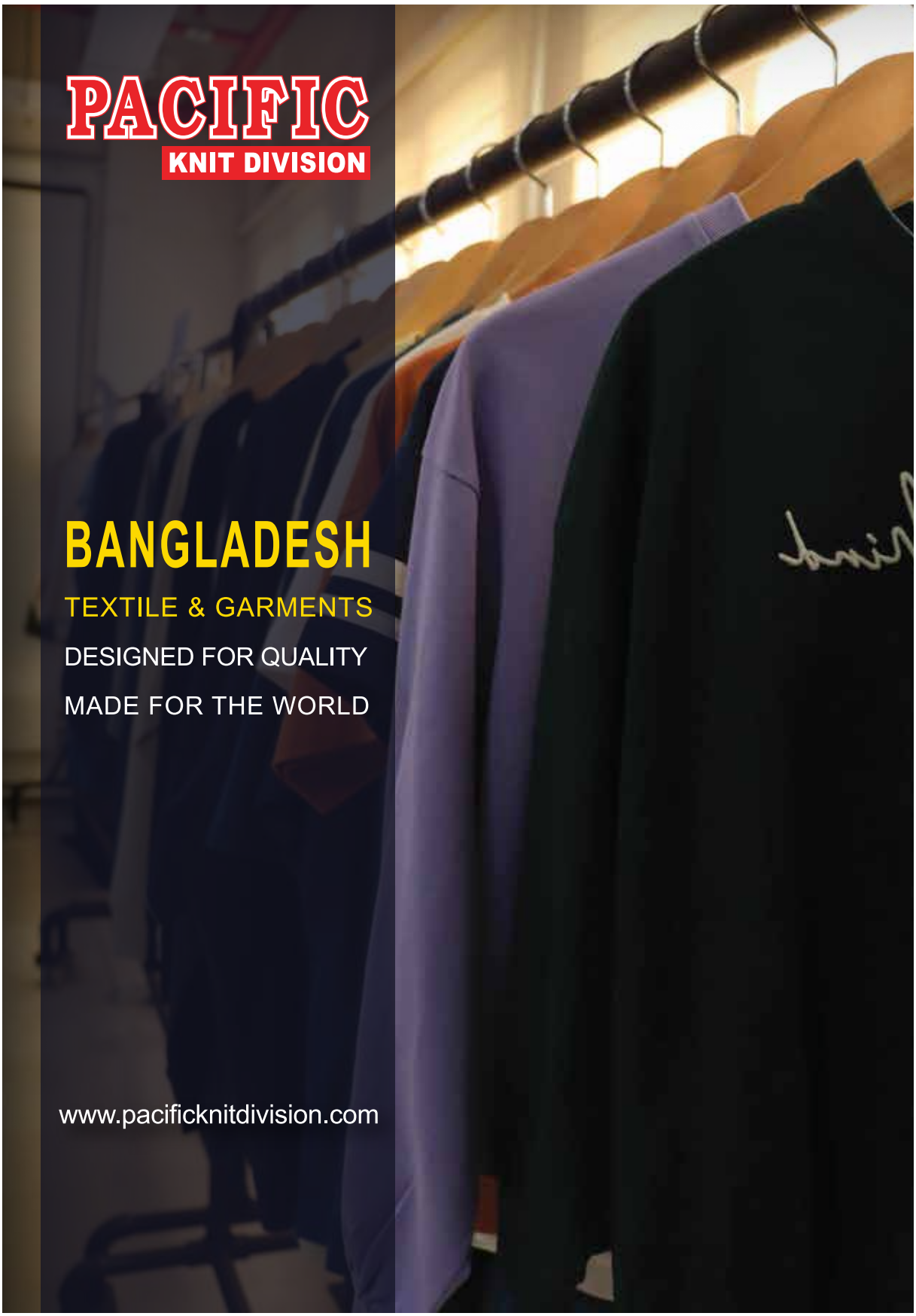
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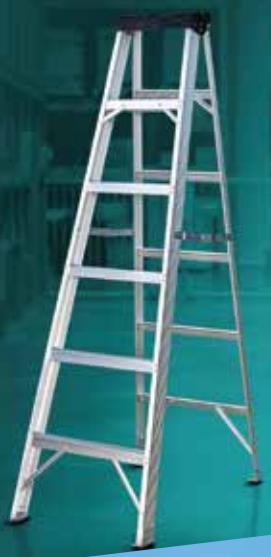

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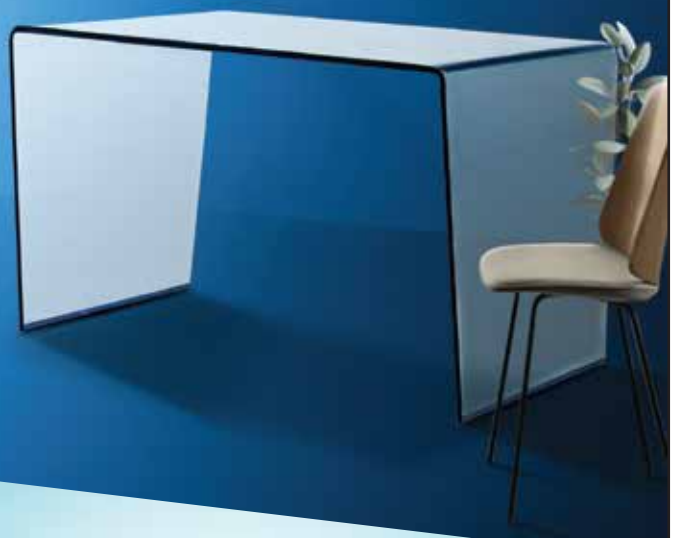

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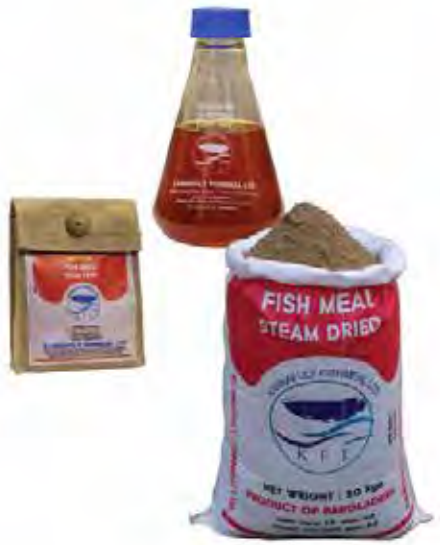

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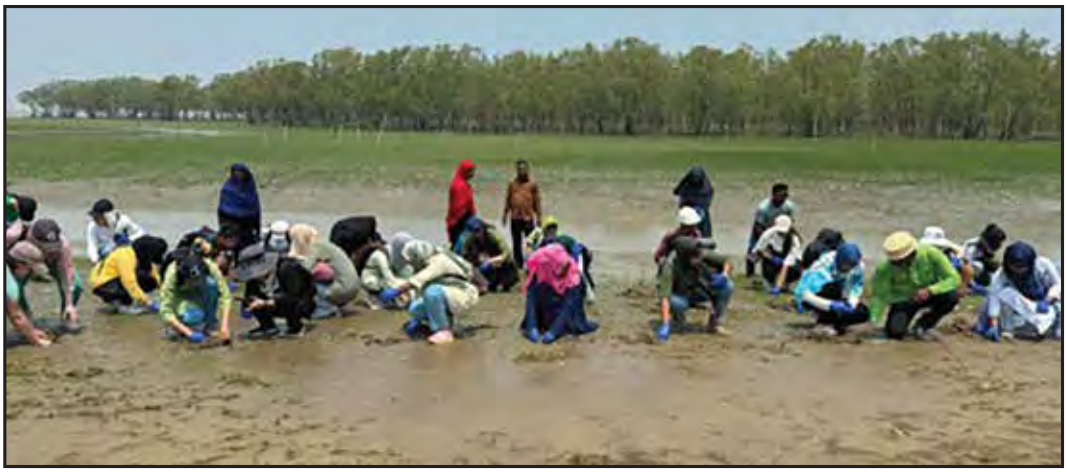

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