7TH ENVIRONMENTASIA INTERNATIONAL CONFERENCE 2025

Integrating Efforts to Tackle the Triple Planetary Crisis

CONFERENCE PROGRAM AND ABSTRACTS

September 4 - 6, 2025

The Landmark Bangkok Hotel, Thailand


Anniversary
20th
สมาคมสถาบันอุดมศึกษาสิ่งแวดล้อมไทย
The Society of Higher Education Institutes on Environment

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MESSAGE FROM CONFERENCE CHAIRS

It is our great pleasure to welcome you to the 7th EnvironmentAsia International Conference under the theme ***"Integrating Efforts to Tackle the Triple Planetary Crisis"***, to be held from 4 – 6 September 2025 at The Landmark Hotel, Bangkok, Thailand. This prestigious event is jointly organized by the Thai Society of Higher Education Institutes on Environment (TSHE) and the Sustainable Environment Research Institute (SERI), Chulalongkorn University.

Our world is currently facing a triple planetary crisis: climate change, biodiversity loss, and pollution, which poses complex and interconnected threats to human well-being and the health of our planet. Responding to these challenges requires not only scientific innovation but also inclusive dialogue, collaborative action, and interdisciplinary approaches across sectors and borders.

The 7th EnvironmentAsia International Conference serves as a dynamic platform for academics, researchers, policymakers, practitioners, students, and civil society to come together to exchange knowledge, share solutions, and inspire action. Through keynote lectures, oral and poster presentations, panel discussions, and networking opportunities, this conference aims to foster collaboration and contribute to advancing sustainability transitions at all levels.

We are confident that the diversity of perspectives and the quality of contributions will make this conference a fruitful experience for all participants. On behalf of the organizing committees, we extend our warmest invitation to you to join us in Bangkok and to be part of this important conversation toward a more sustainable and resilient future.

We look forward to welcoming you to Bangkok in September 2025.

With warm regards,

Associate Professor Dr. Pantawat Sampanpanish
Director of Sustainable Environment Research Institute
Conference Chair, SERI,
Chulalongkorn University

Associate Professor Dr.Ratcha Chaichana
President of the Thai Society of Higher Education Institutes on Environment
Conference Chair, TSHE

OPENING REMARKS

It is with great honor and privilege to welcome you to the 7th EnvironmentAsia International Conference 2025 on "Integrating Efforts to Tackle the Triple Planetary Crisis". This international conference is hosted by Sustainable Environment Research Institute, Chulalongkorn University (SERI), and Thai Society of Higher Education Institute on Environment (TSHE), Thailand from September 4th to 6th, 2025.

We gather here at a time when our world is confronting the interconnected triple planetary crisis of global climate change, pollution and biodiversity loss. The combined impact of these issues is particularly alarming, as they can create a socio-ecological cascade. Specifically, they form a complex, compounding threat to the long-term well-being of both humanity and the planet's ecosystems, and the future of generations to come.

Firstly, the climate crisis continues to accelerate the loss of biodiversity, displacement of communities, and disruption of ecosystems. Secondly, many countries worldwide experience severe pollution. Air pollution, for instance, is the leading environmental risk to health causing approximately 7 million premature deaths annually. Lastly, we found overwhelming consensus that biodiversity loss demands urgent global action. And because of this, this international conference is not just a forum for dialogue, but we are called to bridge disciplines, and build new frameworks for cooperation — among nations, sectors, and communities.

Distinguished guests, let me express on behalf of the organizing committee, our most sincere wish that the power of shared knowledge, shared responsibility, and shared hope from the conference will positively contribute to the role of global citizens for a sustainable future. Each voice holds a key to shaping a more just, sustainable, and resilient global future. So, I invite you to participate actively, collaborate openly, and leave here not only more informed, but more empowered. And I wish you all — us all — the very best for a most successful conference meeting. Thank you for being part of this movement and let's begin.

With warm regards,

Professor Dr. Wilert Puriwat

the President of Chulalongkorn University, Thailand

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Dr. Wilailuk Niyommaneerat
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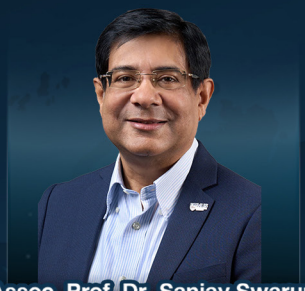
Miss Nawinee Khumthong
SERI Chulalongkorn University

KEYNOTE SPEAKER

Marie Jurisoo
Asia Centre Director,
Stockholm Environment Institute (SEI) Asia



Assoc. Prof. Dr. Sanjay Swarup
Director
NUS Environmental Research Institute,
National University of Singapore

Dr. Wijarn Simachaya
President
Thailand Environment Institute

Prof. Dr. Shabbir H. Gheewala
Head of Life Cycle Sustainability Assessment Laboratory
The Joint Graduate School of Energy and Environment,
King Mongkut's University of Technology Thonburi

PANELISTS AND INVITED SPEAKERS

PANEL DISCUSSION

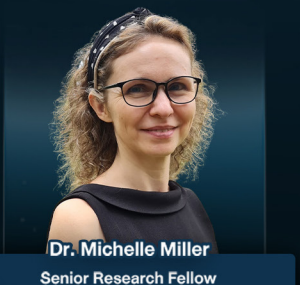
Assoc. Prof. Dr. Steve Kardinal Jusuf
Faculty of Engineering,
Singapore Institute of Technology

Assoc. Prof. Dr. Savitri Garivait
Chairperson of Environmental Division
The Joint Graduate School of Energy and Environment,
King Mongkut's University of Technology Thonburi

Dr. Michael Roy
Conservation Director
WWF Thailand

INVITED SPEAKERS

Assoc. Prof. Dr. Yusuke Toyoda
College of Policy Science
Ritsumeikan University



Dr. Michelle Miller
Senior Research Fellow
Asia Research Institute,
National University of Singapore

Prof. Dr. Sandhya Babel
Sirindhorn International Institute of Technology,
Thammasat University

CONFERENCE PROGRAM

The 7th EnvironmentAsia International Conference

"Integrating Efforts to Tackle the Triple Planetary Crisis"

4 – 6 September 2025 The Landmark Hotel, Bangkok, Thailand

4 September 2025

08:00-08:45	Registration
08:45-09:00	Welcome remarks Assoc. Prof. Dr. Ratcha Chaichana *President of the Thai Society of Higher Education Institutes on Environment*
09:00-09:15	Opening remarks Prof. Dr. Wilert Puriwat *The President of Chulalongkorn University*
09:15-09:45	Keynote speech Marie Jurisoo *Asia Centre Director, Stockholm Environment Institute (SEI) Asia* Title: Three Crises, One Planet: Insights on Global and Asian Pathways Forward
09:45-10:15	Keynote speech Assoc. Prof. Dr. Sanjay Swarup *Director of NUS Environmental Research Institute (NERI),* *National University of Singapore* Title: Ecology-inspired Solutions for Healthier Environment and Climate-resiliency in Agricultural Production MC: Dr. Puntita Tanwattana and Asst. Prof. Dr. Peerapong Pornwongthong
10:15-10:30	**Refreshment**
10:30-12:00	Panel Discussion: **"Challenges and opportunities to tackle the triple planetary crisis"** 1. Assoc. Prof. Dr. Steve Kardinal Jusuf *Faculty of Engineering, Singapore Institute of Technology* Title: Sustainable Urban Design Strategies for Managing Climate Risk – Singapore Case 2. Assoc. Prof. Dr. Savitri Garivait *The Joint Graduate School of Energy and Environment (JGSEE)* Title: Clearing the Air: Leveraging National Emission Inventories to Confront the Triple Planetary Crisis? 3. Dr. Michael Roy *Conservation Director, WWF Thailand* Title: Rewilding Southeast Asia: A Vision for the Next Half Century Moderator: Dr. Sujitra Vassanadumrongdee
12:00-13:00	**Lunch**

4 September 2025

13:00-14:00	Poster Presentation (7) ENV0303-0001 / ENV0303-0002 / ENV0304-0005 / ENV0304-0009 / ENV0304-0014 / ENV0409-0006 / ENV0410-0003			
14:00-16:30	**Oral Presentation**			
Session	Climate Risks	CE&ESG	Pollution	Others Related Topic
Room	Conservatory	Landmark 1	Ballroom	Landmark 2-3
Chair	Dr. Nantamol Limphitakphong, CU	Dr. Kallaya Suntornvongsagul, CU	Dr. Bualuang Faiyue, CU	Dr. Ratchanon Piemjaiswang, CU
Co-chair	Dr. Kullapon Kesonkan, KMUTNB	Dr. Thong Anh Tran, Australian National University, Australia	Assoc. Prof. Dr. Chuleemas BoonthaiIwai, KKU	Assoc. Prof. Dr. Uma Langkulsen, TU
14:00-14:15	ENV0106-0004	ENV0201-0001	ENV0301-0004	ENV0401-0001
14:15-14:30	ENV0101-0001	ENV0201-0002	ENV0303-0004	ENV0402-0002
14:30-14:45	ENV0101-0002	ENV0202-0003	ENV0303-0005	ENV0402-0003
14:45-15:00	ENV0101-0005	ENV0202-0006	ENV0304-0011	ENV0404-0002
15:00-15:30	**Refreshment**			
Session	Climate Risks	CE&ESG	Pollution	Others Related Topic
Room	Conservatory	Landmark 1	Ballroom	Landmark 2-3
Chair	Dr. Kullapon Kesonkan, KMUTNB	Dr. Thong Anh Tran, Australian National University, Australia	Assoc. Prof. Dr. Chuleemas Boonthai Iwai, KKU	Assoc. Prof. Dr. Uma Langkulsen, TU
Co-chair	Dr. Nantamol Limphitakphong, CU	Dr. Kallaya Suntornvongsagul, CU	Dr. Bualuang Faiyue, CU	Dr. Ratchanon Piemjaiswang, CU
15:30-15:45	ENV0101-0006	ENV0202-0007	ENV0303-0006	ENV0406-0001
15:45-16:00	ENV0102-0001	ENV0202-0008	ENV0303-0007	ENV0409-0001
16:00-16:15	ENV0102-0002	ENV0202-0009	ENV0303-0008	ENV0409-0002
16:15-16:30	ENV0103-0001			ENV0409-0003

5 September 2025

08:00-09:00	Registration
09:00-09:30	Keynote speech Dr. Wijarn Simachaya *President of Thailand Environment Institute* Title: Environmental Challenges and Crises in the Next Decade: What's Coming and What must be Done?
09:30-10:00	Keynote speech Prof. Dr. Shabbir H.Gheewala *Head of the Life Cycle Sustainability Assessment Laboratory,* *King Mongkut's University of Technology Thonburi (KMUTT)* Title: From Nexus to Solutions: Tackling the Planetary Crisis via Water–Food–Energy–Land–Climate Linkages MC: Asst. Prof. Dr. Ornprapa Phummakanjana Robert and Dr. Nattapong Tuntiwiwattanapun
10:00-10:30	**Refreshment**
10:30-12:00	Invited speakers • Assoc. Prof. Dr. Yusuke Toyoda *Associate Professor, College of Policy Science* *Director, Research and Development Institute of Regional Information* *Deputy Director, Institute of Disaster Mitigation for Urban Cultural Heritage* *Ritsumeikan University* Title: Disaster Risk Management: Harmonization of Top-Down and Bottom-Up Decision-Making Approaches • Dr. Michelle Miller *Asia Research Institute, National University of Singapore* Title: Transboundary Agenda for Nature-Based Solutions: Crossing the Urban-Rural Divide in Southeast Asia • Prof. Dr. Sandhya Babel *Distinguished Professor in Science and Technology, Thammasat University* *School of Biochemical Engineering and Technology* *Sirindhorn International Institute of Technology (SIIT)* Title: Unraveling Microplastics Contamination in Bangkok Metropolitan Area: Challenges and Way Forward Moderator: Asst. Prof. Dr. Peerapong Pornwongthong
12:00-13:00	**Lunch**

5 September 2025

13:00-14:30	Oral Presentation			
Session	Climate Risks	CE&ESG	Pollution	Others Related Topic
Room	Conservatory	Landmark 1	Ballroom	Landmark 2-3
Chair	Dr. Atima Dubsok, CU	Dr. Vacharaporn Soonsin, CU	Assoc. Prof. Dr. Penradee Chanpiwat, CU	Dr. Kittiwoot Chaloeytoy, CU
Co-chair	Assoc. Prof. Dr. Patthra Pengthamkeerati, KU	Assoc. Prof. Dr. Natapol Thongplew, UBU	Assoc.Prof.Dr. Sumeth Wongkiew, CU	Asst. Prof. Dr. Peerapong Pornwongthong, KMUTNB
13:00-13:15	ENV0106-0003	ENV0202-0010	ENV0303-0010	ENV0106-0010
13:15-13:30	ENV0106-0005	ENV0203-0001	ENV0303-0012	ENV0409-0004
13:30-13:45	ENV0106-0006	ENV0304-0007	ENV0303-0013	ENV0409-0005
13:45-14:00	ENV0106-0008	ENV0304-0010	ENV0303-0014	ENV0410-0004
14:00-14:15	ENV0304-0002	ENV0304-0015	ENV0303-0015	ENV0304-0013
14:15-14:30		ENV0304-0004	ENV0304-0001	
14:30-15:00	**Refreshment**			
15:00-15:15	Announcement of Best Oral Presentation and Best Poster Presentation Awards			
15:15-15:30	Closing Ceremony **Assoc. Prof. Dr. Ratcha Chaichana** *President of the Thai Society of Higher Education Institutes on Environment*			

6 September 2025 Excursion Agenda

Trip to Ayutthaya

08.00 A.M. – 09.30 A.M.

Depart from Landmark Hotel to Ayutthaya

13.30 P.M. – 15.00 P.M.

Depart from Ayutthaya to Landmark Hotel

ORAL PRESENTATION SESSIONS

Session I Climate Risks

Code	Abstract Title	Presenter
ENV0101-0001	Biowaste Materials as Protein-amino Based Adsorbents for CO_2 Capture Technologies	Suthita Nueangkaew
ENV0101-0002	Gummy Jelly Development from Amla Residue and Its Bioactive Compound Content	Thapakorn Chumphon
ENV0101-0005	Assessment of Sustainable Urban Green Area for Thailand's Carbon Neutrality	Montathip Sommeechai
ENV0101-0006	Strategic CO_2 Storage Site Prioritization in Thailand Using AHP: Linking National Policy with Subsurface Salinity Data	Paul Benjamin
ENV0102-0001	Greenhouse Gas Emissions from Waste and Wastewater: A Case Study of High-Rise Buildings in Bangkok	Wirine Supapornchaisin
ENV0102-0002	The Perspective of Stakeholders in Situation of Illegal Construction on Urban Sprawling Area on Agriculture Land, in Nan Oo Lwin, Mandalay, Myanmar	Lin Aung Oo
ENV0103-0001	Advanced Modelling of Plant Tolerance to Air Pollution by Combining Biochemical, Physiological, and Remotely Sensed Environmental Data	Chamila Priyankara Hetti Arachchige
ENV0106-0003	How Ammonia (NH_3) Can Play a Role in Climate Change and Air Quality by Being a Carbon-free Fuel?	Thanapat Jansakoo
ENV0106-0004	Ecological Grief and Livelihood Precarity in the Mekong Floodplains: Unravelling the Dark Sides of Place-based Adaptation	Thong Tran
ENV0106-0005	Integrated Hydrological and Hydraulic Modeling of an Extreme Flood Event in the Lower Mekong Basin	Hnin Aye Lin
ENV0106-0006	Carbon footprint assessment of Koh Sichang sub-district municipality, Chonburi Province	Visaruth Rojritthikrai
ENV0106-0008	Effect of Tidal Frequency on Soil Carbon Storage in Mangrove Forest at The King's Royally Initiated Laem Phak Bia Environmental Research and Development Project, Thailand	Sunaree Wangluk
ENV0106-0010	Determination of Methane Emissions from Eutrophic Reservoir	Sinlaphop Pongdet

Session II : Circular Economy and ESG

Code	Abstract Title	Presenter
ENV0201-0001	Vermicompost Application as a Bio-Circular Solutions for Saline Soil Rehabilitation and Sustainable Chili Production	Wichien Aengwanich
ENV0201-0002	Evaluating Bio-based Carbon in Single-use Beverage Cups in Thailand Using Radiocarbon Analysis	Nichtima Uapoonphol
ENV0202-0003	Reducing Zinc Contamination in Bioponic Lettuce with MIL-88A: Impacts on Plant Yield and Microbial Dynamics	Suchana Amnuaychaichana
ENV0202-0006	Informal Sector Integration for Safer and Inclusive Portable Battery Waste Management in Thailand	Humm Kham Zan Zan Aung
ENV0202-0007	A Systematic Review of Sustainability Assessment Methodologies, Indicators, and Decision-Making Tools for Municipal Solid Waste Management	Apirak Bumyut
ENV0202-0008	Development of Biodegradable Films from Durian Rind and Shrimp Shells for Sustainable Packaging Applications	Cindy Agriningsih Haruna
ENV0202-0009	A design review of Black Soldier Fly (BSF) rearing systems: from lab insights to farm-level applications for organic waste treatment	Abu Towab Md Shahriar
ENV0202-0010	Environmental Performance Comparison of End-of-Life Air Conditioner Management in Thailand and Japan.	Viveha Sriskandaraja
ENV0203-0001	Forecast for Currency Pairs USD/THB using the Box-Jenkins Model of ARIMA for Time Series	Ringyaomi Shimray

Session III : Pollution

Code	Abstract Title	Presenter
ENV0301-0004	Nutrient Neutralization and Carbon Capture for Canal Water Treatment Through Continuous Cultivation of *Azolla microphylla*	Aye Myint Thu
ENV0303-0004	Application of Thai Probiotic Strains to Improve Water Quality in White Shrimp *(Litopenaeus vannamei)* Aquaculture	Prapa Sohsalam
ENV0303-0005	Evaluation of Microalgae Electron Activity for Bioelectricity Production	Siraporn Potivichayanon
ENV0303-0006	Developing electro-Fenton for Grease Trap Wastewater Treatment: Magnetized Biochar Cathode Production and Process Optimization	Amina Khatun
ENV0303-0007	The Study on Application of Hemp Biomass-Derived Biochar for Dye Treatment in Dawmang Hemp Textile Community in Ban Mae Sa Noi, Chiang Mai Province	Phoomphet Panphetchara
ENV0303-0008	Removal of Chromium and Colorant from Synthetic Dyeing Factory Wastewater by Biochar Derived from Water Hyacinth	Wanida Muangtong
ENV0303-0010	Removal of Organic Substances and Nitrogen from Wash Water Using Tender Coconut-Derived Biochar in a Small-Scale Pig Farm	Pabhornchanok Chalermsub
ENV0303-0012	Two Site Models Predicted Fate and Transport of Atrazine in Three Distinct Soils under Temperature-Dependent Conditions in Suphan Buri, Thailand	Nanchaphorn Udomsri
ENV0303-0013	Removal Performance of Nitrogen and Emerging Contaminants in Full-Scale Constructed Wetlands: Case study from Thailand Japan, and the USA	Pongsak Noophan
ENV0303-0014	Calcium Foliar Application Enhances Growth and Nitrogen Uptake of Canna indica under Simulated Hypoxic Conditions	Tanapong Suriyakaew
ENV0303-0015	Effect of Plant Presence and Species on the Treatment of Freshwater Aquaculture Effluent in Constructed Wetland	Harry Lye Hin Chong
ENV0304-0001	Assessment of Heavy Metal Levels in the Freshwater Resources of Island Communities in Surigao City, Philippines	Jerry Cuadrado
ENV0304-0002	Improved Determination of Small Microplastics in the Municipal Solid Waste Leachates	Atsamon Limsakul
ENV0304-0004	Using Organic Amendments to Remediate Cadmium-Contaminated Soils and Boosting Nutrient Content	Yoseph Junedi Nuwa Dhuge Poa
ENV0304-0007	Association of Temperature Inversions on Vertical $PM_{2.5}$ Distribution in Bangkok During the Dry Season	Arisara Nakburee
ENV0304-0010	Microplastics in the Corals of the Upper Gulf of Thailand	Udomsak Darumas

Code	Abstract Title	Presenter
ENV0304-0011	Extraction and Application of Cellulose from Water Hyacinth Petioles *(Eichhornia crassipes)* and Pineapple Crown Leaves *(Ananas comosus)* for Bioplastic Production	Arya Krishna
ENV0304-0013	Enhanced Electrochemical Degradation of Per- and Polyfluoroalkyl Substances (PFAS) in Water using Gold Nanoparticles Electrodeposited on a Boron-Doped Diamond (BDD) Electrode	Warissara Nintasin
ENV0304-0015	Chromosome Abnormalities Assessment of Hybrid Catfish in the Reservoir Contaminated with Heavy Metal from Municipal Landfill	Tanadol Savigun

Session IV : Other Related Topics

Code	Abstract Title	Presenter
ENV0401-0001	Mitigating Urban Heat Island Effects through a Large Urban Oasis of Bangkok: A Google Earth Engine Approach	Chayanit Homsin
ENV0402-0002	Evaluation of Treated Wastewater Use in Hydroponic System: Nitrogen Transformation, Lettuce Growth and Root Microbial Communities	Pachara Pakwang
ENV0402-0003	Potential of GSHP Application under Tropical Climate: A Case Study in Thailand	Sorranat Ratchawang
ENV0404-0002	Green Extraction of Cocoa Butter and Antioxidants by Natural Deep Eutectic Solvent	Darya Makhotkina
ENV0406-0001	Rediscovering Challenges in Nigeria's Social Housing System: Identifying Archetypes Towards Just Transition.	Michael Ojo
ENV0409-0001	Spider webs: The potential to be environmental monitoring tool	Thanakron Into
ENV0409-0002	Coastal Ecosystem Influence on Phytoremediation of Water Quality: Case Study of the Bangpakong River Estuary	Suchanad Boonyachai
ENV0409-0003	Adsorptive Removal of Fluoride from Water Using Composite Adsorbents Derived from Water Treatment Residues	Natthapong Proysurin
ENV0409-0004	Reptile Diversity in Human Modified Habitats: Case Study of Suranaree University of Technology Campus	Soe Thandar Aung
ENV0409-0005	Conservation, Caste/ethnicity, and Livelihoods: A Political Ecology of Buffer Zone Governance in Langtang National Park, Nepal	Sharmila Shyangtan
ENV0410-0004	Environmental and Public Health Implications of Inappropriate Antibiotic Prescribing for Upper Respiratory Tract Infections: Evidence from Primary Care in Bangkok, Thailand	Pattiya Wichayapong

POSTER PRESENTATION SESSION

Code	Abstract Title	Presenter
ENV0303-0001	The Impact of Waterbody Size on Water Quality and Its Implications for Environmental Management in Thailand's Freshwater Bodies	Chuti Rakasachat
ENV0303-0002	Comparative Analysis of Phytoplankton Diversity and Abundance in Relation to Water Body Sizes Across Thailand: Implications for Freshwater Ecosystem Monitoring and Management	Peangtawan Phonmat
ENV0304-0005	Assessment of methane emissions from local paddy field by AERMOD model in Surin Province	Sutthicha Nilrit
ENV0304-0009	Characterization of Microplastics in Soil, Leachate and Groundwater at a Municipal Landfill in Rayong Province, Thailand	Wanlapa Wisitthammasri
ENV0304-0014	Occurrence and Characteristics of Microplastics in the Zoanthid Zoanthus kuroshio from the Eastern Gulf of Thailand	Charernmee Chamchoy
ENV0409-0006	Filling GRACE/GRACE-FO Terrestrial Water Storage Anomaly Gaps Using a Hybrid CNN-LSTM and XGBoost Residual Framework	Quoc Non Duong
ENV0410-0003	Local Innovations in Climate Action: A case study of Sheep Transhumant Pastoralism from Barkpak, Gorkha	Nirmal Aryal

ABSTRACTS
Session I Climate Risks

ENV0101-0001

Biowaste Materials as Protein-amino Based Adsorbents for CO_2 Capture Technologies

Suthita Nueangkaew[1], Yordkhuan Tachapermpon[2] and Chairat Treesubsuntorn[1,2*]

[1]*School of Bioresources and Technology, King Mongkut's University of Technology Thonburi, Bangkok 10150, Thailand*

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Abstract

Chicken feathers are a by-product of the poultry processing industry and contain a keratin protein structure with properties suitable for carbon dioxide (CO_2) adsorption. In an era of increasing climate change, reducing the amount of CO_2 in the atmosphere represents one of the important goals of achieving carbon neutrality. In this study, chicken feathers were investigated as a sustainable and protein-rich biosorbent for CO_2 capture. The inherent keratin structure, rich in amino functional groups, provides active sites for CO_2 adsorption. A comparative batch adsorption analysis was conducted using a CO_2 concentration sensor to assess the adsorption capacity of chicken feathers relative to pig nails and soybean residue. The results demonstrated that chicken feathers exhibited higher CO_2 adsorption capacity (32.56 ± 8.85 mg/g) compared to pig nails (24.30 ± 1.11 mg/g) and soybean residue (13.77 ± 12.49 mg/g). Moreover, Sodium hydroxide hydrolysis treatment of chicken feathers significantly enhanced their adsorption capacity to 183.42 ± 22.68 mg/g. Compared to other reported biosorbents such as wood biochar (41.23 - 45.85 mg/g) and chitosan (163.72 mg/g), the treated chicken feathers exhibited a higher CO_2 adsorption capacity. This indicates their potential for sustainable carbon capture, contributing to circular economic strategies and otherwise underutilized industrial by-product.

Keyword: Amino-based adsorbents; Biowaste materials; Carbon dioxide adsorption; Chicken feathers; Sodium hydroxide hydrolysis

ENV0101-0002

Gummy Jelly Development from Amla Residue and Its Bioactive Compound Content

Thapakorn Chumphon[1], Sarunkorn Amornrattanasirikul[2], Yanisa Khamphui[3] and Prapa Sohsalam[4*]

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Abstract

In convention amla juice processing, 50% of amla residue was abandoned as waste which could emit greenhouse gas 821 ton CO_2 per year in Thailand. The high vitamin C and fiber were remained in amla residue and this waste could be developed to be a gummy jelly. Improving the flavor of gummy jelly by using lite sugar or stevia sugar with gelatin or pectin as jelly formation were conducted. The 4 formulas of gummy jelly from Amla residue supplements dietary fiber were (1) dietary fiber 2 g and lite sugar. (2) dietary fiber 5 g. and lite sugar, (3) dietary fiber 2 g and stevia sugar and (4) dietary fiber 5 g. and stevia sugar, Sensory evaluation of these four formulas were tested the taste, shape, size, color, smell, flavor (sour or sweet taste) texture (chewiness or meltiness in the mouth). It was found that the consumer gave the same highest satisfaction score for all formula. Vitamin C and fiber per serve in this study were accounted to 49.42% and 12.5% of recommended daily intake. The antioxidant activity was 20 % DPPH scavenging (DPPH : 2,2-diphenyl-1-picrylhydrazyl). This product could be the healthier snack with low sugar, zero fat and reduction of greenhouse gas emission compared with the convention amla processing.

Keyword: Amla residue; Gummy jelly; Waste utilization; Greenhouse gas reduction

ENV0101-0005

Assessment of Sustainable Urban Green Area for Thailand's Carbon Neutrality

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Abstract

Thailand's carbon neutrality target for 2050 requires strategic urban environmental management. We conducted a comprehensive evaluation of urban green spaces through the GIZ-funded project "Enhancing Urban Green Area Serving for Thailand's Carbon Neutrality" in collaboration with the Department of Climate Change and Environment. Our mixed-methods approach integrated Random Forest machine learning analysis of high-resolution satellite imagery with field measurements from 104 permanent plots across various regions of Thailand, representing diverse urban environments. Analysis revealed 450 trees per hectare with above-ground biomass of 163.44 t/ha, storing 76.81 tC/ha (281.62 tCO_2/ha equivalent). The 2023 assessment identified 611,206 hectares of urban green areas containing 46.95 million tons of carbon (172.15 million tons CO_2 equivalent). However, current coverage represents only 2.7% of national territory, substantially below the 5% policy target established by Office of the National Economic and Social Development Council. These findings reveal critical implementation gaps in Thailand's urban greening strategy. We developed an evidence-based roadmap and assessment toolkit to address these deficits through strategic green infrastructure development. The framework supports nature-based climate solutions while enhancing urban liveability, providing practical guidance for achieving national carbon neutrality commitments through systematic urban greening initiatives.

Keyword: Carbon neutrality; Roadmap; Carbon pool; Sustainable green spaces; Random Forest

ENV0101-0006

Strategic CO_2 Storage Site Prioritization in Thailand Using AHP: Linking National Policy with Subsurface Salinity Data

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Abstract

Achieving Thailand's 2050 carbon neutrality target demands the rapid deployment of secure geological CO_2 storage. However, no transparent, uncertainty-aware framework exists for comparing the country's candidate saline aquifers. This study addresses this by developing a reproducible, policy-aligned framework for CO_2 storage site evaluation, aiming to systematically screen and rank saline aquifers. A key objective was to incorporate salinity as a key criterion alongside storage capacity and injectivity, seal integrity and containment, and socio-economic constraints. The methodology involved a four-stage decision-support workflow. First, data for two candidate basins representing onshore and offshore sites (Khorat, Pattani) were collected from public domain sources (2001–2025) and screened against international thresholds. Qualified sites were ranked using Multi-Criteria Decision Analysis (MCDA) that couples the Analytic Hierarchy Process (AHP) with Data Confidence Scores (DCS). This included expert pairwise comparisons. Finally, uncertainty was propagated through 10,000 trial Monte Carlo simulations to test the robustness of the ranking. Results show the Pattani basin (Middle Miocene Sandstone) as a more suitable near-term candidate (71.7%) compared to the Khorat basin (Phu Phan formation) (64%). This framework provides an auditable basis for site selection, enabling regulator shortlisting and operator pre-FEED planning. It clarifies immediate technical and engagement priorities and is readily extensible to other Thailand saline aquifers, thereby accelerating Thailand's net-zero transition.

Keyword: Carbon Capture and Storage (CCS); Analytic Hierarchy Process (AHP); Salinity; Site Ranking.

ENV0102-0001

Greenhouse Gas Emissions from Waste and Wastewater: A Case Study of High-Rise Buildings in Bangkok

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Abstract

This study evaluates greenhouse gas (GHG) emissions from the waste management activities of high-rise buildings in Bangkok. Researchers focused on the Central, Northern, and Eastern zones, which were chosen for their dense urban core, economic significance, and rapid growth. The assessment included 603 buildings across 22 districts, covering both direct and indirect activities. Data from Environmental Impact Mitigation and Monitoring Reports (July 2023 - June 2024) were primarily used.

GHG emissions were calculated using the 2006 IPCC Guidelines and expressed in units of CO_2e, then spatially visualized via QGIS 3.40 program. Results show wastewater treatment generated 148,517 tCO_2e/month, waste management 30,316 tCO_2e/month, and electricity for wastewater processes 1,054 tCO_2e/month. Total waste sector emissions reached 2,158,645 tCO2e/year, with an average intensity of 15.52 $kgCO_2e/m^2$. Don Mueang District (NTB04) recorded the highest emissions per area at 37.97 $kgCO_2e/m^2$. The results confirm that wastewater treatment, solid waste management, and electricity for wastewater treatment are the primary contributors. This study provides crucial baseline GHG emission data for Bangkok's high-rise building waste management activities, informing future reduction strategies.

Keyword: GHG emission; High Rise Building; Waste management; Electricity consumption; Wastewater treatment

ENV0102-0002

The Perspective of Stakholders in Situation of Illegal Construction on Urban Sprawling Area of Agriculture Land, in Nan Oo Lwin, Mandalay, Myanmar

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Abstract

In Myanmar, unplanned urban expansion erodes fertile agricultural land, threatening food security and sparking land disputes. Nan Oo Lwin, a rapidly growing town in Mandalay with highly productive soils, was selected as the case study due to its acute tension between farmland preservation and informal development. This research examines how agricultural land protection has been regulated under two governance regimes: military rule (1980–2008) and the democratic era (post-2008). Data collection is underway, combining 40 semi-structured interviews with residents, farmers, officials, and community leaders, alongside a review of policy documents. Interview transcripts will be transcribed verbatim and analysed thematically, using a coding framework derived from the interview protocol to identify patterns, themes, and sub-themes on urban sprawl and illegal construction. Comparative analysis will explore perspectives on enforcement patterns, political incentives, and local resistance across regimes. Early insights suggest a paradox: the military dismantled illegal structures more decisively, while democratic governments have often legalized informal developments to win public favour. By tracing these governance shifts, the study aims to illuminate the trade-offs between political legitimacy, community needs, and sustainable land protection, offering lessons for agrarian regions worldwide confronting the pressures of unplanned urbanization.

Keyword: Urban Sprawl; Myanmar; Agricultural Land; Illegal Construction; Perspective

ENV0103-0001

Advanced Modelling of Plant Tolerance to Air Pollution by Combining Biochemical, Physiological, and Remotely Sensed Environmental Data

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Abstract

Plant responses to air pollution are naturally complex with dynamic urban environments, highlighting the necessity for advanced, technologically integrated methodologies for understanding and capturing the responses. This study aimed to advance the prediction of the Plant Air Pollution Tolerance Index (APTI) by combining laboratory-analyzed biochemical (ascorbic acid concentration, total chlorophyll content) and physiological (pH, and relative water content) indices with high-resolution environmental data acquired through satellite remote sensing. Sentinel-5P (NO_2, SO_2, O_3), MODIS ($PM_{2.5}$), and satellite-ground-integrated datasets (for temperature, humidity, and rainfall) were acquired and processed via the Google Earth Engine (GEE). *Ficus microcarpa* L. plant leaf samples (n = 208) were collected between December 2023 and February 2025 across multiple provinces in Thailand which were strategically selected to represent a gradient of air pollutant concentrations and meteorological dynamics for modeling. Random Forest (RF) machine learning model was evaluated in predicting plant's APTI. The RF model achieved high accuracy for ecological studies with R^2 = 0.80 (train) and R^2 = 0.69 (test), which demonstrated the generalization of unseen data. This integrative modelling approach enables accurate, region-wide prediction of vegetation tolerant of air pollution using remote sensing and advanced models, with limited or no ground monitoring. This methodological advancement strengthens the scientific foundation for designing suitable nature-based solutions in urban planning, supporting the development of air pollution-resilient green infrastructure for sustainable, climate-adaptive cities.

Keyword: Built environment; Nature-based solutions; Nitrogen Dioxide (NO_2); Plant responses; Urban Planning

ENV0106-0003

How Ammonia (NH_3) can Play a Role in Climate Change, Air Quality, and N Deposition by being a Carbon-free Fuel?

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Abstract

Green ammonia (NH_3) fuel holds great promise for decarbonizing hard-to-abate sectors such as heavy industry and long-distance transport, contributing to the global goal of limiting warming to 1.5 °C. However, its environmental implications remain underexplored. We employed an advanced modeling framework that integrates a policy assessment model with an atmospheric chemical transport model to evaluate the global air quality impacts of green NH_3 under net-zero emissions scenarios. Our results indicate that NH_3 use could significantly worsen air quality, with tropospheric ozone (O_3) and fine particulate matter ($PM_{2.5}$) concentrations increasing by over 20%, primarily due to elevated NO_x and NH_3 emissions from shipping and heavy industry. This deterioration in air quality could lead to a substantial rise in pollution-related premature deaths. These findings highlight the critical need to align climate mitigation strategies with robust air quality management when implementing NH_3 as a clean fuel.

Keyword: Air quality; Green Ammonia fuel; Climate Change; Mitigation; Ozone (O_3); Fine Particulate Matter ($PM_{2.5}$)

ENV0106-0004

Ecological grief and livelihood precarity in the Mekong floodplains: Unravelling the dark sides of place-based adaptation

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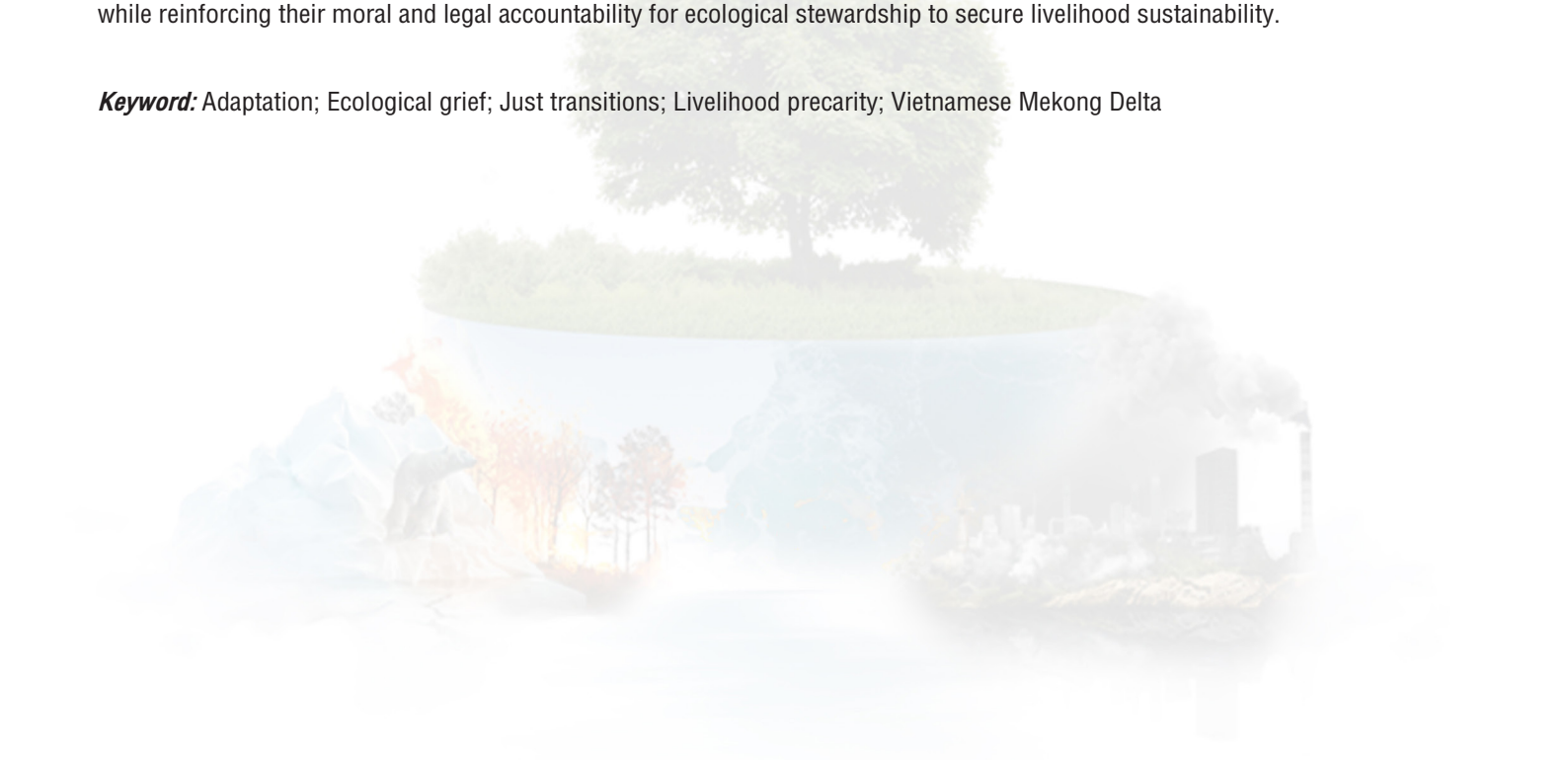
Abstract

The 21st century has witnessed significant changes in human-environment relations, characterised by the polycrisis of climate change and rampant infrastructure development. These forces disrupt traditional ecosystems, such as wild fisheries, which rural communities have relied on for livelihoods. In the Vietnamese Mekong Delta, these ecosystem-based livelihoods are currently grappling with mounting pressure from climatic effects, upstream hydropower development, and *in-situ* impacts of agricultural development policies. This paper critically examines how these interwoven challenges are empirically understood through the lenses of ecological grief and livelihood precarity, as grounded in rural communities' place-based adaptation. Drawing on empirical data gathered from thirty-seven in-depth interviews with government officials, environmental experts, and senior farmers, together with twelve focus group discussions with local farmers and government officials, we argue that the disrupting agroecosystems in the Mekong floodplains are closely linked to the coupled outcomes of place-based adaptation characterised by state-led agricultural development policies (e.g. dykes) and rural communities' exploitation of local agroecosystems (e.g. soil and fish) to support their livelihoods. The findings reveal how the place-based adaptation practices embrace the myriad aspects of maladaptation, placing more hardship on rural communities. This paper foregrounds the overlooked nature of place-based adaptation and its relevance to livelihood precarity in the Mekong floodplains, where the rural communities are seen as both victims and agents of their own actions. Navigating these challenges suggests exigencies for just transitions that help promote community-based recognition of local agroecosystem values while reinforcing their moral and legal accountability for ecological stewardship to secure livelihood sustainability.

Keyword: Adaptation; Ecological grief; Just transitions; Livelihood precarity; Vietnamese Mekong Delta



ENV0106-0005

Integrated Hydrological and Hydraulic Modeling of an Extreme Flood Event in the Lower Mekong Basin

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Abstract

The Lower Mekong Basin (Thailand, Lao PDR, Cambodia, Myanmar, and Vietnam) is highly vulnerable to flooding, particularly from tropical cyclones. In July 2017, tropical cyclone SONCA triggered severe flooding in low-lying areas of northeastern Thailand and Laos. This study investigates the SONCA-induced flood event under existing land cover conditions using an integrated modeling approach. The Soil and Water Assessment Tool (SWAT) was applied for hydrological simulation, while the Hydrologic Engineering Center's River Analysis System (HEC–RAS) was employed for hydraulic modeling. Model results demonstrated reasonable agreement with observed flood dynamics, providing a reliable baseline for future analyses of land cover scenarios and supporting the development of effective flood mitigation strategies.

Keyword: Tropical Cyclone–induced Flood; Hydrological model; SWAT; Hydraulic model HEC–RAS; Flood mitigation; Land cover change

ENV0106-0006

Carbon Footprint Assessment of Koh Sichang Sub-District Municipality, Chonburi Province

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Abstract

Carbon footprint assessment is critical for identifying greenhouse gas (GHG) emission sources and guiding low-carbon strategies. This study evaluated GHG emissions in 2023 for Koh Sichang sub-district municipality, Chonburi province, Thailand a small island with a unique profile shaped by water-borne transportation and tourism. Global Protocol for Community-scale greenhouse gas emission inventories (GPC) was applied to calculate emissions from stationary energy, transportation, waste, and Agriculture, Forestry and Other Land Use (AFOLU) sectors. Activity data were obtained from municipal records, utility providers, waste management operators, and field surveys. Results revealed that total emissions amounted to 98,382 tCO_2e, with transportation being the dominant source (51.3%), primarily due to water-borne transportation activity. Stationary energy contributed 39.2%, mainly from electricity generation, followed by waste (9.5%). AFOLU made only a minor contribution. Consequently, these results can serve as a baseline for municipal climate action planning and may inform broader mitigation approaches for similar island or coastal communities, highlighting the urgent need for decarbonizing marine transport and strengthening local waste and wastewater systems. Recommendations include promoting clean marine fuels, increasing renewable energy uptake, improving waste segregation, and enhancing local data systems for future emissions tracking and policy support.

Keyword: City carbon footprint; GPC methodology; Koh Sichang sub-district municipality; Low carbon city

ENV0106-0008

Effect of Tidal Frequency on Soil Carbon Storage in the Mangrove Forest at The King's Royally Initiated Laem Phak Bia Environmental Research and Development Project, Thailand

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Abstract

Tide is a crucial parameter to control soil carbon storage in mangrove ecosystems by influencing both the quantity and stability of stored carbon. This study investigated the effect of tidal frequency on mangrove soil carbon storage and its physicochemical properties along tidal gradients. The study area was conducted at two sites, including an experimental site and reference site, in mangrove forests at the King's Royally Initiated Laem Phak Bia Environmental Research and Development Project (LERD). Each site was divided into three zones by monthly tidal frequency (< 18, 18 – 25, 25 – 30 days). Total potential for soil carbon storage at a depth of 0 – 100 cm was 38.63 ± 5.28 and 45.07 ± 9.20 t C ha^{-1} in the experimental and reference sites, respectively. Both sites showed decreased in soil carbon storage from landward to seaward and with depth ($p < 0.05$). Soil carbon storage correlated positively with salinity and clay, and negatively with pH and total phosphorus. Although nutrient enrichment, higher tidal frequency reduced in situ storage. Results indicate that tidal frequency and texture influence the spatial variation of mangrove soil carbon at LERD. Management should prioritize hydrological zoning to conserve mangrove blue carbon in the context of Thailand.

Keyword: Mangrove; Soil carbon storage; Soil physicochemical properties; Tidal frequency

ENV0106-0010

Determination of Methane Emissions from Eutrophic Reservoir

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Abstract

Methane emissions determination has been hampered by the high analysis cost and inconsistent methodological approach. In the current study, the observed BOD data and the emission factors based on the Intergovernmental Panel on Climate Change (IPCC) guidelines were applied for estimating methane emissions from eutrophic reservoir, Bueng Kaen Nakhon, Khon Kaen Province, Thailand. Water collections were conducted twice during the dry season, with eight sampling points in the littoral zones throughout the reservoir. Measurement of water quality emphasizes organic content, eutrophication evaluation, and relevant parameters. There was no significant difference in all measured variables between the first and second samplings ($p > 0.05$) except pH and TP ($p < 0.05$). It depicted the violent eutrophication phenomenon at a hypertrophic level. Determination based on IPCC guidelines showed the calculated methane emissions from the reservoir of 0.050 ± 0.015 and 0.049 ± 0.011 kg/m^3/month, obtained for the first and second sampling. Meanwhile, the estimated methane emissions of 250,651.80 - 274,523.40 kg/season, which were equivalent to 7,018.25 - 7,686.66 tons CO_{2e}/season, were projected with respect to the increase in the organic content of the reservoir between 5-15%. Therefore, the practical and economic determination of methane emissions, according to IPCC guidelines, was suggested for the worst-case scenario evaluation in the eutrophic reservoir.

Keyword: Methane emissions; Eutrophication; Nutrients; Eutrophic reservoir

ABSTRACTS
Session II : Circular Economy and ESG

ENV0201-0001

Vermicompost Application as a Bio-Circular Solutions for Saline Soil Rehabilitation Sustainable Chili Production

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Abstract

Soil salinization threatens agricultural sustainability in Southeast Asia, requiring innovative bio-circular-green (BCG) solutions. This study evaluated vermicompost as a circular economy approach for rehabilitating saline soils while maintaining chili (Capsicum annuum L.) productivity. The experiments were conducted by using vermicompost applications (0-1,000 g/plant) across salinity levels: low (0-4 dS/m), moderate (> 4-8 dS/m), and high (> 8-16 dS/m). Results demonstrated that 1,000 g/plant vermicompost significantly improved saline soil properties, reducing pH from 7.36 to 7.07 and optimizing nutrient availability. Root development increased by 993.85% in low-salinity conditions, enabling successful cultivation in moderate-salinity soils where untreated plants failed within 58 days. This bio-circular approach transforms organic waste materials into valuable soil amendments provide a practical solutions for climate-resilient agriculture in saline-affected regions. The study demonstrates how circular economy principles can address environmental challenges while supporting food security, offering scalable BCG economy models for sustainable agricultural development.

Keyword: Bio-Circular Solutions; Saline Soil Rehabilitation; Vermicompost; Chili

ENV0201-0002

Evaluating Bio-based Carbon in Single-use Plastic Cups in Thailand Using Radiocarbon Analysis

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Abstract

In response to the fast-paced and convenience-oriented lifestyle of modern society, there has been a significant increase in the use of single-use plastic packaging. Health-related concerns, along with shifting consumer behaviors, have contributed to the increasing use of single-use plastic cups for freshly prepared beverages. Their portability and ease of handling make them especially popular among on-the-go consumers seeking fast and convenient service. However, these containers are quickly discarded, contributing significantly to short-lived plastic waste. This study aims to assess the bio-based content of plastic cups in the Thai market by employing carbon-14 (^{14}C) analysis via Liquid Scintillation Counting (LSC) in accordance with ASTM D6866 standard protocol. A selection of commercially available samples was analyzed without reference to brand names to determine the proportion of renewable carbon in each material. The findings reveal that most cups tested contain bio-based carbon in the range between 0% to 15%. It is important to note that a product being fully biodegradable does not necessarily indicate that it is composed entirely of bio-based carbon. In this study, some of environmentally friendly cups exhibited less than 25% bio-based content. These results underscore the importance of scientific verification to ensure that product claims align with actual material composition. Radiocarbon analysis offers a robust, transparent method for confirming renewable content, which supports sustainable material choices and aligns with Thailand's Bio-Circular-Green (BCG) economy strategy, as well as the United Nations Sustainable Development Goals (SDGs), particularly Goals 12 and 13.

Keyword: Single-use plastics; Bio-based content; Carbon-14 analysis; Sustainability; Thailand

ENV0202-0003

Reducing Zinc Contamination in Bioponic Lettuce with MIL-88A: Impacts on Plant Yield and Microbial Dynamics

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Abstract

In bioponic systems, organic waste, as a nutrient-rich substrate, can be contaminated by organically-bound heavy metals such as copper and zinc. This study investigated the use of MIL-88A (Materials of Institut Lavoisier-88A), a type of iron-based metal-organic framework (MOF), to oxidize organic compounds and remove heavy metals within a bioponic system. The primary objective was to determine the optimal quantity of MIL-88A for cultivating Romaine lettuce *(Lactuca sativa* L. Var. *longifolia*) in a bioponic setup. Two conditions of organic fertilizer were tested: low chemical oxygen demand (COD) vermicompost leachate and high COD vermicompost leachate supplemented with bio-fermented water. MIL-88A was added to these fertilizers at concentrations of 2, 5, and 8 g/L, with pure organic fertilizer serving as a control. The MIL-88A-treated fertilizers were activated by aeration before being added weekly to a recirculating bioponic tank. Results showed that the concentrations of phosphate, total phosphorus (TP), and total nitrogen (TN) in the system decreased with the addition of MIL-88A. Post-harvest analysis revealed that plant weight in the bioponic system with the highest MIL-88A concentration (8 g/L of fertilizer) was significantly lower than in other systems. Conversely, zinc content in plant samples significantly decreased after MIL-88A addition. Despite MIL-88A being iron-synthesized, the hazardous risk index in the plants remained acceptable (below 1). Furthermore, the rhizomicrobial communities on plant roots exhibited significant differences ($p \leq 0.05$) with varying MIL-88A concentrations. Notably, by 16S rRNA gene sequencing, genera such as *Rhodobacter*, involved in iron homeostasis, showed significant changes. Therefore, MIL-88A demonstrates potential for application in bioponic systems to reduce zinc accumulation in plants. However, excessive MIL-88A may negatively impact plant weight due to oxidative stress.

Keyword: Bioponics; MIL-88A; Heavy metal removal; Microbial community; Zinc accumulation

ENV0202-0006

Informal Sector Integration for Safer and Inclusive Portable Battery Waste Management in Thailand

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Abstract

Informal collectors (Salengs), junkshops, and community dismantlers play a pivotal role in Thailand's portable battery waste management, handling an estimated 90% of discarded batteries. While these actors significantly contribute to resource recovery, their operations are largely unregulated, posing environmental, health, and traceability risks. This study examined the activities, challenges, and prospects for integrating the informal sector into a circular battery economy. Through interviews, field observations, and stakeholder consultations, the roles of Salengs, junkshops, and dealers were analyzed in the collection, dismantling, and trade of portable batteries. The results indicate that informal networks are effective in recovering valuable components but operate with limited safety measures, which can lead to exposure of workers and communities to hazardous substances such as lead, cadmium, and lithium. Traceability gaps from social-media-driven trading and unregulated black mass exports hinder recycling targets and environmental safeguards. Despite these risks, integrating the informal sector into formal systems in Thailand may increase collection rates. A hybrid approach is proposed that involves legal recognition through licensing, implementing targeted training and certification programs, launching community sorting hubs, and adapting existing social media platforms as digital traceability tools. Integrating the informal sector could support environmental safety and achievement of circular economy goals in portable battery waste management in Thailand.

Keyword: Portable battery waste; Informal sector; Circular economy; Thailand

ENV0202-0007

A Systematic Review of Sustainability Assessment Methodologies, Indicators, and Decision-Making Tools for Municipal Solid Waste Management

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Abstract

Municipal solid waste (MSW) is projected to increase continuously, reaching 3.88 billion tonnes by 2050. Inadequate municipal solid waste management (MSWM) causes pollution, human health issues, and climate change, hindering the sustainable development goals. Sustainable MSWM plays an essential role in addressing these issues. Previous studies implementing various sustainability assessment methodologies to evaluate the environmental, social, and economic impacts of MSWM approaches faced various methodological challenges that require future development. This study aimed to conduct a systematic review of sustainability assessment methodologies applied in MSWM worldwide, identifying tools and existing methodological gaps. Relevant articles from four major online database have been identified: Scopus, Web of Science, Science Direct, and PubMed. In total, fifty-eight articles were analyzed to provide an in-depth understanding of the application of sustainability assessment methodologies. The findings indicated that although life cycle sustainability assessment was designed to be the most comprehensive framework, it exhibited gaps related to uncertainty and reliability. Uncertainty arises from indicator weighting and reliance on assumptions, which points to future development in key areas, including methodology, indicators, and stakeholder engagement. This review highlights the critical need for the development of standardized and robust frameworks to reduce uncertainties in comprehensive sustainability assessment.

Keyword: Sustainability assessment methodologies; Sustainability dimensions; Methodological gaps; Municipal solid waste; Systematic review

ENV0202-0008

Development of Biodegradable Films from Durian Rind and Shrimp Shells for Sustainable Packaging Applications

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Abstract

The increasing environmental concern over synthetic plastic waste, particularly from food packaging, has driven the development of biodegradable films derived from biowaste as promising alternatives. This study successfully prepared biodegradable films using Microcrystalline cellulose (MCC) from durian rind (DR) and chitosan from shrimp shells (SS) via solvent casting. The extracted chitosan showed high purity and MCC proved effective as a reinforcing agent. Film produced from chitosan, Chitosan-SS, MCC-Chitosan, and MCC-DR-Chit-SS have smooth surface, and transparent. Mechanical testing revealed that the film MCC-DR-Chit-SS had the highest thickness (0.118 ± 0.007 mm) and lowest coefficient of variation (6.34 %), indicating homogeneity. It also exhibited the highest tensile strength (47.9 MPa), elongation at break (14.5%), and structural morphology analysis in 500x magnification indicating strong compatibility and reinforcement between components. The FTIR showed that the peaks produced in biodegradable plastic films have similar functional groups. Based on thermal analysis, film MCC-Chit, and film MCC-DR-Chit-SS exhibit thermal stability starting to degrade around 150 °C. These findings highlight the potential of biowaste as eco-friendly materials for sustainable packaging solutions.

Keyword: Biodegradable films; Microcrystalline cellulose; Chitosan; Durian rind; Shrimp shells; Sustainable packaging

ENV0202-0009

A Design Review of Black Soldier Fly (BSF) Rearing Systems: From Lab Insights to Farm-Level Applications for Organic Waste Treatment

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Abstract

Global attention to sustainable organic waste treatment, alternative protein production, and anticipated industrial growth has led to advancements in numerous experimental and innovative research studies on Black Soldier Fly (BSF) farming. A vast number of experimental studies have outlined the prospects and limits of BSF-led technology. The geographical distribution of experimental setups has also revealed contextual limitations due to climatic and resource requirements, making it challenging to translate them for real-world diffusion across different geographies. The primary purpose of this paper is to review the experimental research literature conducted in various geographical contexts to determine the design principles of the BSF farming system and to synthesize innovations into farm design essentials for practical implementation. This paper examines controlled and semi-controlled research environments, including spatial and structural configuration, efficiencies and thresholds of rearing conditions, substrate management, and operational parameters, to identify BSF rearing systems and recurring patterns that emerge across different experimental systems. This paper translates pilot-scale studies and laboratory insights into scalable, adaptable, and re-designable solutions to meet the real-world requirements of BSF farming. The findings of this paper focus on developing insights to integrate academic experiments and practical system development, thereby laying the foundation for designing efficient, scalable, and context-sensitive BSF farming models.

Keyword: Black Soldier Fly (BSF); Circular Economy (CE); Design Science Research (DSR); Farming System Design; Municipal Organic Waste Treatment (MOWT); Sustainability

ENV0202-0010

Environmental Performance Comparison of End-of-Life Air Conditioner Management in Thailand and Japan

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Abstract

The amount of e-waste generated worldwide has surpassed 65 billion tons, which has created consequences related to the management and disposal of e-waste. The primary concern regarding air-conditioners is waste management, as these units consist of plastics, metals, hazardous materials, and refrigerants. Improper disposal or leakage of refrigerants poses a significant greenhouse gas threat that accelerates climate change. The end-of-life (EOL) stage is often overlooked in the management of discarded air-conditioners. Therefore, this study focuses on filling the knowledge gap regarding the comparison of EOL management methods and analysing the effectiveness of regulated management methods. This study aims to use material flow analysis (MFA) and life cycle assessment (LCA) in environmental assessment, considering one ton of waste as the functional unit. The environmental assessment results showed global warming as the major hotspot impact category. The results showed the least emission values were obtained for Japan (-6,338.72 kg CO_2 eq), due to improved systems and practices for proper refrigerant and residue management, whereas Thailand had higher emissions (19,297.86 kg CO_2eq), with more than 90% vented refrigerants and the rest from poor disposal practices. The findings validate the need to improve the effectiveness of EOL management practices for air-conditioners, especially the refrigerant management.

Keyword: Waste air-conditioner; Material flow Analysis (MFA); Life cycle assessment (LCA); Environmental impacts; Global warming potential (GWP)

ENV0203-0001

Forecast for Currency Pairs USD/THB using the *Box-Jenkins* Model of ARIMA for Time Series

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Abstract

A reasonable predictability is important element for sustainability of any undertaking. The research objective is to forecast the currency pair USD and THB by developing a model based on Box-Jenkins Model using Autoregression (AR) and Moving Average (MA) of its past values. The rationale is that in spite of volatility, some logical prediction is necessary for better decision making in business. The forecast is based on historical value and avoids all other influencing factors. A sample of seventeen-month data of exchange rate from 2024-2025 retrieved from Bank of Thailand database. The model was developed by achieving stationary through first differencing to arrive a special case of ARIMA (0,1,0) which was a random walk with drift. The drift value was -0.150176. ADF test, KPSS test, graph plots etc. were used to verify autocorrelation and absence of. Goodness of model was tested using Correlation LM test, Q-Statistic, KPSS and Normality test. Forecast accuracy was compared using RMSE, MAE, MAPE and Theil'U. The forecast shows the future rate drifting downward from current 32.7 to 31.8 on the sixth month of the forecast. This indicates that THB will appreciates in the near future. The variance or confidence band widens progressively indicating uncertainty.

Keyword: Forecast; Appreciation; Auto-correlation; Lag; White Noise

ABSTRACTS
Session III : Pollution

ENV0301-0004

Nutrient Neutralization and Carbon Capture for Canal Water Treatment Through Continuous Cultivation of *Azolla microphylla*

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Abstract

Nowadays, eutrophication, the indicator of high levels of nutrients like nitrogen and phosphorus, presents serious threat to aquatic ecosystem. The present study aimed to assess the factors affecting the neutralization of nutrients in synthetic canal water by free-floating aquatic fern *Azolla microphylla* under varying hydraulic retention times (HRTs) and to investigate the dual potential of the efficiency of *A.microphylla* in neutralization of nutrients and capturing carbon dioxide. Batch experiments were conducted to evaluate the efficiency of neutralizing ammonia nitrogen (NH_3) concentrations of 5 mg/L, 10 mg/L, 15 mg/L and phosphorus (P) concentrations of 0.3 mg/L, 0.5 mg/L, 0.7 mg/L which were simulated for eutrophication conditions. After 72h, the highest efficiency of 100 % NH3 was found in all various concentrations. For P, 100 % removal was observed at 0.3 mg/L and 0.5 mg/L whereas at 0.7 mg/L, the removal efficiency declined slightly to 86 % after 72h. Statistically, it was confirmed that HRT is the key factor influencing neutralization of nutrients by *A.microphylla* and 72h HRT proved to be the most effective. The notable biomass production resulted in carbon sequestration rate of 0.93 g CO2 per g *A.microphylla* (dry weight). The study concludes that *A.microphylla* can serve as a nature-based solution for nutrient neutralization in canal water, supporting circular economy models in water and nutrient management.

Keyword: *Azolla microphylla*; Nutrient neutralization; Hydraulic retention time; Canal water; Carbon sequestration

ENV0303-0004

Application of Thai Probiotic Strains to Improve Water Quality in White Shrimp (*Litopenaeus vannamei*) Aquaculture

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Abstract

Shrimp farmers in Thailand are spread out in the central, eastern and southern regions. Shrimp export was valued of 42.563 billion baht in 2024. Then shrimp feed products, water quality improvement products in shrimp ponds and other products related to shrimp farming gave a relatively high market share. The microbial which is obtained in water quality improvement products are imported from abroad. Probiotics which were isolated in Thailand as *Bacillus subtilis, Bacillus amyloliquefaciens* and *Lactobacillus rhamnosus* were probiotics for animals and could be used in Thailand. These probiotics were tested to improve the water quality in white shrimp ponds with optimization of aeration time in central region. The result showed that nitrate was reduced by 37% compared with the conventional shrimp farming. This method also reduced the energy consumption in aeration by 40% without reducing shrimp production. This effective and eco-friendly in white shrimp aquaculture as above was also reduced cost and greenhouse gas emission from probiotic import and energy reduction.

Keyword: White shrimp aquaculture; Water quality improvement; Probiotics; Energy consumption reduction; Greenhouse gas reduction

ENV0303-0005

Evaluation of Microalgae Electron Activity for Bioelectricity Production

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Abstract

Bio-photovoltaic (BPV) is a sustainable technology for converting wastewater into bioelectricity based on metabolic activity through the photosynthetic processes of microalgae. This research aimed to isolate microalgae capable of treating cassava wastewater and producing bioelectricity. The dye reduction-base electron-transfer activity monitoring (DREAM) assay was applied to screen the electrogenic algal species. In this assay, the electron generation of microalgae cells was assessed by measuring the redox characteristics of the methylene blue reduction coefficient. The results revealed that blue-green algae isolated from a cassava wastewater treatment plant were the dominant electrogenic algal species with the highest redox coefficient of 0.307 ± 0.070. The electrical current during operation with a graphite rod electrode was obtained and conformed to the DREAM assay coefficient with a maximum open voltage circuit potential at 353.1 mV, while the average microalgae cell density was obtained at 10^7 cells/mL. The capability of wastewater treatment revealed that chemical oxygen demand and nitrogen removal efficiency were approximately more than 80%. This study demonstrated the feasibility of a practical alternative for clean and renewable energy.

Keyword: Bio-photovoltaic (BPV); Microalgae; Electron transfer; Open voltage circuit (OVC); Wastewater treatment

ENV0303-0006

Developing electro-Fenton for Grease Trap Wastewater Treatment: Magnetized Biochar Cathode Production and Process Optimization

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Abstract

Grease trap wastewater (GTWW) has become a challenging issue worldwide due to its potential to pollute surface water and damage the aquatic ecosystem. In this study, the electro-Fenton (EF) with magnetized biochar cathode and its particle electrodes was applied to break down long-chain fatty acids (LCFAs) in synthetic GTWW. Jute stick, the high porous agricultural residual, was doped by $FeCl_3$ and $ZnCl_2$ solution to produce magnetized biochar (Zn-Fe-biochar) via pyrolysis. The effects of various Zn-Fe-biochar cathodes, including their use as particle electrodes, as well as the effects of EF process conditions (electrolyte type and operating pH), were investigated for the degradation of palm oil as a representative of LCFA. The results demonstrated that $FeCl_3$ loading significantly influenced LCFAs degradation. Incorporating $ZnCl_2$ further enhanced oil reduction to 57.67%, with an acid value of 10.24 mg KOH/g oil. The effects of electrolyte types, Na_2SO_4 and Na_2HPO_4 (0.1M), were also explored, in which both electrolytes yielded similar oil reductions during EF, though Na_2HPO_4 produced a higher acid value. Acidic pH led to greater oil degradation and acid formation. The EF process broke down palm oil into short-chain fatty acids, including acetic, propionic, and butyric acids, which are potential substrates for biogas or biohydrogen production.

Keyword: Electro-Fenton; Biochar; Cathode; Magnetized; Grease trap wastewater

ENV0303-0007

The Study on Application of Hemp Biomass-Derived Biochar for Dye Treatment in Dawmang Hemp Textile Community in Ban Mae Sa Noi, Chiang Mai Province

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Abstract

Wastewater generated from community-based textile dyeing processes poses significant environmental concerns, particularly in rural and semi-urban areas where effective wastewater treatment systems are often lacking. At the same time, agricultural biomass such as hemp stalks is frequently wasted and underutilized. This study aims to investigate the optimal dosage of biochar derived from hemp biomass for the adsorption of natural dyes, using methylene blue as a model dye to simulate dye-contaminated wastewater commonly found in local textile production. The biochar used in this study was produced from hemp waste sourced from the Dawmang Hemp Textile Community Enterprise in Ban Mae Sa Noi, Chiang Mai Province. It serves as a low-cost and eco-friendly adsorbent. The biochar was produced through slow pyrolysis at a temperature of 700 °C. Characterization results revealed that the biochar had a strong, porous structure with a carbon content of 80.33%. Adsorption experiments were conducted at room temperature and pH 7. The results showed that biochar in the range of 1–5 grams maintained stable adsorption performance, while the 20-gram dosage exhibited the highest dye removal efficiency. Result showed that hemp-derived biochar can serve as an effective, low-cost, adsorbent for treating wastewater contaminated with natural dyes in community settings.

Keyword: Hemp biomass; Biochar; Methylene blue; Adsorption; Community wastewater

ENV0303-0008

Removal of Chromium and Colorant from Synthetic Dyeing Factory Wastewater by Biochar Derived from Water Hyacinth

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Abstract

Water pollution from dyeing industry effluents, particularly due to chromium and synthetic dyes, poses significant environmental and public health risks. This study evaluated the efficiency of water hyacinth-derived biochar (WHB) for removing trivalent chromium (Cr(III)) and acid blue dye from synthetic wastewater through batch adsorption experiments. WHB was produced via slow pyrolysis in an oil drum at 1,000 °C for 45 min. Characterization using BET, FTIR, and XRF showed a surface area of 8.720 m^2/g, pore volume of 0.025 cm^3/g, predominant hydroxyl groups, and major inorganic components including CaO (73.40% w/w) and K_2O (18.40% w/w). WHB achieved 99.95% Cr(III) removal (at 50-mg/L initial concentration) within a 4 h equilibrium time and 79.79% dye removal efficiency (at 100-mg/L initial concentration) within 72 h. Adsorption kinetics followed a pseudo-second-order model, indicating chemical adsorption as the dominant mechanism. Cr(III) reached the equilibrium 18 times faster than the dye, likely due to the dye's higher molecular weight (416.38 g/mol), which may hinder its diffusion and adsorption onto biochar. Overall, WHB produced at high temperature shows favorable physicochemical properties for the effective removal of Cr(III) and acid blue dye. Utilizing water hyacinth for biochar production supports the circular economy and promotes biomass utilization in wastewater treatment.

Keyword: Chromium adsorption; Pyrolysis; Synthetic dye removal; Water hyacinth biochar

ENV0303-0010

Removal of Organic Substances and Nitrogen from Wash Water Using Tender Coconut-Derived Biochar in a Small-Scale Pig Farm

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Abstract

A substantial amount of tender coconut waste is generated from industrial activities in Ratchaburi Province, Thailand. This waste can be converted into biochar via slow pyrolysis and used to remove organic substances and nutrients from pig farm wash water. This study evaluated the performance of biochar-amended soil in treating synthetic pig farm's wash water. Soil column experiments were conducted using 300 g of soil with biochar added at 0%, 0.5%, 1%, and 2% by weight. Synthetic wash water was applied at 60 mL/day, divided into two doses at 10 a.m. and 2 p.m., for 56 days. Leachate was regularly collected and analyzed. The 1% biochar amendment demonstrated the highest nutrient retention and effective removal of organic matter, as indicated by reduced biochemical oxygen demand. This optimal dosage was validated with real pig farm wash water, which showed similar trends. Nitrogen removal was primarily attributed to biodegradation, while elevated potassium and chloride concentrations were observed during the initial phase. Kinetic studies revealed faster leaching of nutrients and organic substances with real wash water compared to synthetic wash water. Overall, 1% biochar-amended soil offers a promising low-cost solution for nutrient retention and organic load reduction in small-scale pig farm wastewater management.

Keyword: Biochar; Pig Fram; Ratchaburi Province; Tender coconut; Waste utilization

ENV0303-0012

Two Site Models Predicted Fate and Transport of Atrazine in Three Distinct Soils under Temperature-Dependent Conditions in Suphan Buri, Thailand

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Abstract

The fate and transport of atrazine were investigated in three distinct agricultural soils (Chantuk (Cu)-loamy sand, Ladya (Ly)-sandy loam, and Doembang (Db)-loam) from Suphan Buri province, Thailand, using HYDRUS-1D coupled with a temperature-dependent two-site sorption model. The column experiments were conducted to characterize bromide and atrazine breakthrough curves under saturated conditions. The two-site sorption model successfully simulated the non-equilibrium transport behavior of atrazine with high coefficients of determination (R^2 = 0.980, 0.914, and 0.963 for Cu, Ly, and Db soils, respectively). The key transport parameters included the adsorption isotherm coefficients, K_d (3.928, 3.391, and 4.566 $cm^3\ g^{-1}$), and fractions of instantaneous sorption sites (0.029, 0.389, and 0.364) for Chantuk (Cu), Ladya sandy (Ly), and Doembang (Db) soils, respectively. The relatively low equilibrium sorption fraction in Cu soil (3%) indicated predominantly kinetic sorption processes, explaining its distinctive breakthrough patterns. The field simulations incorporating local meteorological data and Arrhenius-based temperature dependencies revealed that atrazine predominantly remained within the upper 15 cm across all soils. Interestingly, Cu soil exhibited a higher potential for deeper movement despite its lower clay content, followed by Ly and Db soils. Temperature-dependent effects significantly influenced atrazine behavior, with modest increases in sorption (7–12%) but dramatic increases in degradation rates (867–1067%) as temperatures increased. This temperature-dependent modeling approach provides critical insights into herbicide behavior under tropical agricultural conditions, where high temperatures and seasonal rainfall generate transport dynamics fundamentally different from those in temperate regions.

Keyword: Atrazine transport; HYDRUS-1D; Two-site sorption model; Tropical soils; Temperature-dependent degradation; Breakthrough curves; Non-equilibrium transport; Pesticide leaching; Soil column experiments

ENV0303-0013

Removal Performance of Nitrogen and Emerging Contaminants in Full-Scale Constructed Wetlands: Case study from Thailand Japan, and the USA

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Abstract

Water reclamation can be a promising solution for areas facing water scarcity. However, the reclaimed water must meet high quality standards to protect health and ensure safety for use. In this work, three full-scale wetlands - the Laem Phak Bia Environmental Study and Development Project's wetlands, Phetchaburi Province, Thailand; Fukuoka, Japan; and Tucson, Arizona, United States of America - were studied for bacteria communities involved in the nitrogen cycle and the wetland's treatment performance on chemical pollutant removal including contaminants of emerging concern (CECs).Quantitative polymerase chain reaction (qPCR) was used to quantify anammox bacteria in the sediments and plant roots of the three wetlands. High quantity of anammox bacteria (105 copy/g-sediment and 105 copy/g-wet root) were found in the sediment and plant roots of the Thailand and USA wetlands. Polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE) was used to identify microbial communities of ammonia-oxidizing bacteria (AOB), nitrite-oxidizing bacteria (NOB), denitrifying bacteria (DNB), and other bacteria from sediment and biofilm on plant roots of the Thailand and USA wetlands. The results suggested that biofilm on plant roots might play a crucial role in supporting partial nitritation and the anammox process in the wetlands. Only the USA wetland was investigated for concentrations of the following: CECs:perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorohexanoic acid (PFHxA), perfluorohexane sulfonic acid (PFHxS), and perfluorobutanesulfonic acid (PFBS). They were detected in the influent and effluent of the wetland, but their concentrations were below the U.S. guideline levels. The findings showed that the Thailand and USA wetlands removed nitrogen pollutants efficiently in the low biochemical oxygen demand (BOD) condition. Therefore, they can be effectively used to treat wastewater with low BOD but high nitrogen content. Overall, the treated effluent from these wetlands appears suitable for water reclamation.

Keyword: Treated effluent; wetland; Thailand; Japan; USA

ENV0303-0014

Calcium Foliar Application Enhances Growth and Nitrogen Uptake of *Canna indica* under Simulated Hypoxic Conditions

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Abstract

Constructed wetlands (CWs) are a sustainable approach to wastewater treatment. Most plants in constructed wetlands usually grow under high nutrients and low oxygen levels, or hypoxic conditions, which may affect their growth and nutrient removal efficiency, particularly nitrogen. Calcium foliar applications have been widely used in agriculture to improve yield and plant nutrition. A suitable calcium foliar spray will improve plant growth and plant nitrogen uptake. However, limited research focused on its effects on wetland plants has been conducted. This study, therefore, assessed the effects of calcium foliar spray on growth and nitrogen uptake on *Canna indica* L. grown under low oxygen levels. *Canna indica* (n=5) were grown with a modified nutrient solution (Smart and Barko, 1985) under hypoxic conditions (the approximate dissolved oxygen level was 1.5 mg L^{-1}). Each plant was sprayed with 15 ml of different concentrations of $CaCO_3$ (0, 2.5, 5.0, and 10.0 mM) every 7 days for a total of 91 days and the nutrient solution was renewed every week. The results showed that the plants supplied with 10.0 mM $CaCO_3$ foliar spray had the highest total biomass (9.8 g DM). The increase of biomass production promoted nitrate uptake rates by 19% and ammonium uptake rates by 46%. Moreover, the plants supplied with 10.0 mM $CaCO_3$ foliar spray showed an improved root dry mass and lateral root density, which can release oxygen and improve dissolved oxygen in the nutrient solution by 38%. These findings suggest that the application of 10.0 mM $CaCO_3$ foliar spray on plants can improve plant growth and nitrogen removal efficiency, especially nitrate. The application of calcium foliar spray might be a cost-effective practice in constructed wetlands to improve treatment efficiency, particularly in the constructed wetlands that received high loading of nitrogen.

Keyword: Calcium foliar application; Canna indica L.; constructed wetlands; nitrogen removal.

ENV0303-0015

Effect of Plant Presence and Species on the tTreatment of Freshwater Aquaculture Effluent in Constructed Wetland

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Abstract

Freshwater aquaculture has expanded due to food security. Constructed wetland offers a naturally acceptable and technically sustainable solution; however, there exist data gap on treatment of freshwater aquaculture effluent by *Canna austria* (C), *Typha angustifolia* (T) and not (U) planted constructed wetlands. The objective of this work was to elucidate effect of plant presence and species on removal of ammoniacal nitrogen (AN), orthophosphate (OP), biochemical oxygen demand (BOD), chemical oxygen demand (COD) and total suspended solids (TSS). Three outdoor constructed wetlands were set up, acclimatised 120 days and experimented 180 days. Hydraulic retention time was five days, and all water analyses were performed using standard methods. Removals of AN, OP and COD were highly significant ($p \leq 0.001$) with plant presence although not significant ($p > 0.05$) in BOD and TSS removals. Highest AN (98.63%), OP (98.47%) and COD (98.89%) removals was observed in C; nonetheless not significantly ($p > 0.05$) better than T. Both C and T have similar BOD removal (99.74%). Although not significantly different ($p > 0.05$), T (98.21%) has higher TSS removal than C (98.11%). Thus, plant presence is important and *Canna austria* (flowering) can replace *Typha angustifolia* (conventional) plant without sacrificing removal performance.

Keyword: Plant presence; Species; Treatment; Freshwater aquaculture effluent; Constructed wetland

ENV0304-0001

Assessment of Heavy Metal Levels in the Freshwater Resources of Island Communities in Surigao City, Philippines

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Abstract

Heavy metal contamination poses a significant threat to aquatic ecosystem, particularly in island communities affected by mining activities. This study assessed the concentrations of Pb, Ni, and Hg in freshwater resources, aquatic vertebrates (*Gerres* sp. and *Puntius* sp.), and selected aquatic macrophytes (*Ipomoea aquatica* and *Pandanus* sp.) in the Island communities of Surigao City, Philippines. Results showed that while the concentrations of the assessed metals in the freshwater resources generally remained within permissible limits, bioaccumulation in fish muscle exceeded the European Food Safety Authority threshold for Pb in Alang-alang (1.07 mg/kg) and Cantiasay (0.538 mg/kg), and Ni in Talisay (1.835 mg/kg). Hg levels were consistently low in all samples. *Pandanus* sp. exhibited significant Ni accumulation, especially in Nonoc Stream (238 mg/kg). This is potentially influenced by natural geological processes and historical as well as current land use activities. The ability of *Pandanus* sp. to accumulate Ni indicates its suitability for phytoremediation. These findings emphasize the need for continuous environmental monitoring, policy interventions, and remediation measures to mitigate heavy metal contamination in mining-affected freshwater ecosystems.

Keyword: Bioaccumulation; Freshwater pollution; Nonoc Island; *Pandanus* sp.; Phytoremediation

ENV0304-0002

Improved Determination of Small Microplastics in the Municipal Solid Waste Leachate

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Abstract

Small microplastic (< 100 μm) determination in the leachate is the great challenges imposed by limitation of effective methods to detect such smaller sizes. In this study, optimized conditions of the commonly used method that can detect small microplastics were developed. Leachate sample collected at the landfill site in Chonburi Province was filtered through stainless-steel sieves with different mesh sizes. To illustrate optimized digestion and separation, varied volume ratios of 30% H_2O_2 and samples were mixed, followed by testing with different salts. Our test shows that the digestion with 15% concentration of H_2O_2 at temperature of 45 ± 5 ^oC provides the best performance with no occurrence of white powder which interferes small-microplastic identification. Analysis also reveals remarkable difference in microplastic determination between our modified method and the National Oceanic and Atmospheric Administration (NOAA) method. More than four times of microplastic abundance in the samples could be determined by our modified method. However, the NOAA method was unable to analyze the small microplastics which significantly represent (74%) in the leachate samples. Based on these results, it is reasonable to say that optimization of leachate pretreatment applied in this study succeed in the determination of small microplastics with smallest detected size of 30 μm.

Keyword: Microplastic; Leachate; Optimization; Digestion

ENV0304-0004

Using Organic Amendments to Remediate Cadmium-Contaminated Soils and Boosting Nutrient Content

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Abstract

Heavy metal contamination in agricultural soils poses significant environmental and health risks, particularly from excessive fertilizer use. This study evaluated vermicompost, biochar, and *Azolla microphylla* as soil amendments for cadmium bioremediation. Four treatments were applied to cadmium-contaminated soil (100 mg Cd/kg) over five weeks with three replications. Combined amendments achieved optimal results, reducing total cadmium by 40% and exchangeable cadmium by over 80%, with *A. microphylla* showing particular effectiveness. Statistical analyses revealed strong negative correlations between cadmium levels and soil properties (electrical conductivity, nitrogen, phosphate, potassium, and organic matter), confirmed by PCA. Acute toxicity tests with *Eisenia fetida* earthworms demonstrated 60% survival with continued growth after 120 hours. Results indicate that organic amendments effectively remediate cadmium contamination while enhancing soil fertility, supporting sustainable agricultural management.

Keyword: Soil pollution; remediation; heavy metals; vermicompost; biochar

ENV0304-0007

Association of Temperature Inversions on Vertical $PM_{2.5}$ Distribution in Bangkok During the Dry Season

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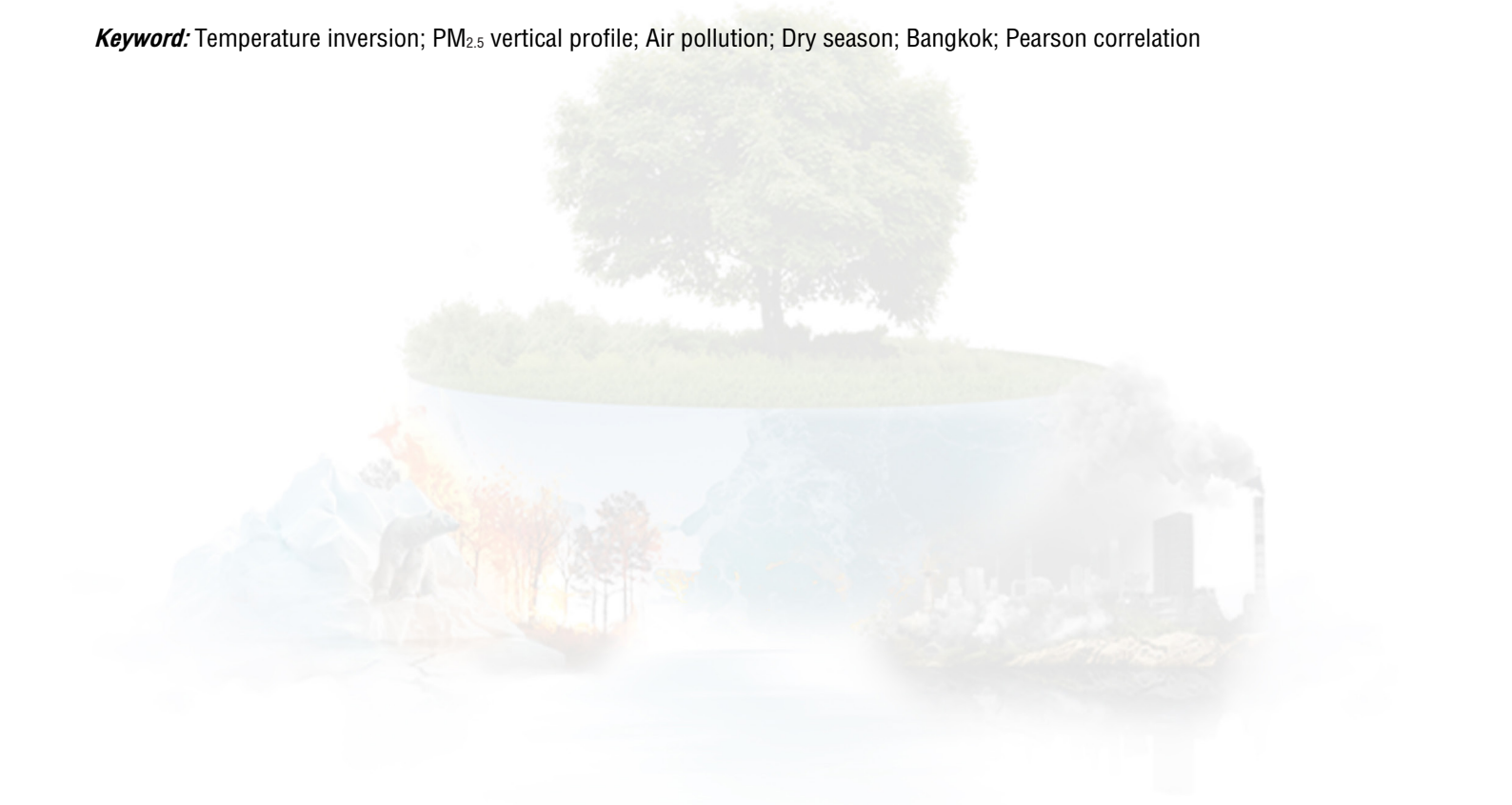
Abstract

The Bangkok metropolitan area experiences recurrent $PM_{2.5}$ pollution events, particularly during the dry season, with observed intensification in both concentration levels and duration in recent years. The temperature inversions significantly modulate vertical air pollution dynamics, particularly during the dry season. This study analyzes the relationship between vertical $PM_{2.5}$ concentration profiles and temperature inversion characteristics from December to March using Pearson correlation coefficients. Results reveal a strong seasonal dependency: January exhibits the highest positive correlations between $PM_{2.5}$ (especially minimum values) and inversion strength ($r > 0.8$), inversion thickness, and frequency of occurrence. Lower inversion base heights and increased inversion occurrence were associated with elevated $PM_{2.5}$ near the surface, indicating effective suppression of vertical mixing. Conversely, March demonstrates weakening inversion effects, with negative or negligible correlations, consistent with increased convective activity and boundary layer development. These findings underscore the role of stable stratification in exacerbating pollution episodes during the cool season and highlight the importance of incorporating inversion forecasts into Bangkok's air quality management and early warning systems. This work contributes to improving urban atmospheric models and guiding health-oriented mitigation strategies under seasonal meteorological constraints.

Keyword: Temperature inversion; $PM_{2.5}$ vertical profile; Air pollution; Dry season; Bangkok; Pearson correlation



ENV0304-0010

Microplastics in the Corals of the Upper Gulf of Thailand

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Abstract

Marine plastics represent a significant portion of the marine debris found along the coast of Thailand. This investigation focused samples collected from several coral species in the coastal area of Khao Ma Jor, which lies under the jurisdiction of the Royal Thai Navy in the Samae San Subdistrict of Chon Buri Province, located in the upper Gulf of Thailand. Despite the area's military oversight, it is primarily recognized for its fishing activities and picturesque scenery that attracts tourists. The influx of visitors, especially during holidays, substantially impacts the local ecosystem. In this study we found a high concentration of microplastics across various coral genera, including *Pocillopora, Acropora, Astreopora, Diploastrea, Favia, Porites, Galaxea, Turbinaria, Echinopora,* and *Favites.* The microplastics detected ranged in size from 0.1 mm to 2.0 mm. Alarmingly, these particles were found embedded deep within the coral polyps, suggesting potential adverse effects on their normal physiological functions. This study investigates the diversity and accumulation of microplastics in corals within this region and examines the correlation between microplastic abundance and coral size.

Keyword: Microplastics; Corals; Gulf of Thailand

ENV0304-0011

Extraction and Application of Cellulose from Water Hyacinth Petioles (*Eichhornia crassipes*) and Pineapple Crown Leaves *(Ananas comosus*) for Bioplastic Production

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Abstract

Plastic pollution remains a pressing issue in Thailand, where only a fraction of the 2 million tonnes of plastic waste generated annually is recycled, leaving much to accumulate in landfills and waterways. At the same time, invasive water hyacinth (*Eichhornia crassipes*) clogs waterways and disrupts ecosystems, while discarded pineapple (*Ananas comosus*) crowns contribute to agricultural waste and environmental degradation. This study extracted cellulose from water hyacinth petioles and pineapple crowns using NaOH and NaOCl treatments, then combined it with cassava starch, chitosan, and glycerol. Two biomass ratios (3:1 and 1:1) were tested under varying drying and refrigeration conditions. The optimal conditions, 2-week drying with a 3:1 ratio, achieved maximum strength (2.91 ± 0.11 N) after 24-hour refrigeration, while 1-hour refrigeration is recommended for improved elasticity. This work demonstrates the potential of converting invasive species and agricultural waste into biodegradable plastics, providing an alternative to conventional plastics. FTIR analysis showed O–H (3356 cm^{-1}), C–H (2938 cm^{-1}), C=O (1641 cm^{-1}), C–O (1017 cm^{-1}), and β-1,4-glycosidic (927 cm^{-1}) confirming cellulose preservation; other peaks verified integration of other components. The lightweight, flexible bioplastic is suitable for single-use applications such as compostable bags, food packaging, and seedling trays. Its structural integrity and functional groups suggest good potential for eco-friendly use. Future work, including water biodegradability testing, will further characterize the environmental performance of these bioplastics.

Keyword: Bioplastic; Cellulose extraction; Water hyacinth *(Eichhornia crassipes*); Pineapple crown (*Ananas comosus*); Agricultural waste

ENV0304-0013

Enhanced Electrochemical Degradation of Per- and Polyfluoroalkyl Substances (PFAS) in Water Using Gold Nanoparticles Electrodeposited on a Boron-doped Diamond (BDD) Electrode

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Abstract

Per- and polyfluoroalkyl substances (PFAS) have significant negative impacts on bodies of water and surrounding ecosystems due to their toxicity, environmental persistence, and resistance to conventional treatment methods. Electrochemical oxidation (EO) is a promising treatment technology for PFAS degradation because of its ability to completely remove PFAS while being environmentally friendly. Boron-doped diamond electrodes (BDDEs) are commonly used as anodes for PFAS treatment due to their high conductivity and excellent electron transfer capability. Nevertheless, their limited surface area has restricted the widespread use of BDDEs. In this study, gold nanoparticles (Au NPs) were electrodeposited on the BDDE to enhance the electrochemical degradation of perfluorooctanoic acid (PFOA), perfluorohexane sulfonate (PFHxS), and perfluorooctane sulfonate (PFOS). The Au-modified BDDE (Au-BDDE) showed significantly improved PFAS removal, particularly in the first hour of treatment, with degradation rates 1.1 to 3.7 times higher than the unmodified BDDE at a current density of 14.1 mA/cm^2. After 5 hours, PFOA removal was highest, with Au-BDDE achieving 83.7% degradation compared to 76.5% for BDDE. PFOS removal slightly increased from 69.8% to 70.1%, while PFHxS removal was greater with unmodified BDDE (71.9%) than Au-BDDE (67.1%). These results indicate competitive interactions among PFAS and limited catalytic activity of Au NPs in the EO system.

Keyword: PFAS; Electrochemical oxidation; Boron-doped diamond; Modified electrode; Gold nanoparticles

ENV0304-0015

Chromosome Abnormalities Assessment of Hybrid Catfish in the Reservoir Contaminated with Heavy Metal from Municipal Landfill

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Abstract

The Khon Kaen municipal landfill in Khon Kaen Province, Thailand, has been operating for over 50 years despite its 20-year design. This overuse has resulted in excessive residual solid waste, posing potential pollution risks to nearby reservoirs. Previous studies have reported elevated levels of heavy metals in water, sediment, and aquatic organisms near the landfill, some exceeding Thailand's quality standards. Heavy metals are persistent pollutants that bioaccumulate and biomagnify, causing toxic effects such as genotoxicity. This study investigated the chromosomal abnormalities (CA) of hybrid catfish (Clarias gariepinus x C. macrocephalus), a widely farmed species known for its tolerance and high meat yield, in the affected reservoir near the landfill compared with those from the unaffected reservoir with no heavy metal contamination from landfill leachate. Kidney tissues were examined using the direct method, revealing eight types of CAs in the fish from the affected reservoir, with deletions being the most frequent. The affected site had significantly higher levels of chromosome abnormalities, with 318 total CAs and 22% of cells showing CAs, compared to 67 and 8.60% at the unaffected site ($p < 0.05$). These findings support the hypothesis that environmental contamination from the landfill leachate, particularly heavy metals, may induce genetic damage in fish species.

Keyword: Catfish; Chromosome abnormality; Heavy metal; Landfill

ABSTRACTS
Session IV : Other Related Topics

ENV0401-0001

Mitigating Urban Heat Island Effects through a Large Urban Oasis of Bangkok: A Google Earth Engine Approach

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Abstract

Bang Kachao is a large green space, renowned as "The Best Urban Oasis of Asia" located in the central plains of Bangkok, Thailand. Land use changes have impacted the urban heat island (UHI) phenomenon. This study applies Google Earth Engine to analyze satellite imagery from Landsat 8, 9, and Sentinel to detect changes in Land Use Land Cover (LULC), Land Surface Temperature (LST), and the Normalized Difference Vegetation Index (NDVI) in the Bang Kachao area over a five-year period (2020-2024). It also examines the relationship between these indices and the occurrence of UHI. The results of the study indicate that, over the five-year period, LST has shown an increasing trend, rising from 33.62 °C to 36.28 °C, with an average annual increase of 0.53 °C. NDVI, on the other hand, has shown a declining trend, decreasing from 0.34 to 0.27. Notably, the implementation of Thailand's tax reduction policy for agricultural land in 2023 has led to a significant shift in land use, from forest restoration areas to agricultural land. Urban planning strategies should focus on increasing green space and enhancing NDVI values in specific areas, ultimately helping to mitigate urban heat islands.

Keyword: Urban green space; Urban heat island; Climate change; Land Use Land Cover

ENV0402-0002

Evaluation of Treated Wastewater Use in Hydroponic System: Nitrogen Transformation, Lettuce Growth and Root Microbial Communities

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Abstract

This study investigated the feasibility of utilizing treated on-site domestic wastewater from the main library of Chulalongkorn University in hydroponic systems for lettuce cultivation to support sustainable water resource management. The experiment was conducted using a hydroponic system to grow green cos lettuce. The study compared a control system (using hydroponic fertilizer) with systems using 50% and 100% treated wastewater. This research examined nutrient dynamics across varying proportions of treated wastewater, as well as impacts on plant growth and microbial community composition in lettuce roots. The results indicated that nitrite and ammonium concentrations were initially elevated in systems receiving 100% and 50% treated wastewater (0.49 ± 0.00 and 0.40 ± 0.01 mg/L for nitrite; 29.72 ± 0.87 and 26.68 ± 2.01 mg/L for ammonium, respectively) but decreased over time. Nitrate concentrations remained stable, with the highest levels observed in the control system (197.38 ± 9.63 mg/L). Total Kjeldahl nitrogen (TKN) was highest in the 100% treated wastewater system (35.71 ± 0.92 mg/L). Lettuce in the control system exhibited significantly greater fresh (46.49 ± 3.45 g) and dry weight (2.61 ± 0.13 g). Microbial community analysis revealed that Sphingomonadales exhibited markedly higher abundance in the treated wastewater group (10.54 – 11.55%). These findings highlight the potential of integrating treated wastewater into hydroponic agriculture to enhance resource efficiency, reduce environmental impact, and promote circular economy practices in water and nutrient management.

Keyword: Treated wastewater; Hydroponic cultivation; Nutrient recycling; Microbial diversity; Sustainable resource management

ENV0402-0003

Potential of GSHP Application under Tropical Climate: A Case Study in Thailand

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Abstract

To mitigate climate change, efficient air conditioning system is necessary to response high cooling demand in tropical countries, such as Thailand. Ground source heat pump (GSHP) is introduced as a promising solution. However, the long-term performance of GSHPs in tropical climates remains uncertain, particularly concerning potential thermal imbalances within operational environments due to the significant cooling loads on buildings. This study aims to report the potential of GSHP operation with vertical ground heat exchanger (GHE) and horizontal GHE under tropical climate in Thailand. Each GSHP was compared with normal air conditioner in term of electricity consumption in the same experimental room. Moreover, subsurface temperature was also on-site monitored because of operation under thermal imbalance condition. For vertical GHE, the underground system consisted mainly of two 50-m-deep drilling wells and pipes with a total length of 170 m and average subsurface temperature of 30 ^{o}C. Bangkok aquifer is also found at the depth of 25 to 50 m utilized as heat exchanger media. For horizontal GHE, the pipe system was installed at the depth of 1.5 to 2 m with two carpet-type heat exchangers and 300 m-HDPE pipes. The result indicated that GSHP with vertical GHE can achieved approximately 30% energy saving. On the basis of the data derived from on-site measurements, the underground temperature seemed to be consistent and lower than the average outside air temperature, over two years with heat transfer through ground water. GSHP with horizontal GHE can also obtain 20 to 35% energy saving without significant subsurface temperature rise. Therefore, GSHP could be considered an environmentally friendly technology, even when used under thermal imbalance conditions. This study could serve as a beneficial case study, and the result could be transferable to other geographical areas in tropical climates.

Keyword: Ground Source Heat Pump (GSHP); Tropical climate; Ground heat exchanger; Thermal imbalance

ENV0404-0002

Green Extraction of Cocoa Butter and Antioxidants by Natural Deep Eutectic Solvent

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Abstract

Recovering bioactive compounds is a valuable food waste management strategy, but conventional organic solvents pose health and environmental risks. Natural Deep Eutectic Solvents (NADES) have gained attention as green solvents, primarily for polar compounds, yet their use in plant oil recovery remains underexplored. This study applied choline chloride: lactic acid (ChCl-Lac) NADES to purple cocoa bean (PCB) waste to simultaneously recover cocoa butter and antioxidants. PCB was treated with ChCl-Lac (1:2 molar ratio) in a 1:5 (w/w) solid-to-liquid ratio at 80 °C and 140 rpm shaking for 1 h, followed by centrifuging. Compared to total oil recovered by n-hexane, NADES treatment recovered 64.37% of oil, superior to acidic water (19.62%) and ethanol (52.07%) yet lower than screw press (72.72%). The NADES extract revealed promising total phenolic content of 115.94 mg GAE/g DW and DPPH radical scavenging activity of 31.80 mg Trolox/g DW. Although NADES is a polar solvent typically suited for antioxidant extraction, it also demonstrated promising oil extraction yield. This is attributed to its ability to dissolve lignocellulose, disrupting the plant cell wall and enhancing oil release. The dual recovery of oil and antioxidants via a single NADES extraction process offers an integrated valorisation strategy for agro-industrial waste.

Keyword: Natural Deep Eutectic Solvent; Cocoa butter; Antioxidant; Purple cocoa bean

ENV0406-0001

Rediscovering Challenges in Nigeria's Social Housing System: Identifying Archetypes Towards Just Transition

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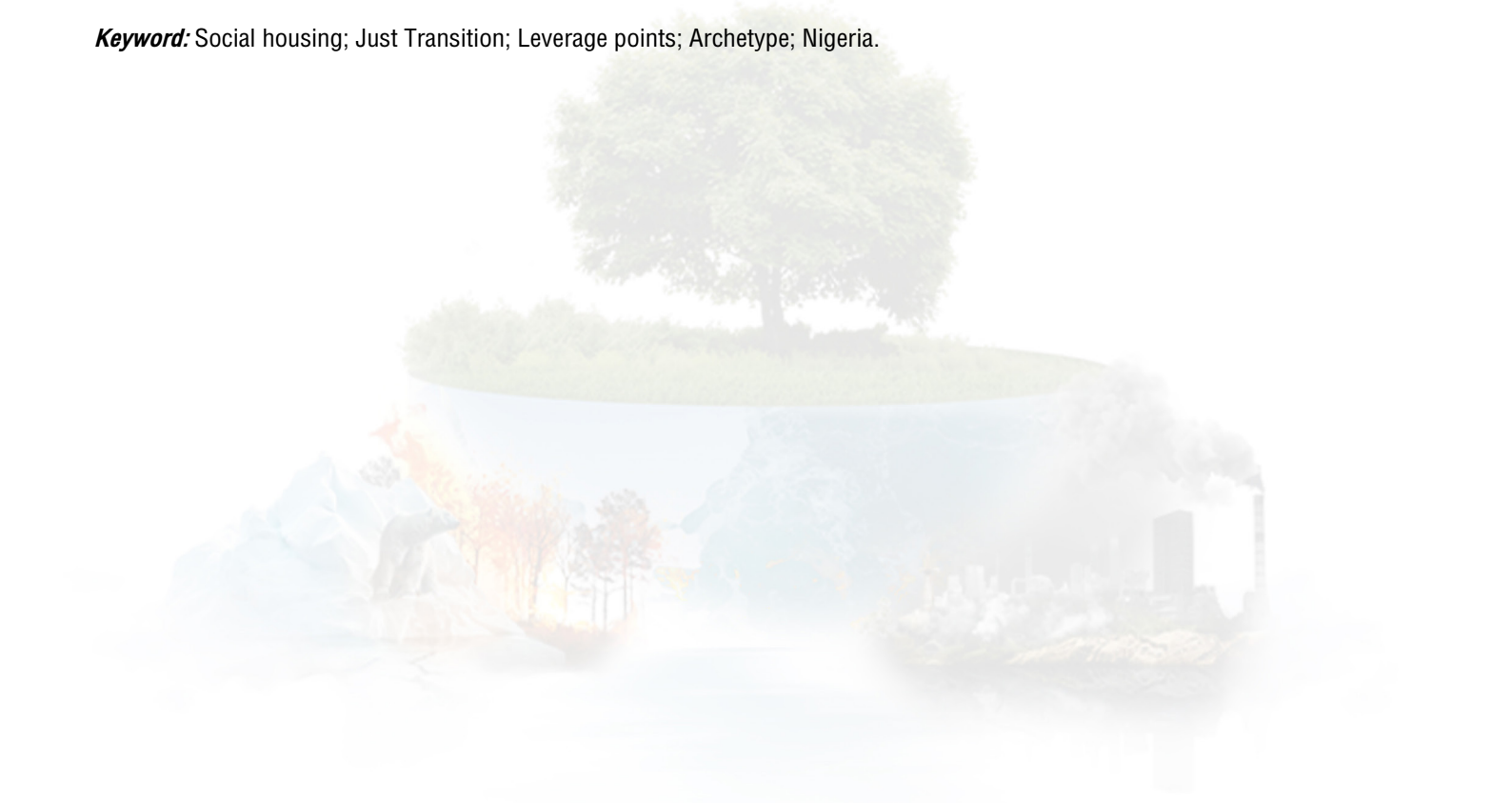
Abstract

Nigeria faces interconnected challenges in providing social housing due to growing urbanization and a shortfall of 28 million housing units. This study examines these challenges through a systems thinking approach. Data were gathered from a literature review of scholarly sources (Google Scholar, Web of Science, and Scopus), covering both colonial and current contexts, along with six expert-recommended policy documents, grey literature, and a systematic review. These sources were selected for their policy relevance and data richness to develop causal loop diagrams, a tool for visualizing systemic feedback loops used to understand cause-and-effect relationships in Nigeria's housing sector. Four systemic patterns emerged: "growth and underinvestment," "shifting the burden," "fixes that fail," and "limits to success." These patterns show how increasing urbanization, limited financial resources, and inadequate infrastructure worsen inequality, accelerate slum growth, and undermine policy effectiveness. Based on this analysis, six leverage points are suggested: participatory governance frameworks, targeted financing mechanisms, mortgage accessibility, subsidy programs, improved infrastructure development, and land titling. The novelty of this study lies in applying systems thinking to address persistent housing policy issues, challenging the traditional approach of frequent policy revisions, and offering an alternative method. It also equips policymakers with tools to transform the entire system.

Keyword: Social housing; Just Transition; Leverage points; Archetype; Nigeria.



ENV0409-0001

Spider Webs: The Potential to be Environmental Monitoring Tool

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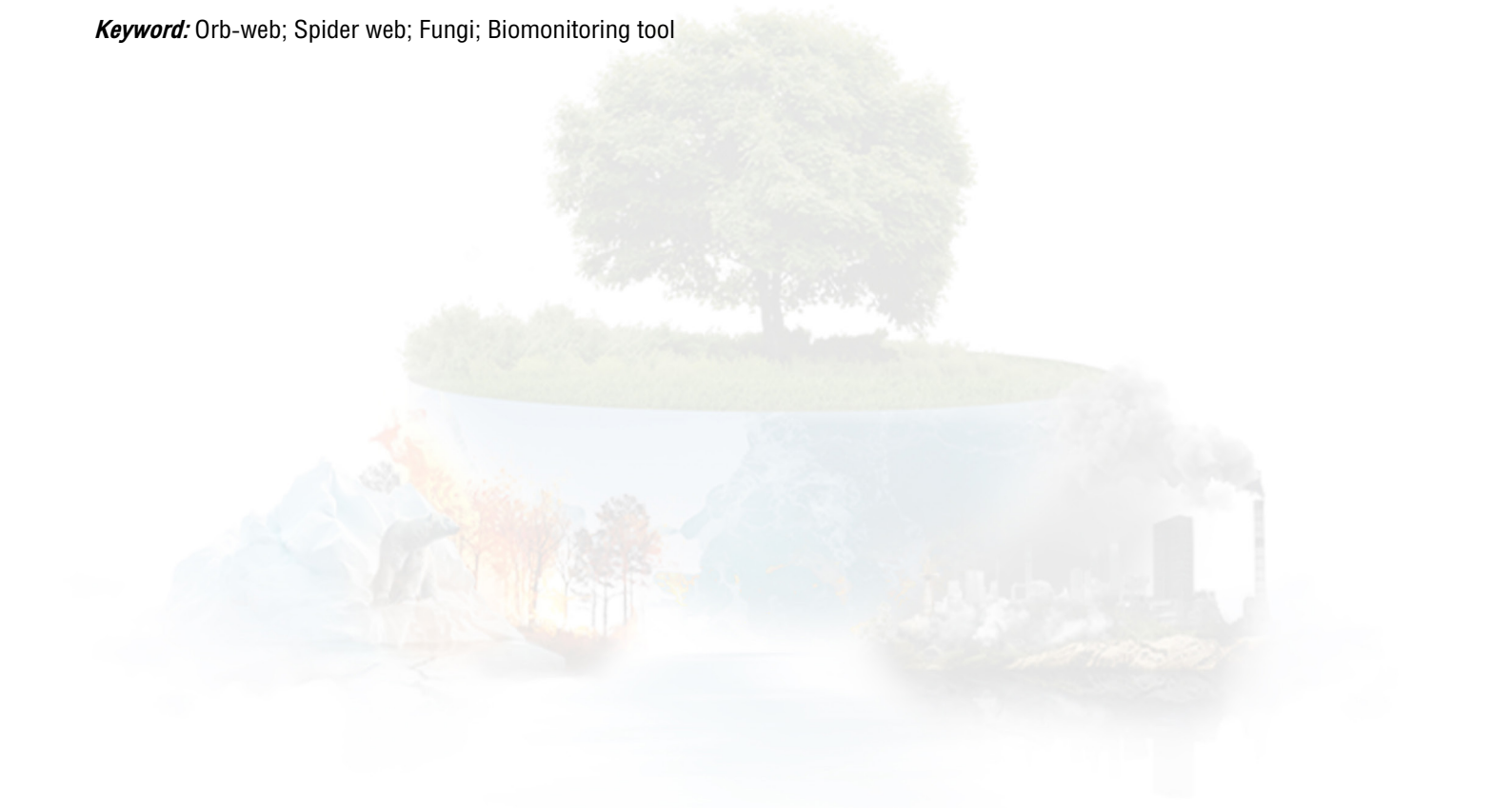
Abstract

Spider webs can be used as a low-cost and accessible method for environmental monitoring, particularly for air quality. This is due to the unique properties of spider silk, which is coated with sticky compounds that enhance its ability to capture airborne matter. This study was to preliminary investigate microbial species associated with the webs of *Cyclosa mulmeinensis* (Thorell, 1887), a trashline orb-weaving spider known for constructing permanent webs. Spider webs were collected from habitats comprising trees and vegetation close to the rice field embankment in Phetchaburi, Pathum Thani, and Nakhon Nayok provinces, Thailand. Fungal isolates were obtained from the webs using the dilution-spread plate method, and species identification was performed through phylogenetic analysis based on multiple gene regions. Six fungal genera were identified, including 1 isolate of *Alternaria longissima,* 3 species from 5 isolates of *Aspergillus,* 11 species from 43 isolates of *Cladosporium,* 1 isolate of *Fusarium equiseti*, 4 species from 5 isolates *Talaromyces,* and 1 isolate of *Quambalaria* sp. To discover the fungi inhabiting the webs with a clue of differences in fungal communities highlighted the potential of spider webs as an environmental monitoring tool, especially through detecting microorganisms.

Keyword: Orb-web; Spider web; Fungi; Biomonitoring tool



ENV0409-0002

Coastal Ecosystem Influence on Phytoremediation of Water Quality: Case Study of the Bangpakong River Estuary

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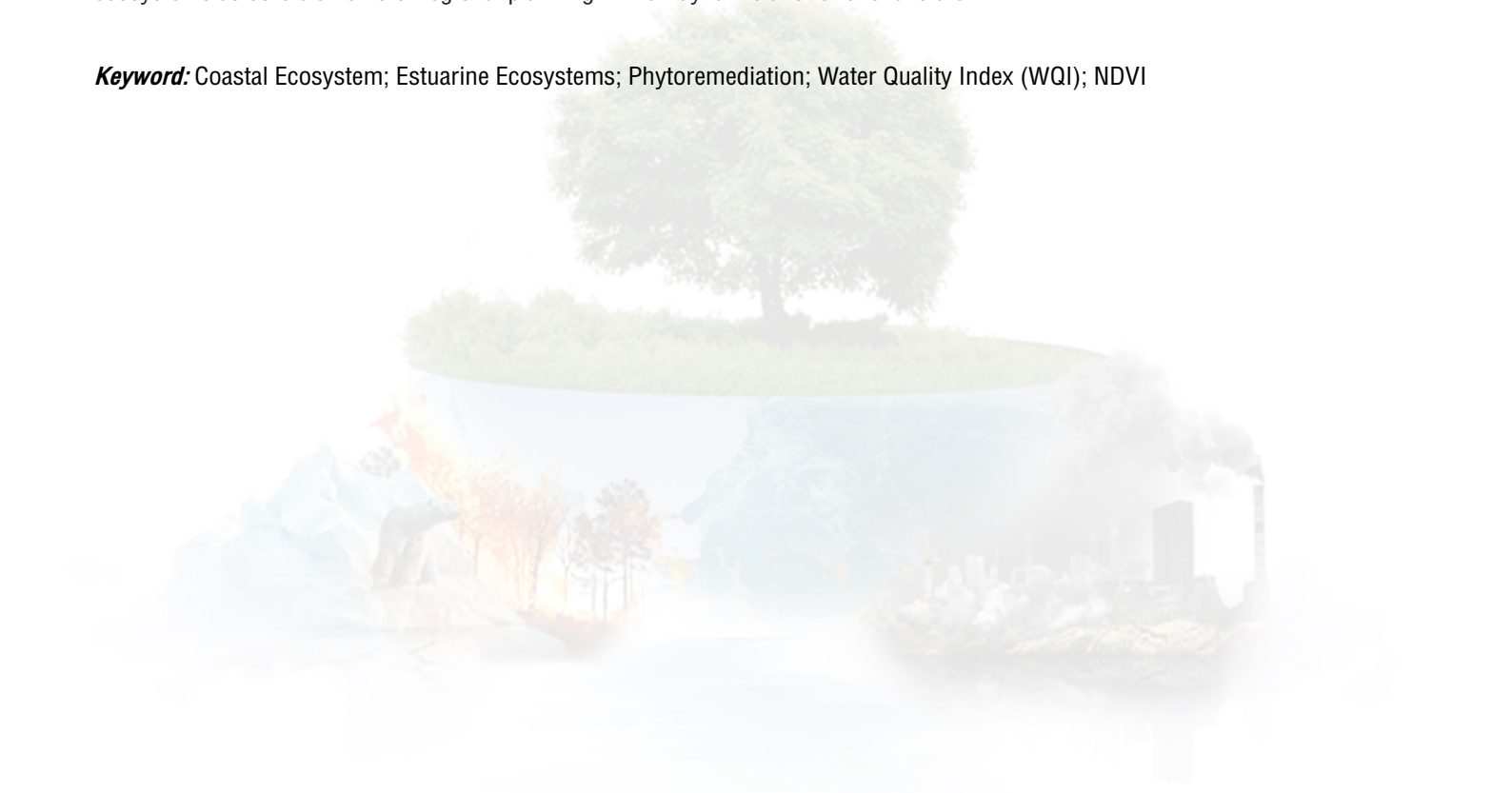
Abstract

The Bangpakong River Estuary in Thailand is a coastal ecosystem that provides vital services, including natural phytoremediation processes supporting water quality. However, ongoing anthropogenic pressures have disrupted ecological dynamics, triggered pollution, and accelerated degradation. This study investigates how coastal ecosystems influence water quality through phytoremediation across upstream to downstream zones. Water sampling was conducted at nine locations over three time periods, testing Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform Bacteria (TCB), Fecal Coliform Bacteria (FCB), and Ammonia (NH_3) using the Water Quality Index (WQI) from Thailand's Pollution Control Department. Land use and Normalized Difference Vegetation Index (NDVI) data from satellite imagery were used to classify land into ecosystem service areas, anthropogenic farming, and urban development. GIS shapefiles from the Land Development Department supported interpretation of land use change and vegetation cover. Most sampling sites fell into the 'poor' (31–61/100) to 'very poor' (0–30/100) WQI range, primarily due to serious concerns with BOD and NH_3 levels, which were strongly associated with upstream flow controls and land conversion. In contrast, areas with greater natural ecosystem cover showed improved phytoremediation performance. Findings support integrating Nature-Based Solutions (NbS) into estuarine governance by prioritizing natural rewilding, hydrological recovery, and ecosystem-led purification, positioning coastal ecosystems as core elements of regional planning in their dynamic and functional state.

Keyword: Coastal Ecosystem; Estuarine Ecosystems; Phytoremediation; Water Quality Index (WQI); NDVI



ENV0409-0003

Adsorptive Removal of Fluoride from Water Using Composite Adsorbents Derived from Water Treatment Residues

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Abstract

Excessive fluoride concentration in drinking water is considered as a contaminant that can cause dental fluorosis and bone deformities. In this study, spent sand filters and water treatment sludge was repurposed as raw materials forming composite adsorbents for fluoride removal from synthetic water in batch experiment. Mixture of spent sand filters and water treatment sludge were blended with bentonite in ratio of 3 :2 :1 and formed in 1 cm diameter of spherical shape. Then, composite adsorbents were dried in 103 ± 2 °C and ignited in 550 °C before adsorption experiments. This study aimed to study the optimum conditions such as contact time (0-120 min.), adsorbent dose (2.5-10 g.), pH (3-9), initial concentration (0.5-1.1 mg/L) for fluoride removal and to investigate the isotherms and adsorption kinetics of fluoride. The results showed that the optimum conditions for fluoride removal were contact time of 30 min., adsorbent dosage of 7.5 g., pH 3, and initial fluoride concentration of 0.5 mg/L, achieving a removal efficiency of 67.44%. The adsorption isotherms well fitted with Langmuir isotherm model. According to the kinetics analysis, pseudo-first-order model best describes the adsorption process with reaction rate constant (k) of 0.0496 min^{-1}. Application composite adsorbents derived from water treatment residues has great potential to eliminate fluoride from water.

Keyword: Fluoride removal; Adsorption; Composite adsorbent; Water Treatment Residues

ENV0409-0004

Reptile Diversity in Human Modified Habitats: Case Study of Suranaree University of Technology Campus

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Abstract

Reptiles are vital components of terrestrial ecosystems, functioning as both predators and prey while serving as indicators of environmental change. This study evaluated the species diversity and distribution of reptiles across five habitat types on the Suranaree University of Technology campus in Nakhon Ratchasima Province, Thailand. From March to December 2024, field surveys were conducted using visual encounter methods, recording 2,917 individual detections representing 33 species. Species richness was highest in human-disturbed forests (22 species), followed by around buildings (18), plantations (16), reservoirs (16), and agricultural areas (12), respectively. The human-disturbed forest also recorded the highest species diversity (Shannon-Wiener index H' = 2.75) and eveness (Pielou's J' = 0.82). Despite lower diversity, around buildings supported the highest reptile abundance (954 detections), particularly synanthropic species such as *Hemidactylus frenatus* and *Dixonius siamensis*. Several species of conservation concern were documented, including *Cuora cuora kamaroma* (Endangered), *Python bivittatus* and *Naja siamensis* (Vulnerable), and *Ptyas korros* (Near threatened). These findings highlight the ecological value of mixed-use urban landscapes and support the need for integrative biodiversity conservation strategies within institutional settings.

Keyword: Biodiversity; Conservation; Herpetofauna; Reptile

ENV0409-0005

Conservation, Caste/ethnicity, and Livelihoods: A Political Ecology of Buffer Zone Governance in Langtang National Park, Nepal

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Abstract

Langtang National Park (LNP), located in Nepal's central Himalayan region, presents a dynamic context where conservation goals intersect with the livelihoods of ethnically diverse communities. This study explores how ethnicity shapes perceptions of conservation policies and access to livelihood assets within the park's buffer zones, a region characterized by longstanding social stratification and unequal resource governance. The research adopts a mixed-methods methodology, consisting of 397 household surveys, 23 in-depth interviews, and 4 Focus Group Discussion (FGDs), to assess experiences among Indigenous, Brahmin, and Dalit populations. Quantitative findings reveal statistically significant differences in perception of conservation policies and access to key livelihood assets. Indigenous communities consistently expressed stronger alignment with conservation narratives, while Brahmins reported greater access to human and physical assets. Dalit showed notable improvement in financial capital over time. Comparative analysis of before-and-after scores highlights meaningful gains across all groups in human, physical, social, financial, and natural capitals, but with uneven distribution. The Kruskal-Wallis test confirmed significant caste-based variation in human and physical assets, reinforcing structural disparities in access. Qualitative insights further contextualize these patterns, revealing the historical marginalization of Indigenous groups, asymmetrical participation in buffer zone governance, and differential trust in conservation authorities. Grounded in a political ecology framework, the study highlights how identity, power, and institutional design influence resource access and conservation results. The findings imply focused, equity-driven conservation policies that enhance Indigenous involvement, promote institutional equity, and bolster culturally relevant livelihood alternatives in protected area governance.

Keyword: Political Ecology; Buffer Zones; Livelihood Assets; Conservation Policy; Indigenous Communities

ENV0410-0004

Environmental and Public Health Implications of Inappropriate Antibiotic Prescribing for Upper Respiratory Tract Infections: Evidence from Primary Care in Bangkok, Thailand

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Abstract

Antimicrobial resistance is an escalating global concern contributing to environmental degradation, public health risks, and the broader planetary health crisis. Inappropriate use of antibiotics in primary health care is a major driver of resistance but is often under-monitored at the patient and disease-specific levels in Thailand. Upper respiratory tract infections are one of leading causes of outpatient visits and inappropriate antibiotic use, particularly in LMICs where AMS is inconsistent. In Thailand, prescribing remains highly inappropriate, and no system comprehensively monitors patient-level data in Bangkok primary care. This study examined antibiotic prescribing patterns for upper respiratory tract infections among outpatients in primary health care units in Nong Chok District, Bangkok, and identified factors associated with prescription appropriateness. A retrospective analysis was conducted using routinely collected national health insurance reimbursement data from April 2021 to March 2022. Outpatients visit data were obtained from the OPBKK and E-Claim databases, with URTI cases identified through diagnosis codes based on the tenth revision of the International Classification of Diseases and standardized drug codes were used to assess prescribing appropriateness. Appropriateness of prescribing was assessed using a claims-based measure adapted from the 2019 study Appropriateness of Outpatient Antibiotic Prescribing Among Privately Insured US Patients, which applied ICD-10-CM codes to classify conditions as “always,” “sometimes,” or “never” requiring antibiotics. Following this framework, prescriptions were categorized as appropriate, potentially appropriate, or inappropriate. Among 35,664 visits for upper respiratory tract infections, 63.5 percent resulted in antibiotic prescriptions. Of these, only 1.8 percent were appropriate, 33.5 percent potentially appropriate, and 64.7 percent inappropriate. Inappropriate prescribing was highest among children under fourteen and adults over fifty-five, particularly in private clinics and during the early rainy season. These findings highlight the need for targeted antibiotic stewardship and stronger policy measures to address both environmental and health impacts of antimicrobial resistance in community settings.

Keyword: Antimicrobial resistance; Prescription appropriateness; Health policy; Routine health data; Urban primary health care

POSTER PRESENTATION

ENV0303-0001

The Impact of Waterbody Size on Water Quality and Its Implications for Environmental Management in Thailand's Freshwater Bodies

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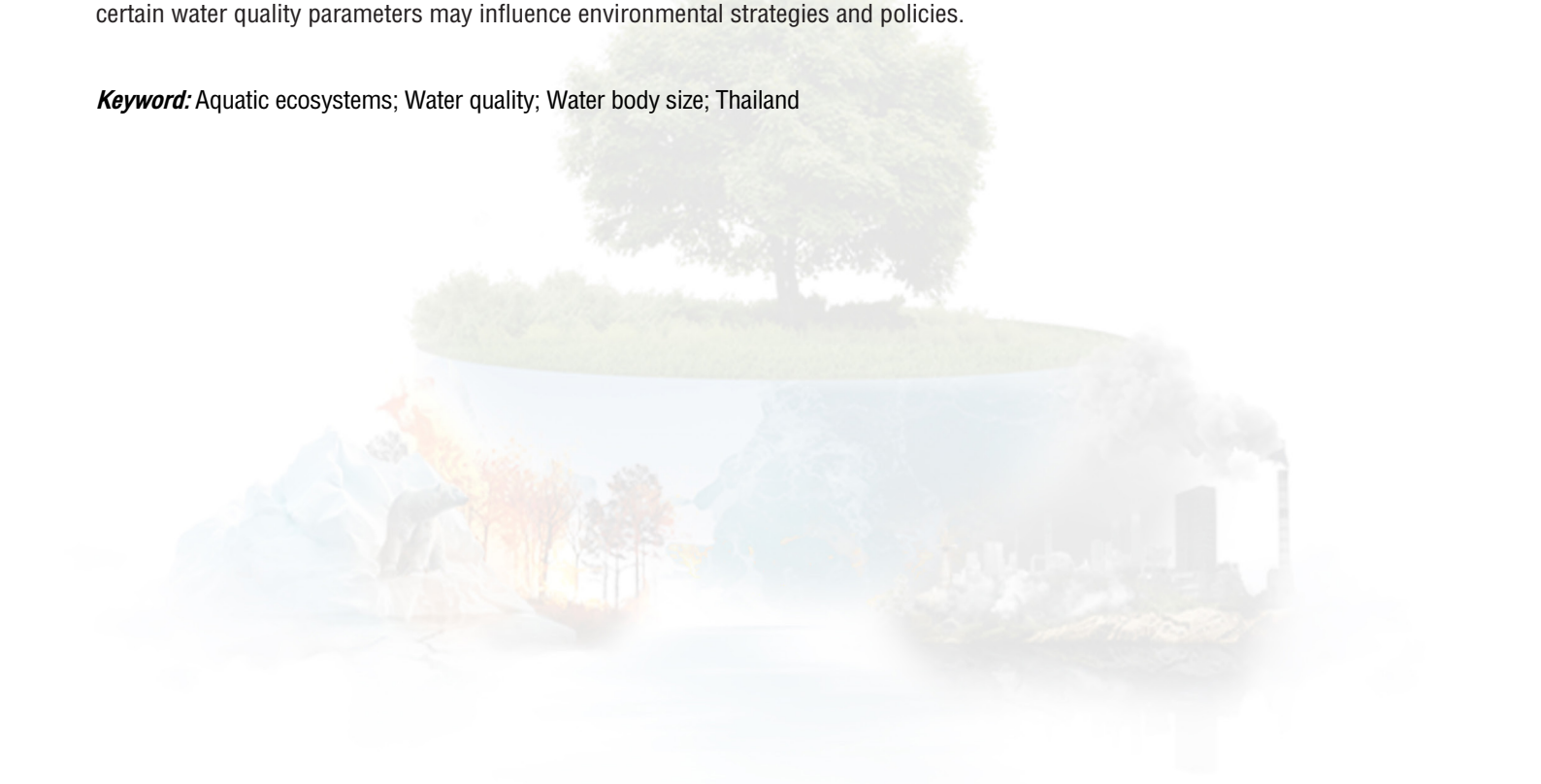
Abstract

This study investigates whether the size of water bodies affects water quality across three different sizes: large (volume > 100 million m^3), medium (100 million – 1 million m^3), and small (volume < 1 million m^3) based on Bureau of Water Resources Protection, Ministry of Natural Resources and Environment. Understanding the relationship between waterbody size and water quality is critical for effective water resource management and environmental conservation, especially in regions where water availability and quality directly impact local ecosystems and communities. The study included 50 water bodies with a total of 264 sampling points across four regions of Thailand: Northern, Northeastern, Eastern, and Central. Water quality parameters were measured both in the field and laboratory between April and May 2024. The results showed no significant statistical difference in dissolved oxygen (p-value = 0.401), turbidity (p-value = 0.158), total phosphorus (p-value = 0.283), and chlorophyll-a levels (p-value = 0.108) across the three water body sizes. However, small-sized water bodies exhibited higher trends in turbidity, total phosphorus, and chlorophyll-a compared to medium and large bodies. Statistically significant differences were found in electrical conductivity (p-value = 0.046), total dissolved solids (p-value = 0.031), and nitrogen levels (p-value = 0.026), where small water bodies displayed higher values. These findings underscore the importance of considering waterbody size in water quality assessments and management practices, as size-related variations in certain water quality parameters may influence environmental strategies and policies.

Keyword: Aquatic ecosystems; Water quality; Water body size; Thailand



ENV0303-0002

Comparative Analysis of Phytoplankton Diversity and Abundance in Relation to Water Body Sizes Across Thailand: Implications for Freshwater Ecosystem Monitoring and Management

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Abstract

This study assessed phytoplankton diversity and abundance in freshwater bodies of various sizes large (n = 9), medium (n = 15), and small (n = 26) across 50 sites in four regions of Thailand. A total of 264 samples were collected during April–May 2024, following the classification by the Department of Water Resources. The results showed that in total, 121 species were recorded, representing 67 genera and 7 divisions. Large water bodies hosted 82 species, with an average density of 26,510 ± 30,034 units/L, dominated by *Oscillatoria* sp. (66.67%). Medium-sized water bodies showed the highest richness with 114 species and a lower average density (17,469 ± 18,377 units/L), where *Oscillatoria* sp., *Peridinium* sp., and *Cylindrospermopsis raciborskii* each contributed ~20% of abundance. In small water bodies, 106 species were identified, with an average density of 23,416 ± 26,688 units/L and *Oscillatoria* sp. remaining dominant (23.08%). Cyanophyta was the leading division across all sizes, accounting for 77.57%, 63.34%, and 44.63% in large, medium, and small water bodies, respectively. These findings highlight the influence of water body size on phytoplankton communities and stress the need for tailored monitoring and management approaches. The dominance of cyanobacteria, especially potential bloom-forming taxa like *Oscillatoria* sp. and *C. raciborskii*, also points to risks under eutrophication and climate change conditions, necessitating proactive ecosystem management.

Keyword: Bioindicators; Eutrophication; Lentic water bodies; Phytoplankton; Water quality

ENV0304-0005

Assessment of Methane Emissions from Local Paddy Field by AERMOD Model in Surin Province

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Abstract

The assessment of methane emissions from local paddy in Surin Province by AERMOD model is a guideline for the assessment of methane emissions from local rice cultivation in Mueang District, Surin Province. The model analysis was used to develop methane emission from the local rice cultivation and estimated the impact from climate change. The study found that methane emission rate from paddy fields in Mueang District, Surin Province was 72,394.33 Gg/yr and the maximum concentration of methane from paddy fields in Mueang District, Surin Province in the case study was low, with the maximum average methane value of 1 year equal to 0.30 ppm. The results are used as a database for evaluating CH_4 from paddy fields in Surin Province because CH_4 database has never been assessed using by the model evaluation. It is used to find ways to reduce greenhouse gases, which are a cause of climate change. The western area has the highest tendency for methane emission from local rice cultivation because the water retention period is longer than other areas, resulting in a higher rate from microbial decomposition activities than other areas. This study provided suggestions for the methane emissions that can be reduced such as reducing the fermentation process and maintaining water levels in paddy fields to control oxygen levels in soil, using well-drained rice fields and managing fertilizers appropriately.

Keyword: Methane emissions; Greenhouse gas; Paddy field; AERMOD model; Climate change

ENV0304-0009

Characterization of microplastics in soil, leachate and groundwater at a municipal landfill in Rayong Province, Thailand

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Abstract

The rapid rise in global plastic production in recent years has intensified environmental concerns, particularly regarding microplastic (MP) pollution. These small plastic particles are now commonly found in a wide range of ecosystems, including both land and sea. In Thailand, limited attention has been given to MP contamination in land-based environments. This study explored the presence and properties of MPs in and around a municipal landfill located in Rayong Province, a highly urbanized coastal area.

Samples included 15 from soil, 2 from leachate, and 7 from groundwater, collected from within the landfill boundaries and surrounding zones. MP concentrations differed across sample types. Soil samples showed MP levels ranging from 240 to 26,100 particles per kilogram of dry matter, with the majority (58.71%) being smaller than 0.5 millimeters (mm). Leachate samples averaged 139 particles per liter, also largely composed of smaller than 0.5 mm MPs. Groundwater samples contained between 18 and 94 particles per liter, mostly measuring between 0.5 and 1 millimeter.

The most frequently observed shapes were sheet-like particles, followed by broken fragments, fibrous strands, and small pellets. Spectroscopic analysis using μ-FTIR identified polyethylene and polypropylene as the dominant polymer types, both widely used in consumer packaging and rope products. The substantial levels of MP pollution discovered in this landfill environment emphasize the pressing need for more in-depth research and practical mitigation measures to reduce the ecological risks associated with microplastic contamination.

Keyword: Microplastics, Landfill, Soil, Leachate, Groundwater, Thailand

ENV0304-0014

Occurrence and Characteristics of Microplastics in the Zoanthid Zoanthus kuroshio from the Eastern Gulf of Thailand

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Abstract

Microplastic pollution has emerged as a significant and escalating threat to marine ecosystems, with documented impacts on various benthic organisms, including cnidarians such as zoanthids. Due to their sessile nature and constant exposure to surrounding seawater, zoanthids are highly susceptible to microplastic contamination. This study investigated the abundance and characteristics of microplastics present on the external surfaces and within the tissues of *Zoanthus kuroshio* collected from Ko Saket, Rayong Province, in the Eastern Gulf of Thailand. Samples were digested with 10% potassium hydroxide (KOH), filtered through qualitative filter paper, and examined under a stereo microscope to classify microplastics by type, color, shape, and size. Selected particles were subsequently analyzed using Fourier-transform infrared (FTIR) spectroscopy to determine their polymer composition. Microplastic fibers were present in all samples, with an overall mean density of 3.27 ± 0.36 pieces/cm^2. The external surface exhibited significantly higher microplastic densities (2.25 ± 0.19 pieces/cm^2) than internal tissues (1.21 ± 0.25 pieces/cm^2) ($t(4) = -6.620$, $p = 0.003$). Most microplastics were fibers ranging from 1,000 to 5,000 μm in length. These findings provide critical baseline data for assessing microplastic impacts on marine organisms and for evaluating the potential transfer of microplastic-associated contaminants through the marine food web. Such processes could threaten biodiversity and compromise the long-term sustainability of marine ecosystems. The results also offer valuable insights for the development of effective policies on plastic pollution management and marine resource conservation.

Keyword: microplastic pollution; Zoanthus Kuroshio; Eastern Gulf of Thailand; marine ecosystems

ENV0409-0006

Filling GRACE/GRACE-FO Terrestrial Water Storage Anomaly Gaps Using a Hybrid CNN-LSTM and XGBoost Residual Framework

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Abstract

The GRACE (Gravity Recovery and Climate Experiment) and GRACE-FO (GRACE Follow-On) satellites provide crucial data on terrestrial water storage anomalies (TWSA) for long-term water resource research. However, during the transition period (10/2017-06/2018), a data gap emerged. Additionally, certain regions have more data loss due to other reasons in the processing. In central of Vietnam, when using this dataset from 01/2004 to 12/2024, 32 months of missing data were observed, limiting their utility for long-term hydrological analysis. To address this, we propose a hybrid deep learning framework that combines a Convolutional Neural Network–Long Short-Term Memory (CNN-LSTM) model with a residual XGBoost regressor to reconstruct missing data. The model is trained on residual component of original TWSA, obtained by decomposing the data using the Multi-Seasonal-Trend-Loess (MSTL) method, to capture spatiotemporal dependencies and nonlinear patterns. To improve accuracy, we use auxiliary variables including precipitation (CHIRPS dataset), variables from GLDAS (soil moisture, surface runoff), evapotranspiration, NDVI and land surface temperature (derived from MODIS). Evaluation results show good performance, with MAE of 15.8 mm, RMSE of 25.2 mm, CC of 0.9777, R^2 of 0.9552. This result highlights potential of hybrid deep learning for GRACE data reconstruction.

Keyword: CNN-LSTM; Data gap; GRACE/GRACE-FO; Hybrid deep learning; XGBoost Residual

ENV0410-0003

Local Innovations in Climate Action: A case study of Sheep Transhumant Pastoralism from Barkpak, Gorkha

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Abstract

Transhumant pastoralism, an ancestral practice of seasonal livestock and human mobility, remains a vital livelihood in Nepal's highlands, including Barpak, Gorkha. However, this system is increasingly strained by compounding climate change impacts and socioeconomic transformations. Employing a narrative inquiry approach, this study draws on insights from six active sheep herders, one former herder, and a local government representative in Barpak Sulikot Rural Municipality to examine adaptive strategies within the transhumant system. Findings highlight that while Traditional Ecological Knowledge (TEK), evident in sophisticated herd management (e.g., goat-led sheep control, traditional marking, strategic sheep pen construction), meticulous grazing management (e.g., altitudinal migration, ecological navigation, single-day pasture use), and effective ethno-veterinary practices (e.g., frost-related disease understanding, parasite control, traditional remedies), remains foundational, it is being increasingly outpaced by emergent challenges. Herders report reduced pasturelands, invasive plants proliferation, unfamiliar livestock diseases, increasing predator encounters, and the diminishing reliability of indigenous weather knowledge. In response, herders demonstrate a strategic interplay between TEK and evolving innovations, such as combining traditional remedies with modern veterinary medicine to address frost-related illnesses, collectively deciding to split routes to overcome pasture shortages, and incorporating radio-based weather forecasts to complement indigenous knowledge. They have also formed the Sheep Herders Association to negotiate for support and facilitate knowledge exchange. These evolving, hybrid practices reflect not a departure from tradition, but a dynamic, collective local adaptation to ecological uncertainty.

Keyword: Transhumant Pastoralism; Climate Change Adaptation; Traditional Ecological Knowledge; Local Innovation; Barpak Gorkha Nepal

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