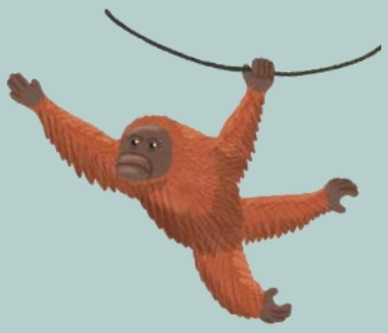

Innovative Mechanisms for Environmental Sustainability:

2025 International Symposium on Biodiversity Credit

環境永續的創新機制 - 2025國際生物信用研討會

摘要集

Red Building Conference Room

Xitou Nature Education Area, the Experimental Forest, NTU

July 1-3, 2025

Innovative Mechanisms for Environmental Sustainability: 2025 International Symposium on Biodiversity Credit

Red Building Conference Room,

Xitou Nature Education Area, the Experimental Forest, NTU

July 1-3, 2025

Time (UTC+08:00)	Tuesday, July 1	
12:00–13:00	**Registration**	
13:00–13:40	**Opening Ceremony**	***Bunun Traditional Cultural Performance (Lo-Na Elementary school)** ***Opening Remarks** **Dr. Wen-Chen SHIH** Deputy Minister, Ministry of Environment **Prof. Wen-Chang CHEN,** President, National Taiwan University **Prof. En-Cheng YANG, Distinguished** Professor, Department of Entomology, College of Bioresources and Agriculture, National Taiwan University **Mr. Jens NIELSEN,** CEO, World Climate Foundation **Prof. Ming-Jer TSAI,** Director, The Experimental Forest, College of Bioresources and Agriculture, National Taiwan University
	Keynote Speech	
13:40–14:20	*Carbon Credits vs. Biodiversity Credits: What Lessons Can Be Learned from Carbon Credits?* **Dr. Wen-Chen SHIH** Deputy Minister, Ministry of Environment	**Prof. Chun-Han KO**, Professor, School of Forestry & Resources Conservation, College of Bioresources and Agriculture, National Taiwan University
14:20–15:00	*From Crisis to Opportunity: Building a New Economy for Nature Through Biodiversity Credits* **Prof. Tzung-Su DING** Head, School of Forestry & Resources Conservation, College of Bioresources and Agriculture, National Taiwan University	
15:00–15:10	**Asian Biodiversity Credit Alliance MOU Signing Ceremony**	
15:10–15:30	**Group Photo and Coffee Break**	
	Taiwan's Bio-Credit and Environmental Sustainability: Policies and Practices	
15:30–15:50	*A Cobenefit Based PPP Mechanism for Sustainable Agriculture Policy in Taiwan* **Dr. Lao-Dar JUANG,** Director-General, Department of Resources Sustainability, Ministry of Agriculture	**Prof. Koichiro KURAJI**, Director, Executive Office, The University of Tokyo Forests
15:50–16:10	*Taiwan Biodiversity Conservation and Research Status* **Pro. Jia-Dong YANG,** Director, Taiwan Biodiversity Research Institute of the Ministry of Agriculture	
16:10–16:30	*Scaling Up: How Asia is Pioneering Its Own Biodiversity Credit Framework* **Mr. George HU,** Regional Representative, World Climate Foundation, Regional Representative, Asia **Mr. Kevin SUN**, General Manager, BioPlus **Prof. Ming-Jer TSAI**, Director, The Experimental Forest, College of Bioresources and Agriculture, National Taiwan University	
16:30–16:50	*H.NbS in Action: Fieldwork Experiments for Sustainable Transformation and Green Finance* **Dr. Wender YANG,** Chairperson, HIMA Foundation	**Prof. Nathaniel C. BANTAYAN,** Vice Chancellor**,** Vice Chancellor for Research and

16:50–17:10	*Mainstreaming Biodiversity in Taiwan: NBSAP, Spatial Planning, and Policy Pathways toward Sustainability* **Dr. Chih-Chin SHIH,** Senior Technical Specialist, Nature Conservation Planning Division**,** Forestry and Nature Conservation Agency, Taiwan	Extension, University of the Philippines Los Baños
17:10–17:30	*Methodology Framework for Alpine Reforestation Biodiversity Credit* **Dr. Chieh-Ting WANG,** Associate Research Fellow, The Experimental Forest, College of Bioresources and Agriculture, NTU	
17:30–17:50	*How Technology Can Enhance Biodiversity: A Case Study of Delta's Coral Restoration Project* **Dr. Wim. CHANG,** Chief Executive Office, Delta Electronics Foundation	
17:50–18:10	**General Discussion**	**Dr. Chiang WEI**, Deputy Director, The Experimental Forest, College of Bioresources and Agriculture, National Taiwan University
18:10-19:30	**Banquet (Success Banner Hotel Restaurant)**	
19:30~	**Gathering and Discussion**	
Time (UTC+08:00)	**Wednesday, July 2**	
07:30–08:30	**Breakfast**	
08:30–08:50	**Registration**	
	Keynote Speech	
08:50–09:30	*From Climate to Biodiversity and Nature: Inclusive Corporate Sustainability* **Ms. Sophia CHENG** Chair of Asia Investor Group on Climate Change, Chief Investment Officer, Cathay Financial Holdings	**Dr. Chiang WEI**, Deputy Director, The Experimental Forest, College of Bioresources and Agriculture, National Taiwan University
09:30–09:50	**Coffee Break**	
	The Current Status of Biodiversity Credit, Biodiversity, and Forest Management in Achieving Net-Zero Across Asian Countries **Sub-theme 1: MRV of Bio-Credit, Case Study of Bio-Credit or Forest Biodiversity** **Sub-theme 2: The Role of Forest Management in Achieving Net-Zero**	
	The Current Status of Biodiversity Credit, Biodiversity, and Forest Management in Achieving Net-Zero in Taiwan, Japan, and Korea	
09:50–10:10	*Building Biota Taiwanica: Integrating Taiwan's Biodiversity Databases for Environmental Sustainability and Conservation* **Dr. Kuo-Fang CHUNG,** Research Fellow**,** Biodiversity Research Center, Academia Sinica, Taiwan	**Prof. PHUA Mui How**, Professor, Faculty of Tropical Forestry, Universiti Malaysis Sabah
10:10–10:30	*The Potential and Limits of Ecosystem Carbon Sinks: What Can We Expect from Forests and Soils?* **Dr. Po-Neng CHIANG,** Research Fellow, The Experimental Forest, College of Bioresources and Agriculture, NTU	
10:30–10:50	*Lessons from Carbon Credits for the Future of Biodiversity Conservation: The Role of Marketization of Environmental Rights in Environmental Policy* **Prof. Hiromichi FURUIDO and Ms. Yukino SAKAI,** Professor and Master student, Laboratory of Forest Policy, Department of Forest Science, Graduate School of Agricultural and Life Sciences, The University of Tokyo	

10:50–11:10	*Estimation of carbon storage in the University of Tokyo Forests* **Dr. Masahiro AIBA,** Assistant Professor**,** Forest GX/DX Co-creation Center, The University of Tokyo Forests, Graduate School of Agricultural and Life Sciences, The University of Tokyo	**Prof. VU Tien Thinh,** Dean, Faculty of Natural Resource and Environmental Management, Vietnam National University of Forestry
11:10–11:30	*Introduction to Seoul National University Forests and Biodiversity* **Prof. KANG Kyu-Suk,** Professor, Seoul National University Forests	
11:30–11:50	*Insect Fauna of Korea* **Prof. PARK Il-Kwon,** Professor, Department of Agricultural, Forestry and Bioresources, Seoul National University	
11:50–12:50	**Lunch (Cafeteria)**	
	The Current Status of Biodiversity Credit, Biodiversity, and Forest management in Achieving Net-Zero in Vietnam, Indonesia, and the Philippines	
12:50–13:10	*Estimating and Comparing Species Richness Using Mark-Recapture Framework: A Case Study with Avian Communities in Different Forest Types in Vietnam* **Prof. VU Tien Thinh,** Dean, Faculty of Natural Resource and Environmental Management, Vietnam National University of Forestry	**Prof. KAMATA Naoto**, Professor, The University of Tokyo Chiba Forest, Graduate School of Agricultural and Life Sciences, University of Tokyo Forests
13:10–13:30	*Beyond Forest Net-Zero: Vietnam's Forests as a Carbon Solution* **Dr. DUONG Thi Bich Ngoc,** Senior Lecturer/Researcher**,** Faculty of Natural Resource and Environmental Management, Vietnam National University of Forestry	
13:30–13:50	*Pathogen Impact on Forest Biodiversity in the Tropics* **Prof. Sri RAHAYU**, Head, the Laboratory of Health and Protection, Faculty of Forestry, Universitas Gadjah Mada	
13:50–14:10	*The Role of Urban Forests in Biodiversity Conservation* **Dr. Rhomi ARDIANSYAH,** Lecturer, Ecotourism Management Laboratory, Department of Forest Resources Conservation, Faculty of Forestry, Universitas Gadjah Mada	**Prof. KANG Kyu-Suk,** Professor, Seoul National University Forests
14:10–14:30	*UPLB's Commitment to Sustainability: Collaborative Efforts and Innovative Solutions* **Prof. Nathaniel C. BANTAYAN,** Vice Chancellor for Research and Extension**,** University of the Philippines Los Baños	
14:30–14:50	*UPLB's University Forests as Sustainable Sanctuary: Protecting Biodiversity through Nature-Based Initiatives* **Dr. Lerma SJ MALDIA**, Associate Professor, Department of Forest Biological Sciences, College of Forestry and Natural Resources, University of the Philippines Los Baños	
14:50–15:10	**Coffee Break**	
	The Current Status of Biodiversity Credit, Biodiversity, and Forest management in Achieving Net-Zero Zero in Sri Lanka, Malaysia, and Thailand	
15:10–15:30	*Unlocking Biodiversity Credit Potential in Sri Lanka's Aquatic and Agro-Ecosystems Kid regards* **Dr. G. G. T. CHANDRATILAKE,** Director, Center for Sustainability, Department of Forestry and Environmental Science, University of Sri Jayewardenepura (Video)	**Prof. Sri RAHAYU**, Head, the Laboratory of Health and Protection, Faculty of Forestry, Universitas Gadjah Mada
15:30–15:50	*Towards Forest Carbon Net-Zero in Malaysia: Remote Sensing of Carbon Stocks* **Prof. PHUA Mui How,** Professor, Faculty of Tropical Forestry, Universiti Malaysis Sabah	
15:50–16:10	*The Development of Biodiversity Credit in Thailand* **Dr. Nantida SUTUMMAWONG**, Lecturer, Faculty of Forestry, Kasetsart University	

16:10–16:30	*The Carbon Sink Potential of Forest and Other Land Uses in the Carbon Neutrality of Thailand* **Prof. Sapit DILOKSUMPUN,** Associate Professor, Faculty of Forestry, Kasetsart University	
16:30–16:50	**General Discussion and Closing Ceremony**	**Prof. Ming-Jer TSAI**, Director of the Experimental Forest, College of Bioresources and Agriculture, National Taiwan University
17:10–18:30	**Depart for Heshe Tract, The Experimental Forest, NTU**	
18:30–20:00	**Dinner**	
20:00~	**Gathering and Discussion**	
Time (UTC+08:00)	**Thursday, July 3**	
07:30–08:30	**Breakfast**	
	Excursion (exclusive for speakers)	
08:30–09:30	Visit Ethnobotany and Agri-Food Education Center, The Experimental Forest, NTU	
09:30–10:30	Depart for Chi-Chi	
10:30–11:30	Visit Taiwan Biodiversity Research Institute of the Ministry of Agriculture	
11:30–12:40	**Lunch**	
12:40–	Depart for Taoyuan Airport or HSR Taichung Station	

Ladies and gentlemen,

Distinguished guests,

Dear colleagues and friends from around the world,

Good afternoon

It is my great honor and privilege, on behalf of National Taiwan University, to welcome you all to the 2025 International Symposium on Biodiversity Credit, hosted by our Experimental Forest. I am especially delighted to see so many experts and practitioners from across Asia and beyond gathered here today in the heart of Taiwan's rich and diverse forest ecosystem, the Xitou Nature Education Area.

Today is especially meaningful—not only is it the opening day of our symposium, but it also marks the 76th anniversary of the Experimental Forest. The Experimental Forest has played a pivotal role in teaching and practice, academic research, forest management, resource conservation, and university social responsibility (USR) in Taiwan. On this special occasion, let us take a moment to wish the Experimental Forest a very Happy Birthday and continued success in its mission for decades to come.

As we face the accelerating twin crises of climate change and biodiversity loss, it is increasingly clear that traditional approaches are no longer sufficient. We must develop innovative mechanisms—scientific, policy-based, and market-driven—to protect our natural capital while supporting sustainable development. Among these innovations, the concept of biodiversity credit has emerged as a promising tool to align economic incentives with ecological conservation.

This symposium is a vital step forward in that direction. Over the next three days, we will explore key issues including policy frameworks, scientific methodologies for biodiversity measurement, mechanisms for credit certification and trading, and real-world applications in forest management, agriculture, and community development.

I am particularly pleased that this event will also witness the signing of a Memorandum of Understanding among leading universities and institutions in Asia, establishing the Asian Biodiversity Credit Alliance. This collaborative platform will help us build shared knowledge, foster regional cooperation, and develop localized models that can be implemented with credibility and impact.

National Taiwan University, as a comprehensive research institution with a long-standing commitment to sustainability, is proud to contribute to this emerging field. The Experimental Forest has served not only as a site for forest conservation and scientific research, but also as a living laboratory for innovation in sustainable resource management and environmental education.

I want to thank the organizing team, our colleagues at the Experimental Forest, and all our international partners for making this symposium possible. I also extend my

deepest gratitude to each of you—our speakers, moderators, and participants—for bringing your expertise, your ideas, and your commitment to the table.

Let us use this opportunity not only to share knowledge, but to build lasting partnerships that will drive real change for the future of our planet.

Once again, I wish this symposium great success—and a heartfelt Happy 76th Anniversary to the Experimental Forest!

Prof. Wen-Chang CHEN,

President, National Taiwan University

Distinguished guests, colleagues, and friends from around the world,

Good afternoon, and welcome to the 2025 International Symposium on Biodiversity Credit. On behalf of the organizing committee, it is my great pleasure and honor to welcome you all to this significant gathering, held here in the beautiful Xitou Nature Education Area.

As the world faces the dual crises of climate change and biodiversity loss, the need for innovative and effective solutions has never been more urgent. Biodiversity credits—both as a concept and a developing mechanism—offer promising pathways to connect conservation with policy, finance, and technology. This symposium provides a platform for global and regional leaders across academia, government, industry, and civil society to engage in meaningful dialogue and collaboration.

There is no silver bullet to the dual crisis, and no perfect solution. But what we can do—what we must do—is act. Action in the face of biodiversity challenges is what we hope to inspire here. Through our collective efforts, we may not solve everything at once, but we can begin to chart a path forward—one rooted in hope, resilience, and responsibility. If we act together, we may yet leave behind a planet that our children and grandchildren can thrive on.

I am deeply grateful for your presence, your ideas, and your commitment. Your willingness to show up, to engage, and to lead with action gives me hope—hope that the future we imagine is still possible.

Thank you once again for being here. May this symposium spark new connections, strengthen our shared purpose, and remind us that even in the face of daunting challenges, we are not alone.

I wish you a meaningful, inspiring, and heartfelt three days ahead.

Prof. Ming-Jer Tsai
Director, The Experimental Forest, College of Bioresources and Agriculture, National Taiwan University

Carbon Credits vs. Biodiversity Credits: What Lessons Can Be Learned from Carbon Credits?

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Abstract

Carbon offseting projects that generate carbon credits have their origin in the Kyoto Protocol, i.e. the Clean Development Mechanism. The main purpose of the CDM projects was to bring in capital and technology that assisted the host countries, mainly developing countries, to pursue a low carbon development path. Since then, jurisdicitons also started to use carbon pricing mechanism, including the cap and trade scheme to reduce GHGs emissions. In the meantime, voluntary carbon offsetting schemes gradually gain their momentum by setting standards and procedures for carbon offsetting projects to follow with the purpose of generating carbon credits. As a result, carbon markets where mandatory and voluntary schemes operate, become a source of climate finance for countries that lack the resources to decarbonise. In addition, when pledges of carbon neutral are made and it is not yet feasible or too costly to reduce emissions to zero, carbon credits can also be used to offset the remaining emissions. All these have been in operation for more than 20 years. Whether carbon offseting projects and carbon credits have played a successful role draw intense and controversial debate. As a comparision, biodiversity credit and biodiversity offset are a more recent concept that only emerges after the early 2000s. Nevertheless, interests given to this new type of market mechanism in the biodiversity field increase rapidly after the adopting of Kunming-Montreal Global Biodiversity Framework (GBF) at COP15 of the CBD in December 2022. Expections that this can bring more biodiversity finance are high. How projects that might generate biodiversity credits can contribute to the nature positive goal is also being looked at. Whether biodiversity credits and offset can achieve these objectives will depend on their design and operation. The lessons learned from the experiences of carbon credit and carbon market will be valuable in this regards.

Keywords

carbon credit, carbon offset projects, biodiversity credit, biodiversity offset, biodiversity finance

From Crisis to Opportunity: Building a New Economy for Nature Through Biodiversity Credits

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Abstract

The global community faces an unprecedented biodiversity crisis, marked by escalating species extinction rates and widespread ecosystem degradation. Traditional conservation funding, primarily philanthropic and governmental, is proving insufficient to bridge the substantial finance gap needed to reverse these alarming trends. Biodiversity credits emerge as a transformative, market-based solution, designed to mobilize new private capital and drive measurable, positive outcomes for nature. Unlike carbon credits, which focus on greenhouse gas emissions reduction, biodiversity credits fundamentally aim for ecological uplift and regeneration. Their integrity hinges on key principles such as additionality (ensuring genuine, net positive impact beyond business-as-usual), permanence, measurability, transparency, and guaranteeing equitable benefits for local communities. For corporate buyers, the value proposition is clear, ranging from fulfilling evolving ESG commitments and anticipating regulatory compliance to enhancing brand reputation and maximizing philanthropic impact.

Credible creation and verification of biodiversity credits demand a rigorous methodology. A comprehensive project development lifecycle begins with robust baseline assessments to establish pre-intervention biodiversity conditions. The design of conservation interventions then follows, complemented by advanced outcome measurement and monitoring techniques that leverage cutting-edge technologies like eDNA, remote sensing, and sophisticated ecological surveys. Most current methodologies emphasize demonstrating additionality and effectively managing potential leakage effects. The critical role of independent third-party verification and the development of harmonized standards and protocols are also crucial for market integrity. Furthermore, understanding factors influencing credit pricing and the nascent structures of both voluntary and compliance markets is essential.

While significant challenges exist in scaling this emerging market—including data limitations, the complexities of long-term monitoring, governance frameworks, and underdeveloped market infrastructure—the opportunities are immense. Biodiversity credits hold the potential to unlock substantial private finance, empower and directly benefit Indigenous Peoples and Local Communities (IPLCs), and foster integrated nature-positive solutions. Ultimately, collective action and collaborative innovation are vital to fully realize the transformative potential of biodiversity credits, driving a systemic shift towards a truly nature-positive global economy.

Keywords

Biodiversity Credits, Nature Finance, Conservation Economics, Ecological Restoration, Market Mechanisms

A Cobenefit based PPP Mechanism for Sustainable Agriculture Policy in Taiwan

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Abstract

Climate change has emerged as one of the most urgent global challenges, prompting countries around the world to intensify efforts to reduce carbon emissions. Taiwan has aligned with this global movement by legislating a national target of achieving net-zero emissions by 2050. Within this framework, the Ministry of Agriculture (MOA) has committed to an earlier net-zero goal by 2040. To achieve this, the MOA has established four strategic pillars: (1) reducing emissions, (2) enhancing carbon sequestration, (3) promoting circular agriculture, and (4) fostering green trends.

Agriculture in Taiwan plays a multifunctional role beyond food production. It contributes significantly to carbon mitigation, biodiversity conservation, cultural landscape preservation, water resource management, and rural employment. These public goods underscore the necessity of pursuing sustainable agricultural development. To this end, the MOA is promoting a co-benefit-oriented Public–Private Partnership (PPP) mechanism to mobilize cross-sectoral collaboration.

First, a stacked payment system is being implemented to recognize the multiple ecosystem services provided by agricultural land. Through this approach, farmers receive layered incentives for delivering benefits such as food production, habitat conservation, and landscape maintenance. Second, the MOA is actively developing standardized methodologies for voluntary greenhouse gas (GHG) reduction in agriculture and forestry. These methodologies aim to enable farmers and enterprises to carry out verifiable mitigation actions and lay the groundwork for participation in domestic or international carbon credit markets. Third, the MOA is proactively guiding private-sector capital toward the agricultural sector by aligning with Taiwan's Green and Transition Finance Action Plan. To further this effort, the MOA has established the ESG Store—a dedicated platform for connecting corporations with sustainability-aligned agricultural initiatives. This matchmaking mechanism accelerates the transition toward sustainable agriculture while enabling companies to fulfill their ESG commitments, thereby achieving mutually beneficial outcomes for both business and sustainable development.

Keywords

Net-zero, Sustainable Agriculture Development, PPP, ESG

Taiwan Biodiversity Conservation and Research Status

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Abstract

Taiwan represents a biodiversity hotspot encompassing diverse ecosystems, which faces growing threats from economic development and global climate change. This issue is particularly severe in mid- to low-elevation mountains, where increasing overlap of wildlife habitats and human activity exacerbates human-wildlife conflicts and hinders effective conservation. In response, Taiwanese governmental, academic, private, and non-governmental institutions launched collaborative initiatives to balance production, life, and ecology. This report presents key advancements, including species threat assessment, open biodiversity data, and the ecological green network, as well as explore their contributions to Environmental, Social, and Governance (ESG) strategies and biodiversity credit implementation.

Taiwan Biodiversity Research Institute (TBRI) and the Forestry and Nature Conservation Agency (FNCA) engaged national experts to conduct species threatened rank and extinct risk assessment following the scientific standards established by the International Union for Conservation of Nature (IUCN). This assessment focused on six taxonomic groups, including native terrestrial vertebrates (mammals, birds, reptiles, amphibians, and freshwater fish) and vascular plants. The first version of Red List assessments was published between 2016 and 2017, and the second updated edition was released in 2024. The Red List and its associated assessment data are publicly accessible, providing valuable tools for identifying conservation priorities, informing policy development, and raising public awareness of threatened species and conservation policies.

The data sources for the Red List assessments are highly diverse, including long-term surveys from academic institutions and citizen science. Citizen science has rapidly grown worldwide and now plays an important role in biodiversity monitoring. In Taiwan, an extensive citizen scientist network has been developed, significantly contributing to valuable biological data and specimens, which support expert systems while enhancing public awareness and participation in conservation.

Effective management and sharing of long-term and large-scale biodiversity data are essential for evidence-based conservation. The Taiwan Biodiversity Network (TBN) integrates biodiversity data contributed by government agencies, academic institutions, and citizen science projects. TBN currently hosts over 27 million records across nearly 2,000 datasets, covering approximately 30,000 species, and offers various visualization tools, such as distribution maps, data gap, and potential species range modeling. Approximately 50% of usage comes from private companies for applications such as ecological assessments, environmental impact evaluations, and sustainability reporting. In 2021, the establishment of the Taiwan Biodiversity Information Alliance (TBIA)

further enhanced the collaboration. Taiwan has contributed nearly 22 million records to the Global Biodiversity Information Facility (GBIF), positioning it among the leading contributors in Asia.

Based on this solid foundation, Taiwan Ecological Network (TEN), a national scale ecological conservation strategy, was launched in 2018. TEN expands conservation beyond the existing Central Mountain Range corridor to diverse landscape, including low-elevation mountains, rivers, plains, wetlands, and coasts. These regions serve as habitats for approximately 55% of protected wildlife species and 64% of plant species listed in Taiwan's Red List; however, they remain largely unprotected and increasingly threatened by land use change. TEN promotes a "Forest–River–Village–Ocean" ecological corridor framework, mapping 45 regional conservation corridors and 44 priority area, establishing wildlife-friendly road network, developing conservation action for 22 endangered species, and promoting payment for ecosystem services (PES).

These efforts provide critical scientific underpinnings for biodiversity credit. For instance, robust data and information are crucial for baseline assessments, quantifying threats and risk, and monitoring restoration outcomes. Furthermore, identified biodiversity hotspots and corridors are potential sites for biodiversity credit projects, guiding ESG resources towards high conservation value areas. Continued strengthening of these frameworks through enhanced data integration and interdisciplinary collaboration is pivotal for Nature-Positive Development in Taiwan.

Keywords
Database; Endangered species; Open data; Protected area; Satoyama

Scaling Up: How Asia is Pioneering Its Own Biodiversity Credit Framework

George HU [1], Ming-Jer TSAI[2]* and Kevin SUN[3]

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Abstract

As the global community intensifies efforts to halt biodiversity loss, Asia is emerging as a key driver of innovation in conservation finance. With its rich biodiversity, dynamic economies, and growing policy momentum, the region holds unique potential to shape credible, science-based biodiversity markets. This presentation explores the rise of biodiversity credits (biocredits) as a mechanism to align ecological protection with economic development, with a particular focus on mobilizing private sector engagement.

Biocredits represent verified units of biodiversity gain, grounded in principles of additionality, ecological integrity, and community inclusion. Unlike traditional offsets, they are designed to serve as positive incentives—encouraging businesses to invest in nature, support ecosystem restoration, and meet evolving regulatory and disclosure expectations.

The Kunming-Montreal Global Biodiversity Framework calls for protecting 30% of land and sea by 2030—a target that cannot be met by governments alone. As nature-related disclosure standards such as TNFD, IFRS S1/S2, and the forthcoming S3 raise the bar for corporate accountability, biocredits offer a practical, measurable pathway for integrating biodiversity into business models and value chains.

Asia is on the move. South Korea is building ESG-compatible recognition systems and has launched the "30 x30 Alliance." Japan is integrating biodiversity indicators into corporate reporting. Malaysia is developing Indigenous-led bioeconomy hubs, and Indonesia is exploring biodiversity taxes and green bond mechanisms. Taiwan is expanding conserved areas and piloting OECM-linked certification schemes. Together, these efforts demonstrate the region's capacity to scale biodiversity finance through regional cooperation, blended finance, and public-private partnerships.

Amid this global momentum, over 40 countries and regions are now engaged in designing biodiversity credits, developing national policies, or participating in voluntary markets. This presentation highlights their progress and emphasizes the pivotal role of the private sector—not only in mobilizing capital, but also in ensuring credibility, accountability, and impact.

By anchoring biodiversity markets in science and local stewardship, Asia has the opportunity to set global benchmarks and lead the way in developing credible, inclusive, and scalable nature-positive economies.

Keywords
Biodiversity credits, Asia-Pacific, Private sector engagement, Nature finance, TNFD and sustainability disclosure

H.NbS in Actions：fieldwork experiments for sustainable transform and green finance

Wen Der YANG

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Abstract

To innovation of low & middle altitude forests by recreating Taiwan Satoyama, H.NbS apply the CSV（Michael Porter, 2011）to create 7 multiverses of H.NbS value systems. Which are

1. Revitalize land and forest assets：

   Revitalizing the「waste lands」is possible based on our experience in the Taklimakan desert, the Sea of death, as well in tropic and sub-tropic areas. for restoration.

2. Self-sustain Lifestyle

   Taiwan Satoyama had tradition self-sustain life style for hundreds of years. Which were developed for 「live harmony between human and natural」by our ancestors.

   Unfortunately, when our ancestors faded away and young generation left tens of years ago. the related wisdom, knowledge, technology and culture of lifestyle disappeared rapidly. H.NbS reforested various trees of Medicine and food, oil, spices, tannin, fiber, Chinese herbal medicine, etc. in the parks and their related soft-power. Hence, these make our visitors enjoy and immerse in our Intangible Cultural Heritage of Rural Life Museum.

3. Transform opportunities : an example of Beverage and food industry

   Each Taiwan Satoyama park has her unique trading products. Tea is our example.

   The supply chain revolution of H.NbS is from geno seeking, plantation, new manufacturing, and sale & marketing developing, the whole supply. The revolution is based on our ancient tradition which preserved in Tibet. the ICT are used for revolution of tradition agriculture supply chains. Which will increase the value of tea business and then attract young generations participations.

4. Newly development of Forest life science.

   The first「life science」of H.NbS is Photosynthesis and beyond. The case would discuss the 2nd one called Fungi. are our focus.

   Antrodia is a famous meta II biologics. The breakthrough technologies of bio-manufacturing show how it stop deforestation and then realizing life justice and social justice.

   The Extension infrastructure including

5. NCIx foster green justice.

Green Justice - Economic Justice

NCIx is not a transaction platform but a service platform. Which is a service platform to make sure every removal is effective and satisfy forms legal, taxation, brand-owner/ supply chains demand.

Green justice II - environment Justice

NCIx is not an exchange for "carbon reduction", but a service platform for "carbon removal". It must be positive about the "results of action" of "positive growth of nature", produce "synergistic effects" on biodiversity and natural resources, and at the very least, must not cause "harm" to nature.

Green Justice III - Social Justice

NCIx is based on science objective results and fair market price. However, it redistributes the value would be in favior of remote communities, Aboriginal people, small formers, landowners, remote communities, etc.

6. Feits : 2nd extension, a new tech application

Feits as an easy way for the white-collar workers and high-level management and future generations to take real actions. Firms also can trust to invest more for further actions.

7. NWM green Investment

Without Green Finance, the expansion of H.NbS is merely impossible. Hence, a NWM was established.

Keywords

H.NbS, low and middle mountain forest, green finance

Mainstreaming Biodiversity in Taiwan: NBSAP, Spatial Planning, and Policy Pathways toward Sustainability

Chih-Chin SHIH [1]*, Chia-Tzu CHEN[2], Hsiao-Tien HSIEH[3] and Hwa-Ching LIN[4]

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[2] Specialist, Forestry and Nature Conservation Agency, Taiwan, m6039@forest.gov.tw
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[4] Director General, Forestry and Nature Conservation Agency, Taiwan, franklin@forest.gov.tw

Abstract

Taiwan is actively aligning with the Kunming-Montreal Global Biodiversity Framework under the Convention on Biological Diversity by updating its National Biodiversity Strategy and Action Plan (NBSAP) and promoting cross-ministerial collaboration to mainstream biodiversity into national policy. To achieve the 2030 targets under the Global Biodiversity Framework, spatial planning has become a core pillar of biodiversity governance. Through the Taiwan Ecological Network, priority biodiversity areas and conservation corridors have been identified, alongside cross-sector habitat restoration efforts. These initiatives foster whole-of-government and whole-of-society participation, integrating environmental, economic, and social dimensions toward a Nature Positive future.

To address the interconnected challenges of climate change and biodiversity loss, Taiwan's policies emphasize the importance of integrated climate and biodiversity action, focusing on conserving ecosystems that underpin nature-based climate solutions. The Forestry and Nature Conservation Agency (FANCA), which leads Taiwan's biodiversity agenda, is developing localized guidance for the Taskforce on Nature-related Financial Disclosures (TNFD) and has launched the Carbon Sink and Biodiversity ESG Project Matching Platform. These initiatives aim to establish public-private cooperation mechanisms, promote corporate engagement in local biodiversity initiatives, and strengthen the linkage between business operations and biodiversity conservation.

In parallel, FANCA is developing a classification system for Taiwan's ecosystems and conducting comprehensive ecosystem mapping, along with building a biodiversity indicator framework. The work begins with forest ecosystems and will progressively extend to others. These instruments will enhance ecosystem valuation and policy performance assessment, providing a science-based foundation for advancing Nature-based Solutions (NbS) and localized biodiversity credit mechanisms.

Keywords

Kunming-Montreal Global Biodiversity Framework (K-M GBF), National Biodiversity Strategy and Action Plan (NBSAP), Spatial Planning, Taiwan Ecological Network, Public-Private Partnerships

Methodology framework for Alpine reforestation biodiversity credits

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Abstract

This study outlines a comprehensive biodiversity credit methodology framework, exemplified by a specific alpine reforestation project. The initiative aims to plant 100,000 saplings of Taiwanese endemic conifers, across 50 hectares in central Taiwan regions, with a projected assessment for credit issuance after 30 years. The framework is meticulously designed to ensure scientific rigor, transparency, and the delivery of tangible, long-term ecological benefits.

The scheme begins with Project Initiation and Evaluation. The afforestation unit (e.g., forestry agencies, NGOs, or community groups) will submit a detailed proposal outlining the reforestation goals, scope, precise methods, and anticipated ecological benefits. This includes the specific planting strategy for the 100,000 coniferous saplings within the 50-hectare area, along with preliminary assessments of co-benefits such as carbon sequestration and improved water retention. An independent evaluation body will then conduct an initial assessment, scrutinizing the plan's feasibility, the scientific validity of the expected ecological gains, and the robustness of the proposed long-term monitoring and management strategies.

Next, Baseline establishment and indicator selection are critical. Prior to planting, a comprehensive ecological survey of the practice site and its surrounding areas will establish detailed baseline data. This encompasses precise assessments of the plant community composition (emphasizing endemic and rare species), animal diversity (focusing on endemics and protected species), soil quality and stability, hydrological conditions, and microclimatic factors. Crucially, foliage structure diversity—both vertical and horizontal complexity—will be thoroughly documented as a core indicator. Based on these findings, relevant and measurable indicators will be chosen, prioritizing endemic species, critical ecological functions, and the complexity of the developing forest structure. For the 30-year projection, key indicators will include the growth metrics of saplings (e.g., height, DBH, biomass), the increased presence or abundance of target endemic fauna and flora, enhanced overall vegetation diversity, and the measured improvement in foliage structure diversity indices.

Monitoring and verification will span the entire 30-year project duration. A robust long-term monitoring plan will regularly collect ecological data utilizing diverse methods such as remote sensing, automated monitoring equipment, and consistent plot sampling. Independent verification bodies will periodically assess data accuracy, reliability, and the degree to which ecological benefits are being realized. Third-party certification will further enhance public trust and market acceptance for the generated credits.

The core of the framework lies in credit calculation and issuance. After 30 years, based on thoroughly verified monitoring data, the ecological gains for each indicator will be meticulously quantified. Alpine ecological models and statistical methods will be employed to convert these gains into tangible ecological service values. Biodiversity credit units will then be calculated based on these quantified gains and predetermined indicator weightings. For instance, a measurable increase in specific high-mountain endemic species or a significant improvement in forest structural complexity will directly translate into a corresponding number of credit units. A specialized credit management institution will issue the credits upon successful verification.

Finally, credit trading and usage will be facilitated through a dedicated platform, drawing lessons from existing carbon credit markets to ensure transparency, fairness, and efficiency. Corporations can purchase these credits to demonstrably offset their biodiversity impacts, while governments or non-profit organizations can acquire them to support vital high-mountain ecological conservation initiatives. Supportive governmental policies and regulations will be essential, providing financial incentives and establishing a clear legal framework to ensure market integrity. Critically, community participation and benefit sharing will be integrated throughout the project lifecycle, fostering active local involvement, respecting indigenous knowledge, and ensuring that local communities equitably share in the ecological and economic benefits derived from these vital afforestation efforts.

Keywords
methodology, alpine reforestation, biodiversity credits

How Technology Can Enhance Biodiversity: A Case Study of Delta's Coral Restoration Project

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Abstract

Since 2020, the Delta Electronics Foundation has led a comprehensive coral restoration initiative in response to the urgent challenges of marine heatwaves related to climate change. The program integrates ecological restoration, environmental education, and smart technologies to rehabilitate coral reefs and promote long-term ecosystem resilience.

In collaboration with local marine scientists, Delta implements restoration techniques such as coral gardening, larval propagation, and gamete collection, supported by Delta's own innovations in LED lighting systems, IoT sensors, and cloud-based data analytics. In 2023, Delta co-established the Coral Restoration Education Centre with the National Museum of Marine Science and Technology, featuring live coral tanks, interactive exhibits, and outreach programs based on the Foundation's picture book *"Corals: The Forests of the Ocean," in collaboration* with the Jane Goodall Institute.

Delta has also expanded its impact through global and cross-sector collaboration. Working with the International Union for Conservation of Nature (IUCN), Delta contributes to the development of the START (Systematic Approaches to Restoration Targets) methodology for marine environments and supports coral reef assessments under the Red List of Ecosystems (RLE). These tools help identify priority ecosystems and guide data-driven restoration planning.

In the U.S., Delta partners with the Mote Marine Laboratory to explore AI applications in coral restoration. With the University of California, San Diego (UCSD), Delta applies Large Area Imaging (LAI) and Structure-from-Motion (SfM) photogrammetry to assess reef structures, and uses CoralNet—an AI platform for image annotation and coral classification—to enhance monitoring precision at scale.

Looking beyond marine ecosystems, Delta is also advancing the development of biodiversity credit mechanisms. Together with the National Taiwan University Experimental Forest, Delta is co-developing methodologies for quantifying and verifying biodiversity credits based on ecological indicators and long-term ecosystem services. This initiative seeks to support nature-positive finance and integrate biodiversity into climate-related decision-making.

Keywords

Coral Restoration, Climate Change, Smart Technologies, Biodiversity Credit, Ecosystem Resilience

From Climate to Biodiversity and Nature: Inclusive Corporate Sustainability

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Abstract

「從氣候到生物多樣性與自然-包容式企業永續行動」

人類正以超過地球生物承載力 1.7 倍的速度消耗資源，極端氣候頻發，帶來災害、生命威脅與經濟損失。全球升溫控制在 1.5°C 內的目標正面臨挑戰，而氣候變遷只是起點，水資源、生物多樣性與自然系統退化等問題亦同步惡化。

因此，企業的永續行動不應只將「低碳」視為首要，同時應具備「包容性」，將更多群體納入永續行動的考量中，企業需進一步重新定義在社會中的角色，朝向更具共識的方向前進。

企業不再只是碳排者，而是永續轉型中的解方提供者與價值鏈合作推動者。除了透過產品與服務創新，擴大永續解方的可及性，企業也積極運用自身資源投入環境教育與生態保育，回應自然與社會層面的需求，強化社會參與與自然共融。

金融業亦不僅是資金提供者，更是市場參與者與轉型推動者。除將自然相關風險納入投資流程，亦與倡議組織合作建立實務工具、透過議合推動企業轉型、引導產業政策朝永續轉型發展等。

我們應擴大視野，從減碳邁向自然保育，思考整體性策略。透過利害關係人間的跨界合作與共學，有助提升可行性、激發創新，形成正向循環，放大永續效益。

From climate to biodiversity and nature: inclusive corporate sustainability

Humans are consuming resources at a rate 1.7 times beyond the Earth's biological carrying capacity. Extreme climate events are occurring more frequently, bringing disasters, threats to life, and economic losses. The goal of limiting global warming to within 1.5°C is facing serious challenges. Climate change is only the beginning of discussion, while problems related to water resources, biodiversity, and the degradation of natural systems also need response urgently.

Corporate sustainability action should also go beyond prioritizing carbon reduction, embracing "inclusiveness" that considers stakeholders who were previously less involved in decision-making. Society is redefining the role of business, moving toward a people-centric inclusive and consensus-driven direction.

Non-financial companies are no longer just emitters, but can be solution providers and enablers of collaboration across the value chain. They can provide innovative products and services toward sustainable solutions. Meanwhile, many are actively leveraging their own resources to support environmental education and ecological conservation, helping to enhance public engagement and foster harmony with nature.

The financial sector is not just a provider of capital, but also a market participant and a key driver of transition. In addition to integrating nature-related risks into investment and lending processes, the financial sector also works with advocacy organizations to develop practical tools, promote corporate transition through engagement, and help guide industry policies toward sustainable transformation.

We need to take a broader perspective, moving from focusing solely on climate to also including nature through a holistic strategy. Balancing stakeholder interests and encouraging cross-sector and interdisciplinary collaboration can improve feasibility, broaden participation, create positive feedback loops through learning by doing, and accelerate innovative solutions, ultimately generating greater long-term impact.

Keywords
Inclusiveness, people-centric, transition, engagement, corporate sustainability

Building Biota Taiwanica: Integrating Taiwan's Biodiversity Databases for Environmental Sustainability and Conservation

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Abstract

The use of biodiversity credits for conservation purposes relies on accurate estimates of a region's biota. A biota is a scholarly monograph providing a comprehensive account of the region's fauna (animals) and flora (plants). Traditionally, writing a biota is regarded as a lifelong pursuit for taxonomists. Completing a national biota showcases a country's academic capacity and contributes greatly to science, education, and biodiversity resource management. However, progress on Taiwan's biota, as well as elsewhere around the world, has stagnated due to a decline in the number of trained taxonomists and insufficient research funding. For example, the second edition of Flora of Taiwan, which documented 4,077 native species and 262 naturalised species, was completed in 2002. However, over the past 20 years, the surge in phylogenetics has led to major revisions in classification systems and the discovery of numerous new taxa. Consequently, there are now 5,304 native species and 918 naturalised species, representing a 43.4% increase since 2002. As such, there is an urgent need for an updated flora, both from conservation practitioners and the academic community. Supported by the Academia Sinica Center for Digital Cultures (ASCDC), the Biota Taiwanica project was launched in January 2025 to facilitate taxonomic studies. Biota Taiwanica is a digital platform that integrates and retrieves data from TaiCOL (Catalogue of Life in Taiwan; https://taicol.tw/), TaiBIF (Taiwan Biodiversity Information Facility; https://portal.taibif.tw/) and TaiEOL (Taiwan Encyclopedia of Life; https://taieol.tw/). Biota Taiwanica encourages scholars and citizen scientists to upload, revise and update their taxonomic works using the 'Scientific Names Management Tool' developed by TaiCOL. The platform generates PDF documents bearing an International Standard Serial Number (ISSN) or International Standard Book Number (ISBN), as well as a globally unique identifier such as a Digital Object Identifier (DOI) or Archival Resource Key (ARK ID). This ensures that the publications comply with taxonomic nomenclature requirements, and that the digital files are preserved and retrievable in the long term. Work generated by Biota Taiwanica can therefore be cited as a regular journal article and indexed. As a digital platform, it can also add and update information relevant to biodiversity credit consistently, providing an accurate and timely estimation for biodiversity conservation.

Keywords

biological classification, e-publication, TaiBIF, TaiCOL, TaiEOL

The Potential and Limits of Ecosystem Carbon Sinks: What Can We Expect from Forests and Soils?

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Abstract

Forest and soil carbon sinks provide a natural solution for achieving climate goals. These nature-based solutions contribute to net-zero emission targets by capturing and storing atmospheric carbon. However, ecological processes, methodological uncertainties, and implementation barriers limit their effectiveness. This study evaluates both the potential and the constraints of ecosystem carbon sinks using data from the National Taiwan University Experimental Forest and applies forest carbon offset methodologies grounded in international and region-specific standards.

The National Taiwan University Experimental Forest includes diverse forest types across elevation gradients and provides a long-term research site for forest restoration and carbon monitoring. In particular, the Shui-li Working Circle features restored plantations established on formerly cultivated lands, using native and mixed-species tree plantings. These sites offer practical examples for assessing carbon offset mechanisms in subtropical forest ecosystems.

In recent years, Taiwan has been actively developing its own forest carbon offset methodologies to align with international frameworks while accounting for local ecological conditions. Two major methodological approaches have emerged: the afforestation-based carbon offset methodology, which quantifies carbon sequestration from newly planted forests on previously non-forested or degraded lands; and the enhanced forest management methodology, which evaluates additional carbon benefits gained through interventions such as thinning, mixed-species conversion, or extending rotation cycles in existing forests. Both methodologies emphasize additionality, permanence, and the use of standardized monitoring, reporting, and verification (MRV) protocols tailored to Taiwan's forest ecosystems.

This study adopts a carbon accounting framework based on these principles. Baseline carbon stocks are established using long-term forest inventory data and stratified soil sampling. Management interventions include assisted mixed-species afforestation and selective thinning, aiming to enhance both carbon sequestration and forest structural complexity. Carbon gains are calculated through region-specific allometric models, and soil carbon dynamics are incorporated to account for total ecosystem carbon changes.

Results show that restored forests accumulate carbon rapidly during the initial decades, primarily through aboveground biomass growth. As stands mature, biomass carbon approaches saturation, while soil carbon increases more slowly and varies depending on previous land use and species composition. Disturbances such as typhoons and climate

variability pose risks to carbon permanence. Methodological challenges also remain, including detection of leakage, scalability of soil carbon monitoring, and integration of biodiversity trade-offs into offset protocols.

The NTU Experimental Forest case demonstrates the importance of localized ecological data, robust MRV systems, and long-term investment to ensure the scientific credibility of forest-based carbon offset projects. Forests and soils offer measurable climate mitigation potential, but their contributions are finite. Effective strategies must situate carbon sink initiatives within integrated land-use and climate policy frameworks that support biodiversity, community participation, and adaptive governance. When based on scientific rigor, ecosystem carbon sinks can serve as a key element in a broader portfolio of climate solutions.

Keywords
Ecosystem carbon sinks, Forest carbon offset, Soil carbon dynamics, Nature-based climate solutions

Lessons from Carbon Credits for the Future of Biodiversity Conservation: The Role of Marketization of Environmental Rights in Environmental Policy

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Abstract

Theoretically, the relationship between carbon sequestration and biodiversity of forest management is explained by Peyron(2007)'s "4 types of sylviculture strategies" regarding production possibility. Dales(1968) advocated "tradable environmental rights (TDRs)" as an efficient political instrument for reducing pollution in certain region, only under the condition that there be no polluting emissions beyond regions.

In practice, regarding carbon credits, numerous challenges have been identified. At the planning stage, high initial costs and project designs that do not reflect local conditions, were identified. During the implementation, conflicts with local communities, uneven benefit distribution, leakage, and non-permanence were raised. In the stages of preparing the Project Design Description (PDD) and monitoring reports, issues included overestimation of baseline emissions, which led to exaggerated additionality, and over-issuance of credits. At the third-party validation and verification stage, concerns were raised about prolonged examination, high costs for request, as well as the transparency, as project developers could appoint the validation bodies themselves. At the trading stage, information asymmetry existed between producers and consumers due to undisclosed profit-sharing and calculation methods, and between companies and stakeholders, raising concerns about greenwashing.

From the perspective of biodiversity, permitting monoculture species with high carbon absorption could lead to unexpected changes in biodiversity. Furthermore, the targets and indicators for biodiversity monitoring were often qualitative and indirect. Thus, there are limitations in evaluating biodiversity safeguards and co-benefits within carbon credit projects.

In conclusion, it is evident carbon credits have limitations in conserving biodiversity, which makes it reasonable to establish individual assessments and incentives for biodiversity conservation as can be seen by biodiversity credits. In addition to the issues identified in carbon credits, it is essential to consider issues specific to biodiversity, such as quantitative measurement and evaluation.

Nevertheless, even with the development of rigorous evaluation technologies, ethical issues will remain.

As carbon credits were often criticized as an indulgence to pollute, TDRs tend to provoke controversy. Biodiversity credits for offsetting could also lead to trade-offs between not only spaces but species. To prevent such problems, it is necessary to restrict transactions within a certain region. At present, countries such as the UK and Australia are creating and trading credits

within national borders. However, careful consideration is needed when determining the boundaries of such regions.

While implementing the credit schemes for offsetting at the national level may be relatively effective for island nations, in continental regions, doing so risks excluding countries or dividing ecosystems that span multiple nations. In such cases, the transboundary issues raised by Dales become apparent.

The setting of boundaries also affects market size. In the case of the offset market, within a narrow area, the market will not be well-competitive due to the limited number of suppliers and consumers, and this will affect price formation. In place, a contribution-type credit transaction could be considered, but consumers' incentives would not be well-enhanced since there is no politically set target.

"Biodiversity credits" may be effective. For making sure biodiversity conservation, the institutional design - particularly clear boundary definitions - would deserve careful scrutiny.

Keywords
carbon credits, tradable environmental rights, transparency, effectiveness, regionality

Estimation of Carbon Storage in the University of Tokyo Forests

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Abstract

Accurate and efficient estimation of forest carbon dynamics is essential for understanding the value of forests and thereby promoting green transformation. In this presentation, I introduce our trials to estimate carbon stock/sequestration in the University of Tokyo Forests and some related topics. We are estimating annual carbon sequestration of our university forests based on the stock, amount of logging, and the growth rate listed in the national forest statistical tables every year. Annual carbon sequestration in the university forests was 114 Kt CO_2 in 2024, which is corresponding to 80% of carbon emissions from our university. However, many technical challenges are remaining for more accurate estimation of the carbon dynamics. Recently, I am trying to high precision estimation of carbon stock/sequestration by machine learning analysis of canopy and terrain height data obtained by airborne LiDAR. So far, it is revealed that not only canopy height but also topographic variables such as Laplacian of DEM, which represents a trend from valley to ridge, are important for prediction of above ground biomass. Carbon stock in our Hokkaido site estimated by the new model was 2,049,193 MgC, which was slightly lower than 2,182,100 MgC based on the conventional method. I am planning to introduce some other examples of the use of machine learning and/or remote sensing to understand forest carbon dynamics.

Keywords

Carbon sequestration, Carbon stock, LiDAR, Machine learning

Role of University Forests in Achieving CO2 Net Zero on the Campus of Seoul National University

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Abstract

The Department of Forest Sciences, housed in the College of Agriculture and Life Sciences at Seoul National University, is dedicated to forest nurturing and sustainable resource production. It offers two majors: Forest Environmental Science (FES) and Environmental Materials Science (EMS). Major in Forest Environmental Science was established in 1906, FES is a vital field in environmental sciences focusing on forest-related environments, the world's crucial resources. FES manages forest ecosystems within complex political and social environments, contributing to conservation and management for society's increasing need for commodities, services, and a healthy environment. FES emphasizes global perspectives through international exchange programs: Collaborations with Hokkaido University (Japan) for northern hardwood forests and Bogor Agricultural University (Indonesia) for tropical rainforests. Summer field practices in Mt. Jiri and Mt. Baegun. Study tours to China, Japan, the Philippines, Nepal, Mongolia, Finland, and Russia. Seoul National University Forests (SNUFs) is composed of three regional University Forests: Nambu University Forests, Chilbosan University Forests, Taehwasan University Forests. Mission of Seoul National University Forests are to support education and field practice, experiment and research, development of technology, and conservation of ecosystems. In addition, SNUFs is contributing to local communities.

In order to create sustainable and eco-friendly campus, SNU operates an eco-friendly student council, 2) strengthens energy field monitoring activities, 3) participates in community services, and 4) forms an environmental club association. In addition, SNU is working to foster green leadership and to develop human resources. Through above activities, SNU is doing its best to reduce greenhouse gases and improve energy efficiency. Also, these activities are listed on the SNU Carbon Neutral Portal, providing members of the university with information and opportunities to participate. As of 2023, SNU emits 146,344 tons of greenhouse gas annually (or 12,195 tons per month). Among these, the allowable emission amount is 136,024 tones, which means that 10,320 tons are being over emitted annually. Accordingly, SNU carries out projects to improve lighting efficiency and replace ole equipment every year to reduce carbon emissions. SNU is also expanding solar power generation to increase the use of eco-friendly energy. SNU University forests are managing the forest healthily and seeking ways to cooperate with the local community to support SNU’s eco-friendly and carbon-neural policies.

Keywords

university forest, carbon neutrality, sustainability, eco-friendly, green transformation, SNU, forest sciences

Insect Fauna of Korea

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Abstract

Biological resources encompass all organisms and genetic materials with essential practical and potential value for human life. As foundational assets for the development of high-value products such as new crop varieties, advanced materials, and pharmaceuticals, biological resources are now at the center of growing international competition. The adoption of the Nagoya Protocol in 2010 and its enforcement in 2014 under the Convention on Biological Diversity (CBD) have drastically reshaped the global framework for access to genetic resources and benefit-sharing (ABS). Consequently, nations are intensifying efforts to document and manage native species to secure their sovereign rights over bioresources. Insects, accounting for more than 70% of all known species worldwide, serve as critical indicators of regional biodiversity. Recognizing this, the Korean government has actively supported insect fauna surveys. To date, 14,222 species have been recorded in Korea, spanning 1 subphylum, 2 superclasses, 31 orders, and 193 families. The most diverse orders include Coleoptera (4,719 species), Lepidoptera (4,149), Diptera (2,020), and Hymenoptera (1,223). Beyond simple taxonomic listing, insect fauna surveys form the scientific foundation for biodiversity conservation, bioresource sovereignty, ecosystem monitoring, and industrial applications. Continued, systematic surveys are essential for long-term biodiversity monitoring and for strengthening the evidence base underpinning national biodiversity policies.

Keywords

Insect fauna, biodiversity, Nagoya Protocol, bioresource sovereignty, Korea

Estimating species richness using mark-recapture framework: A case study with bird communities in different habitat types in nothern Vietnam

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Abstract

Quantifying species richness across habitat types is fundamental for assessing both conservation potential and biodiversity credits of ecosystems—yet directly surveying total species numbers remains prohibitively time-intensive, necessitating robust estimation methodologies. In this study, we compared avian species richness in pine plantations to that in second-growth and mature native forests in Tam Dao National Park, Vietnam using mark-recapture framework. Bird species were classified into two categories: forest specialists or forest generalists. To account for strong heterogeneity in detection probabilities, the number of species in each category was estimated using the Pledger-Huggins estimator. We estimated total species richness and number of forest specialist species to be highest in mature forest (191; 95% CI = 96, 287, and 88; 95% CI = 47, 129 respectively), lower in second-growth forest (158; 95% CI = 87, 245 and 58; 95% CI = 18, 98 respectively), and lowest in pine plantation (106; 95% CI = 52, 158 and 49; 95% CI = 2, 97 respectively). The estimated number of forest generalist species was similar between mature forest and second-growth forest (103; 95% CI = 17, 189 and 100; 95% CI = 42, 158, respectively) and least in pine plantation (57; 95% CI = 31, 82). The maintenance of native forest types should receive priority for conservation in Vietnam and pine plantations should be managed to provide additional structure in the hope of increasing species richness.

Keywords

Birds, avian communities, species richness; Mark-recapture

Beyond Forest Net-Zero: Vietnam's Forests as a Carbon Solution

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Abstract

Vietnam's forest sector has undergone a profound transformation, expanding its forest area from approximately 27.2 million hectares in the 1990s to over 42.02 million hectares today. This growth represents a significant achievement, particularly in the context of escalating climate change. Notably, the forestry sector remains the only sector in Vietnam to achieve net negative emissions, with a projected net emission reduction of approximately 46.6 million tons of CO_2 by 2030.

Beyond contributing to the national net-zero target, the forest sector is emerging as a key player in international climate finance through its engagement in forest carbon markets. Currently, two major emissions reduction initiatives are underway. The first, the Emission Reductions Payment Agreement (ERPA), has produced 10.3 million tons of verified emission reductions and secured payments totaling USD 51.5 million. The second, a transaction with the LEAF Coalition, is under validation and verification for 5.15 million tons of CO_2, with a similar valuation. These initiatives offer benefits that extend well beyond carbon mitigation. They improve the livelihoods of forest-dependent communities, safeguard over 6 million hectares of natural forests and critical biodiversity, and enhance Vietnam's technical and institutional readiness to operationalize a domestic forest carbon market by 2028.

Furthermore, many carbon credit-generating projects—particularly nature-based solutions such as reforestation, wetland restoration, and marine conservation—also deliver significant biodiversity co-benefits. In the evolving climate finance landscape, high-quality carbon credits are increasingly linked to biodiversity outcomes.

Ranked 16th in the world and 3rd in Asia for biodiversity richness, Vietnam holds substantial potential to participate in the emerging biodiversity credit market. However, this market differs fundamentally from carbon markets in terms of additionality, measurability, and verification. Therefore, Vietnam should prioritize research on these technical aspects and simultaneously develop a robust legal and regulatory framework to ensure market readiness and unlock opportunities in biodiversity finance.

Keywords

Vietnam forestry**,** Forest carbon market**,** Biodiversity credits.

Impact of Biodiversity on The Emergence of Forest Tree Diseases in The Tropics

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Abstract

Tropical forest diversity plays a crucial role in maintaining ecosystem stability and providing numerous benefits. Tree pests and pathogens are a natural part of ecosystems and play an essential role in forest dynamics. However, primarily due to human actions, such as global trade and climate change, the severity and frequency of tree disease outbreaks have increased worldwide. This paper aims to understand and provide examples of how biodiversity affects the emergence of forest tree diseases in the tropics, particularly in Indonesia. Root rot diseases caused by the Ganoderma fungus in monocultured planted forests have been spreading rapidly. In contrast, the incidence of diseases on urban trees, which comprise diverse species, is also gradually increasing, particularly among susceptible species. The Ceratocystis outbreak was more severe in the *Acacia mangium*-planted forest than in *Acacia deccurens* during natural regeneration after the Mount Merapi eruption. The rust fungi of *Uromycladium* spp. caused the gall rust disease outbreak in *Falcataria moluccana*, whether in monoculture-planted forests or the agroforestry of community forests with diverse species. However, mixed planting can support environmental conditions that are not conducive to the fungus, which can help reduce the spread of diseases. *Fusarium circinatum* caused the pitch canker outbreak on a *Pinus merkusii* plantation, which was also able to infect other plant species surrounding the pine trees, as the fungus has a wide range of hosts in tropical areas. Hence, the Myrtle rust, *Autropuccinia psidii*, was able to infect Myrtaceae species in both plantations and natural forests. However, the outbreak was devastating in the plantation forest. It was noted that in diverse forests, pathogens may have a harder time spreading because they are less likely to encounter their specific host tree species. This "dilution" of susceptible hosts can reduce overall pathogen impact. In conclusion, the relationship between biodiversity and forest disease is complex and multifaceted. While biodiversity can be a source of new pathogens, it also plays a crucial role in regulating the spread of disease and maintaining healthy ecosystems. Loss of biodiversity can exacerbate disease risks, highlighting the importance of conservation efforts to protect biodiversity. Studying the long-term effects of pathogens on forest dynamics and resilience is crucial for understanding how these interactions shape the future of tropical forests.

Keywords

biodiversity, pathogen, tropical forest, monoculture

Biodiversity and People in the City: A Fifteen-Year of Research Progress on Urban Forests

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Abstract

Biodiversity provides numerous benefits essential for human well-being and the health of the planet, including the provision of ecosystem services and recreational areas. In the concept of ecotourism and nature-based tourism, biodiversity is the asset that provides essential ecosystem services and products for sustainable use. However, rapid urbanization and the presence of urban areas can reduce species richness and lead to habitat fragmentation, often resulting in reduced biodiversity. Hence, the utilization of urban areas for biodiversity conservation and connectivity is essential, which is promoted by developing urban forests, where biodiversity meets people in the city. Urban forests play a crucial role in bridging the gap between human well-being and biodiversity conservation, as they provide recreational and tourism benefits in urban areas. This study aims to analyze fifteen years of research on urban forests, biodiversity conservation, and their interaction with urban populations, including preferences, perceptions, and behaviors. We utilize VOSviewer to conduct bibliometric mapping and keyword co-occurrence analysis, including clustering and thematic trends, on 83 open-access publications retrieved from Scopus databases and published between 2010 and 2025. In this analysis, five research clusters were identified: (1) biodiversity and urban ecosystem; (2) ecotourism and recreational; (3) visitor preference and well-being; (4) interaction between humans and environment; and (5) behavioral science and health. According to our findings, multidisciplinary research on urban forests has been conducted since 2020, with an emphasis on pro-environmental behavior, mental health, psychology, and ecosystem services. However, despite their rich biodiversity and rapid urbanization, tropical and developing cities are underrepresented in research, which remains spatially oriented toward the Global North. The results also reveal a significant gap between ecological studies and visitor-focused research, which need to be integrated for future studies. This study presents a conceptual framework that incorporates the environmental and sociological aspects of urban forest research. It highlights that to optimize the multipurpose advantages of urban forests, place-based, behaviorally informed, and multidisciplinary methods are necessary. Urban forests may be key platforms for biodiversity conservation, community participation, and improving public understanding and attitudes toward the environment as cities expand.

Keywords

Biodiversity conservation; ecotourism; urban forests; visitor behavior

UPLB's Commitment to Sustainability: Collaborative Efforts and Innovative Solutions

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Abstract

For UPLB, sustainability is a core principle as the national university on forestry/biodiversity, agriculture, environment, veterinary sciences, engineering, among other fields. Our efforts became more urgent at the height of the impacts of climate change in the last two decades that put premium on sustainability, in general and the SDGs in particular. It was a wakeup call and we needed to respond expeditiously. UPLB also realized that while internally, we needed to reinvigorate our programs with sustainability principles, we also realized that collaboration with like-minded educational and research institutions was a key strategy.

UPLB has recently rebranded our research and extension agenda into five focus areas, which are anchored under the umbrella of AGORA or accelerating growth through one research and extension in action. We have redirected our paradigm from the traditional top to bottom, to a demand driven, solutions driven approach. We consider our research ecosystem as a marketplace of ideas and proactive actions for finding solutions to the problems of food security, one health, impact of climate change, needs of future communities and institutions and bearing in mind social justice and culture.

These five focus areas drive our research and innovation. Anchored on the SDGs, we have aligned our research by explicitly identifying the focus areas that our research projects and programs address. UPLB has deliberately tagged the specific SDGs that our projects and programs address.

We have also expanded our efforts towards a whole of institution approach, thereby focusing not only on research and innovation but also in the other aspects of University operations, academic programs, and community engagement. To achieve this, we have established the UPLB sustainability program.

Keywords

SDGs, food security and sovereignty, resilience and sustainability, whole-of-institution approach

UPLB's University Forests as Sustainable Sanctuary: Protecting Biodiversity through Nature-Based Initiatives

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Abstract

The University of the Philippines Los Baños (UPLB) University Forests, notably the Mount Makiling Forest Reserve (MMFR) and UP Sierra Madre Land Grants, serve as vital ecological sanctuaries within the Philippine biodiversity hotspot. These areas exemplify effective integration of conservation and sustainable land management, functioning as critical habitats for diverse flora and fauna while supporting local communities and academic research. This paper tackles the biodiversity significance, conservation initiatives, and community engagement strategies associated with UPLB's University Forests. Specifically, the MMFR, with its diverse ecosystems ranging from lowland dipterocarp forests to montane forests, harbors numerous endemic and threatened species, highlighting its importance as a biodiversity refuge. The UP Sierra Madre Land Grants, historically designated for agricultural and research purposes, have evolved into protected areas that promote sustainable land use and ecological resilience. Key nature-based initiatives include reforestation programs, biodiversity monitoring, ecotourism, and community-based forest management schemes that aim to balance conservation with livelihood opportunities. These initiatives are reinforced by UPLB's academic and research activities, fostering scientific understanding and advocacy for biodiversity protection. Integration of traditional knowledge and innovative conservation practices enhances the effectiveness of these initiatives. Moreover, the Forest Reserve functions as a living laboratory for students and researchers, promoting ecological literacy and environmental stewardship. Challenges such as encroachment, illegal logging, and climate change necessitate continuous adaptive management and policy support. Overall, UPLB's University Forests exemplify a sustainable sanctuary model that aligns biodiversity conservation with local development, underscoring the importance of nature-based solutions in safeguarding the Philippines' rich biological heritage.

Keywords

University Forests, Mount Makiling, biodiversity conservation, nature-based initiatives, ecological resilience

Unlocking Biodiversity Credit Potential in Sri Lanka's Aquatic and Agro-Ecosystems

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Abstract

Sri Lanka, situated within a global biodiversity hotspot, hosts a mosaic of ecologically rich aquatic and agro-ecosystems that remain underrepresented in biodiversity financing mechanisms. While forest-based credit initiatives are gaining momentum globally, the biodiversity value embedded in riverine floodplains, mangrove forests, freshwater wetlands, and traditional agroforestry systems in Sri Lanka presents a largely untapped opportunity for conservation-linked financial innovation.

Aquatic habitats and agro-ecosystems such as Kandyan homegardens, lowland paddy mosaics, and estuarine mangroves exhibit high levels of species diversity, functional connectivity, and cultural heritage. These landscapes not only sustain ecological functions but also support rural livelihoods and climate resilience. Integrating such systems into biodiversity credit frameworks requires context-sensitive methodologies capable of capturing both ecological integrity and socio-economic co-benefits.

This presentation explores practical entry points for establishing biodiversity credit schemes rooted in these ecosystems. Drawing from field-based assessments and community-driven conservation initiatives—such as ongoing work in the Ittapana mangrove forest—it highlights approaches for developing robust Monitoring, Reporting, and Verification (MRV) systems using ecological and hydrological indicators. Emphasis is placed on participatory mechanisms, ensuring transparency, equity, and benefit-sharing with local communities.

Additionally, the discussion will explore alignment with emerging international frameworks for biodiversity credits and nature-based solutions, and the role of enabling policy environments in fostering scalable models. Sri Lanka's experience offers broader insights for tropical countries seeking to link biodiversity-rich production landscapes with sustainable finance mechanisms.

By operationalizing biodiversity credits in multifunctional landscapes, this work aims to demonstrate how ecological stewardship can be incentivized beyond protected areas—bridging conservation goals with national development priorities. The case of Sri Lanka illustrates how science, policy, and local knowledge can converge to unlock biodiversity value in ways that are measurable, marketable, and meaningful.

Keywords

Biodiversity credits, Aquatic and agro-ecosystems, Monitoring, Reporting & Verification, Participatory conservation, Nature-based finance

Towards Forest Carbon Net-Zero in Malaysia: Remote Sensing of Carbon Stocks

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Abstract

Achieving carbon net-zero is a national and global priority, and forests play a critical role in this effort by acting as carbon sinks. Borneo's rainforest, one of the world's most biodiverse ecosystems, is also essential to the global carbon cycle. However, increasing anthropogenic pressure—particularly in montane rainforests—demands robust conservation strategies, including REDD+ (Reducing Emissions from Deforestation and Forest Degradation, plus). Accurate quantification of aboveground biomass (AGB) is central to such strategies. This study estimates AGB in a montane forest of Sabah, Malaysia, using two high-resolution remote sensing approaches: optical imagery and airborne laser scanning (ALS). IKONOS imagery was preprocessed, segmented, and classified to distinguish intact from degraded forests. Tree crowns were extracted to estimate diameter-at-breast height (DBH) and calculate AGB. Results revealed clear differences in both AGB and biodiversity between forest types.

ALS provided more accurate and spatially consistent AGB estimates. Using multi-temporal ALS datasets, we applied an indirect modeling approach to assess AGB changes, achieving a low RMSE (1.413 Mg/ha/year; relative RMSE: 29.80%) and strong correlation with field data (R^2 = 0.988). Annual AGB changes were estimated at -7.49 Mg/ha/year (loss) and 8.91 Mg/ha/year (gain), with land-use conversion identified as the main driver of biomass loss. These findings demonstrate the complementary value of high-resolution remote sensing in forest carbon monitoring. While optical imagery supports classification and initial biomass estimation, ALS enables precise tracking of carbon stock changes over time. Integrating both approaches strengthens Malaysia's capacity to implement incentive-based conservation and measure progress toward forest carbon net-zero targets.

Keywords

Forest carbon monitoring; Forest degradation; Light detection and ranging; Borneo

The Development of Biodiversity Credit in Thailand

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Abstract

Thailand, recognized as one of the world's biodiversity hotspots, faces increasing ecological pressures from rapid urbanization, deforestation, and climate change. In response to these challenges, the country is advancing innovative financial mechanisms to enhance biodiversity conservation—most notably through the development of biodiversity credit systems. These credits quantify measurable conservation outcomes and may be transacted either to compensate for biodiversity loss or as part of voluntary conservation financing. Central to this initiative is the Thailand Biodiversity Finance Plan (BFP) 2023–2027, developed in collaboration with the United Nations Development Programme (UNDP). The BFP outlines strategic interventions to mobilize biodiversity finance by integrating ecological considerations into national development planning and promoting sustainable mechanisms such as biodiversity credits. Complementing this effort, the National Biodiversity Action Plan (NBAP) 2023–2027 articulates Thailand's priorities for protecting habitats and species, ensuring the sustainable use of biological resources, and mainstreaming biodiversity across various economic and policy sectors. Both frameworks are aligned with the Kunming-Montreal Global Biodiversity Framework, underscoring Thailand's international commitment to nature-positive development.

To guide the establishment of a high-integrity biodiversity credit market, the Biodiversity Credit Alliance (BCA) has issued a set of High-Level Principles. These emphasize verified and additional biodiversity outcomes, equitable benefit-sharing with Indigenous Peoples and Local Communities (IPLCs), and transparent, accountable governance structures. Adherence to such principles is fundamental for fostering trust, credibility, and environmental effectiveness. Pilot initiatives within Thailand—such as community-based mangrove restoration projects in Phetchaburi Province—illustrate the operational potential of biodiversity credits. These pilots, often structured as public–private–community partnerships, highlight the dual promise of biodiversity credits: to deliver measurable conservation impacts and generate socio-economic benefits for local stakeholders. Nonetheless, significant challenges remain. These include the absence of a formal legal framework, the need for standardized monitoring, reporting, and verification (MRV) methodologies, and ensuring that benefit-sharing mechanisms are inclusive and equitable. Addressing these gaps is essential for the maturation and scalability of biodiversity credit schemes in Thailand.

Keywords

Biodiversity Credit Thailand, Thailand Biodiversity Finance Plan, Biodiversity Credit Mechanism, Nature-Positive Investment, Equitable Benefit-Sharing

The carbon sink potential of forest and other land uses in carbon neutrality in Thailand

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Abstract

Thailand's geographical environment exposes its susceptibility to climatic effects, characterized by increasing above-average temperatures, variable precipitation patterns, an aging demographic, and a lengthy coastal region prone to erosion and rising sea levels. The nation's natural resources demonstrate both abundance and absorptive capacity, alongside deteriorating circumstances due to climate-induced disasters. Thailand's First Biennial Transparency Report (BTR1) indicates that overall greenhouse gas emissions, excluding those from the Land Use, Land-Use Change and Forestry (LULUCF) sector, increased from 251.42 million tCO_2eq in 2000 to 385.94 million tCO_2eq in 2022, reflecting an average annually increase of 1.97%. Nonetheless, the LULUCF sector's net CO_2 removal through carbon sequestration rose from 45.32 million tCO_2eq in 2000 to 107.90 million tCO_2eq in 2022.

Thailand has pledged to achieve carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065, as declared in its Long-Term Low Greenhouse Gas Emission Development Strategy (LT-LEDS). An essential element in this process is enhancing the carbon sink potential of the LULUCF sector. Thailand's BTR indicates that the country has sustained a transition from net emitter to sink in its LULUCF sector over the past decade. Building on these gains, Thailand has established a national goal through LULUCF programs to remove 120 million tCO_2eq annually. The objective is to elevate forest cover and green spaces to 55% of the national land area, with a focus on expanding the number of economic forests and Trees Outside Forests (TOF), including agroforestry corridors, riparian buffers, urban greening, and commercial tree planting. Six strategic pillars have been recommended to strengthen the forest sector's role in achieving carbon neutrality.

1. Ecosystem enhancement for forest expansion: Amending regulations to diminish obstacles to forest investment, promoting for landscape-scale restoration utilizing watershed units, and encouraging tree planting through financial instruments.
2. Circular wood utilization through innovation: Promoting for wood-based products as low-carbon alternatives, establishing markets and standards for sustainable forest products, and implementing building rules for engineered wood constructions.
3. Maintenance of carbon stocks through public-private partnerships: Enhancing community forestry, advancing agroforestry on degraded lands, and expanding payment for ecosystem services (PES) initiatives.
4. Wildfire management using technology and community engagement: Establishing early warning systems, community fire patrols, and risk mapping to mitigate carbon loss from fires, particularly in fire-sensitive peatlands and fire-dependent forests.
5. Advancement of forest carbon credit mechanisms: Improving MRV techniques for forest

carbon inside frameworks such as T-VER, REDD+, and international standards (e.g., Premium T-VER, Verra, Gold Standard) for enhancing carbon market readiness and credit valuation.

6. Enhancing awareness and education: Developing climate literacy among public officials, youth, and forest stakeholders using training, curricula, and national learning centers.

This presentation discusses Thailand's forest carbon sink potential within the context of the BTR and LT LEDS, along with pertinent measures. Policy insights will emphasize key strategies to enhance land-based carbon removal while supporting biodiversity, rural development, and ecosystem resilience in achieving the goal of carbon neutrality.

Keywords
LULUCF, Carbon neutrality, Climate change mitigation, Thailand

Ladies and gentlemen, dear friends,

As we draw the 2025 International Symposium on Biodiversity Credit to a close, I am honored to offer a few parting words on behalf of the organizing team at the Experimental Forest, College of Bioresources and Agriculture, National Taiwan University.

Over the past two days, here in the serene and life-filled setting of the Xitou Nature Education Area, we have come together—researchers, policymakers, practitioners, and advocates—from across Taiwan, Japan, Korea, Vietnam, Indonesia, the Philippines, Sri Lanka, Malaysia, Thailand, and beyond. We have shared insights, challenged ideas, and cultivated partnerships, all united by a common purpose: to explore innovative mechanisms for environmental sustainability.

This symposium has not only advanced our understanding of biodiversity credits—from theoretical foundations to practical case studies and regional policy pathways—but also marked a significant step forward with the signing of the **Asian Biodiversity Credit Alliance MOU**. This moment signals the emergence of a truly collaborative platform for nature-based solutions in our region.

I would like to extend my heartfelt thanks to the Ministry of Environment, the Ministry of Agriculture, the College of Bioresources and Agriculture, and the World Climate Foundation for their generous support. Deep gratitude also goes to every speaker, moderator, and participant for the knowledge, passion, and spirit you brought to each session. And to the staff and volunteers from the Experimental Forest—thank you for your tireless work behind the scenes. Most of all, we are grateful to this forest, which embraced us, grounded our conversations, and reminded us of why our work matters.

At the opening, I said there is no silver bullet to the dual crisis of climate change and biodiversity loss—but that collective action gives us hope. After these two days together, that hope has grown stronger. Your presence, your ideas, and your determination have shown that we are not alone in this journey. Together, we are beginning to shape a future where ecology, equity, and economy can thrive side by side.

Let us carry this spirit forward—into our institutions, our communities, and our daily decisions. The path ahead will not be easy, but if we continue to walk it together, step by step, we may yet leave behind a living, breathing planet for future generations.

Thank you once again for being part of this journey. I wish you all a safe journey home, and we look forward to welcoming you back to Xitou—where the forest will always be here to inspire and embrace us.

Prof. Ming-Jer Tsai
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