FORMATH MIYAZAKI 2025
Program: March 14 (Fri) - 15 (Sat)

March 14, 2025

09:50 ～10:00	**Opening Remarks**	Dr. Mitsuda	
1.	**Session 1 (Online and Poster)**	Coordinator: Dr. Chettri	
10:00 ～10:30	Demystifying Field Application of Critical Height Sampling in Estimating Stand Volume (Online)	Tzeng Yih Lam	The University of British Columbia, Canada
10:30 ～11:30	Quantifying the Carbon Sequestration Potential of Mongolia's Billion Tree National Movement Initiative	Sara Kim	Seoul National University Republic of Korea
	Study about the Mechanisms of Erosion in Deforested Areas by Point Cloud Data Analysis Using UAV Surveying and Field survey	Isao Okabe	Miyazaki University, Japan
	The characteristics of Drone lidar and multispectral camera sensing of camellia trees in Satsuma-iō island	Tsuyoshi Kajisa	Kagoshima Univ., Japan
	Biomass allometric equations for understory vegetation based on power function and mixed-effects models	Dayoung Kim	Seoul National University Republic of Korea
11:30 ～12:30	***Lunch***		
2.	**Session 2**	Coordinator: Dr. Obata	
12:30 ～13:00	Analysis of Forest Fire Risk Maps Using Ground-Based Datasets and GIS	Tereza Hüttnerová	Czech University of Life Sciences Prague, Czech Republic
13:00 ～13:30	Landslide Susceptibility Analysis of La Trinidad, Benguet Using Logistic Regression	Roscinto Ian C. Lumbres*	Benguet State University, Philippines
13:30 ～13:40	***Break***		
3.	**Session 3**	Coordinator: Dr. Forsell	
13:40 ～14:10	Application of ALS Data in Regional Forest Planning at Higashi-Ohmi, Japan	Shingo Obata	FFPRI, Japan
14:10 ～14:40	Benchmark of two AI systems for object detection in remote sensed images, Yolo vs Detectron	Peter Surový	Czech University of Life Sciences Prague, Czech Republic
14:40 ～14:50	***Break***		
4.	**Session 4**	Coordinator: Dr. Konoshima	
14:50 ～ 15:20	Efficiency Analysis of Experimental Forest Management Using Data Envelopment Analysis (DEA)	Gihyun Park	Seoul National University, Republic of Korea
15:20 ～ 15:50	Spatially Constrained Optimal Harvest Scheduling with Green Pathway for Time-Constrained Production	Ashi Yoshimoto	ISM, Japan
15:50 ～ 16:00	***Break***		
5.	**Session 5**	Coordinator: Dr. Takahashi	
16:00 ～16:30	The Economics of Social Forestry and Coffee-based Farming System	Bustanul Arifin	University of Lampung, Indonesia
16:30 17:00	Forecasting Coffee Data of Indonesia Using Vector Autoregressive Moving Average (VARMA) – Long Short-Time Memory (LSTM) Hybrid Model	Warsono	University of Lampung, Indonesia
17:00 ～17:30	Economic Impact Analysis of Regional Timber Utilization Using the Regional Input-Output Model in South Korea	Eunjeong Ahn	Seoul National University, Republic of Korea

March 15, 2025			
6.	**Session 6**	Coordinator: Dr. Mitsuda	
13:00 ～13:30	Calculation of forest emission/removal factors for implementing REDD+ in the Central Coast and Central Highlands region of Vietnam	Nguyen Dinh Hung	Forestry Inventory and Planning Institute, Viet Nam
13:30 ～14:00	First signs of global saturation of the Harvested Wood Products carbon pool	Nicklas Forsell	International Institute of Applied Systems Analysis, Austria
14:00 ～14:10	***Break***		
7.	**Session 7**	Coordinator: Dr. Han	
14:10 ～14:40	Economic benefits of mitigating climate change through adaptive planting in forestry	Patrick Asante	Ministry of Forests, BC, Canada
14:40 ～15:10	Estimating the availability of forest biomass resources from aggregated forests in Japan.	Kazuhiro Aruga	Utsunomiya University, Japan
15:10 ～15:20	***Break***		
8.	**Session 8**	Coordinator: Dr. Surový	
15:20 ～15:50	Urban forest cover and LST change monitoring through optical and thermal remote sensing approach	Nova Deyaen Doyog*	Benguet State University, Philippines
15:50 ～16:20	Automatic Identification and Accuracy Evaluation of Wild Boars in Camera Trap Images on the Sandy Beaches of Tokashiki Island Using YOLO Models	Masashi Konoshima*	University of the Ryukyus, Japan
16:20 ～16:30	***Break***		
9.	**Session 9**	Coordinator: Dr. Arifin	
16:30 ～17:00	Implication of Silviculture-based Forest Management at Lumbini Province, Nepal	BB Khanal Chettri	Tribhuvan Univ. Institute of Forestry, Pokhara Campus, Nepal
17:00 ～17:30	Site species suitability of Anes (*Fimbribambusa horsfildii* (Munro) *Widjaja*) and Banos (*Cyrtochloa toppingii* (Gamble) S. Dranf.) using GIS	Krystal Kate A. Polon*	Benguet State University, Philippines
17:30 ～18:00	**Closing Remarks & Business Meeting**	Dr. Kamo & Dr. Tonda	

*Only the presenter's name is listed

March 14 (Fri), 2025
10:00～10:30
Demystifying Field Application of Critical Height Sampling in Estimating Stand Volume

Tzeng Yih Lam (The University of British Columbia, Canada)

Critical Height Sampling (CHS) estimates stand volume free from any volume or tree taper model assumptions. Despite its introduction more than four decades ago, CHS has not been widely applied in forestry due to perceived challenges in measurement. The objectives of this study were to: (1) compare estimated forest volume between CHS and Horizontal Point Sampling (HPS) that used models, (2) the equivalence of the sampling methods, and (3) their efficiency. We established 65 field plots to test CHS and HPS in planted forests of two coniferous tree species in Taiwan. Results showed that CHS produced the most consistent estimated mean stand volume across Basal Area Factors (BAFs) and tree species compared to HPS. However, CHS was less precise and less efficient than HPS. None of the sampling methods were statistically interchangeable with CHS at an allowable tolerance of 55 m3ha-1. Contrary to the common belief, measurement of critical height was more accessible than expected because 72% of measurements were not obstructed by tree crown. Our study suggests that consistency in the mean estimates of CHS is a major advantage when planning a forest inventory. When checking against CHS, results hint that HPS estimates could contain potential model bias. These strengths of CHS could outweigh its lower precision. Lastly, CHS could potentially benefit forest management as an alternative option of estimating stand volume when models are lacking or are not reliable.

March 14 (Fri), 2025
10:30～11:30 **Poster Session**
P01: Quantifying the Carbon Sequestration Potential of Mongolia's Billion Tree National Movement Initiative

Sara Kim (Seoul National University Republic of Korea)

Mongolia is undertaking large-scale national initiatives to combat desertification and forest degradation driven by climate change. A key effort is the Billion Tree National Movement (BTNM), which aims to plant over one billion trees by 2030. This study assesses the carbon sequestration potential of BTNM using the EX-Ante Carbon-balance Tool (EX-ACT) developed by the FAO, under the assumption that BTNM is fully implemented. Findings indicate that BTNM could sequester approximately 26 million tCO2e annually, offsetting about 43% of Mongolia's projected BAU emissions in 2030. Among BTNM interventions, reducing deforestation and increasing forest restoration yield the highest impact, accounting for 71% of total sequestration potential. Additionally, diversified agroforestry and increasing water resources and supply contribute 16% and 13%, respectively. This preliminary assessment provides a quantitative basis for understanding BTNM's environmental impact in terms of carbon sequestration and serves as a critical reference for future carbon project investments and financial resources mobilization.

P02: Study about the Mechanisms of Erosion in Deforested Areas by Point Cloud Data Analysis Using UAV Surveying and Field survey

Isao Okabe (Miyazaki University, Japan)

Forest road construction and deforestation affect erosion and sediment runoff in mountainous areas. There has not been enough research focusing on sediment runoff after forestry operations, based on detailed topographic data. In 2024, UAV surveys using drones were conducted before and after the rainy season in the municipal forest logging area of Miyazaki City. Additionally, field surveys were conducted in the target area to add information that could not be obtained from the point cloud data analysis.
Point cloud analysis revealed erosion in areas such as the upper part of the cut slope, where rainwater collects. Some of the eroded soil from the cut slope was found to have flowed out without accumulating. Field surveys indicated that the small landslide of the cut slope was influenced by wet and dry conditions and weathering. No vegetation was observed in the small landslide areas of the cut slope. The top of the cut slope had vegetation, root, and litter, creating an environment less prone to erosion, so the small landslide occurred from the under area of the top. This collapse exposed the lower soil layer which had less organic matter was less conducive to vegetation growth. The soil that collapsed due to weathering was dry and loose, making it easy to scatter and flow out due to wind and rain, even if it accumulated at the bottom. If sediment does not accumulate at the bottom of the small landslide area, the slope will not stabilize unless it is significantly eroded, suggesting that the amount of sediment erosion may increase in the cut slope areas where forest load is established.

P03: The characteristics of Drone lidar and multispectral camera sensing of camellia trees in Satsuma-iō island

Tsuyoshi Kajisa (Kagoshima University, Japan)

Camellia oil is produced on Iwo Jima as part of regional development. Although the primary production area has expanded, some camellia forests have been abandoned due to the decline and aging of producers, and the current camellia resources are unknown. Therefore, in order to understand the current camellia resources, including abandoned camellia forests, we conducted wide-area observations using drone lidar and multi-spectral camera, and analyzed the characteristics of the camellia forests. The analysis compared camellia, Ryukyu bamboo, and black pine trees using reflectance obtained from the drone lidar and DCHM obtained by subtracting DSM obtained from the first pulse and DEM obtained from the last pulse. In addition, the multispectral camera was analyzed for red edge and near infrared wavelengths in addition to RGB. The drone llidar analysis showed that the reflectance of camellia was lower than that of other black pine and Ryukyu bamboo species distributed on Iwo Jima. The camellia forest also had the lowest canopy height (DCHM). On the other hand, the multispectral camera's reflectance showed that the reflectance of camellia forest was higher than that of other tree species at the red edge and near infrared wavelengths.

P04: Biomass allometric equations for understory vegetation based on power function and mixed-effects models

Dayoung Kim (Seoul National University Republic of Korea)

This study aimed to develop biomass allometric equations for understory vegetation in Korean pine (*Pinus koraiensis*) forests using power function and mixed-effects regression model. The research was conducted in a 61-year-old Korean pine stand on Mt. Taehwa, Gyeonggi Province. Understory vegetation was classified into young trees and herbaceous layers, with individual-based field measurements and destructive sampling performed. Various morphological characteristics of the understory vegetation were used as predictors to estimate the total biomass of individual plants. Power function and mixed-effects models were employed to construct regression equations. Among the independent variables tested, the most effective predictor for young trees was the product of diameter at root collar squared and height. For the herbaceous layer, the combination of stem number and stem length provided the most accurate biomass estimates. In contrast, using vegetation height alone as an independent variable resulted in poor estimation accuracy, likely due to challenges in precisely measuring understory vegetation height and its susceptibility to environmental variability. The mixed-effects model accounted for differences between vegetation types within a single model, eliminating the need for separate models for each type. This approach mitigated sample size constraints and enhanced the accuracy of biomass estimation. Further studies on understory vegetation biomass estimation across various forest types and species are needed to improve assessments of forest resources and carbon stocks.

March 14 (Fri), 2025
12:30～13:00
Analysis of Forest Fire Risk Maps Using Ground-Based Datasets and GIS

Tereza Hüttnerová (Czech University of Life Sciences Prague, Czech Republic)

This study analyzes fire risk and post-fire vegetation regeneration in the Bohemian Switzerland National Park using GIS-based spatial analysis and remote sensing. Fire risk assessment was conducted using topographic factors derived from a digital terrain model created from LiDAR data collection. The DTM was processed in ArcGIS Pro, with topographic variables such as slope, aspect, altitude, and the topographic wetness index calculated using hydrological and spatial analysis tools. The study area ranges from 123 to 620 meters in elevation, with the lowest areas showing the highest fire risk due to lower humidity and higher temperatures. South-facing slopes were classified as the most fire-prone, receiving the highest solar radiation. Fire distribution can be also influenced by slope steepness, as steeper terrain accelerates fire spread due to increased surface wind velocity and lower soil moisture retention. After the fire, a field inventory was conducted to assess the severity and intensity of the affected areas. This field dataset was used to evaluate the relevance of the variables from the DTM to determine the importance of these variables. This study can serve as a strategic mapping basis for the remaining park area, which is also susceptible to forest fires due to the large number of dead trees.

March 14 (Fri), 2025
13:00～13:30
Landslide Susceptibility Analysis of La Trinidad, Benguet Using Logistic Regression

Roscinto Ian C. Lumbres (Benguet State University, Philippines)

The analysis and identification of landslide-prone areas have become significant in minimizing the precarious impacts of landslide hazards, which can result in fatalities, damage to infrastructure, and destruction of natural resources. This study was conducted to analyze the landslide susceptibility of La Trinidad, Benguet by examining the relationship between the historical landslide occurrences and various causative and triggering factors, using the logistic regression method. Specifically, this study aimed to assess the impact of different factors including aspect, elevation, proximity to rivers, distance to roads, land use and land cover (LULC), lithology, normalized difference vegetation index (NDVI), precipitation, slope, and soil texture on landslide occurrences, and evaluate the model performance using the receiver operating characteristics (ROC) and true skills statistics (TSS) metrics. The analysis of landslide susceptibility was performed through a series of steps that included (a) collecting data of past landslide events and causative and triggering factors; (b) conducting a multicollinearity test on the identified factors; (c) assessing landslide susceptibility using logistic regression; (d) determining the contribution of each factor; and (e) evaluating the model's performance with the ROC and TSS metrics. The generated landslide susceptibility map was divided into two categories: susceptible and not susceptible, through a binary classification method. The findings revealed that 463.50 hectares (ha), which represents 6.06% of the total land area, are at risk of landslides. On the other hand, 7,181.48 ha, accounting for 93.94%, were classified as not susceptible. The areas classified as susceptible to landslides generally exhibit features such as high density of population, settlements, and infrastructure. Furthermore, among the 10 identified causative and triggering factors, distance to road, slope, and NDVI are noted as the most significant variables influencing landslide susceptibility in the study area, contributing 65.37%, 11.21%, and 8.01% respectively. In addition, the computed ROC value is 0.90, while the TSS is 0.66, which corresponds to 90% and 66%, respectively. These values for the two-evaluation metrics indicate that the logistic regression approach effectively and accurately classified landslide-susceptible areas within the study area. The results of this study provide significant information, highlighting the importance of integrating landslide susceptibility assessments into the municipality's land-use planning, sustainable development, disaster risk reduction, and decision-making processes. Keywords: causative and triggering factors, disaster risk reduction management, hazard susceptibility analysis, multicollinearity test, receiver operating characteristics (ROC), and true skills statistics (TSS)

March 14 (Fri), 2025
13:40～14:10
Application of ALS Data in Regional Forest Planning at Higashi-Ohmi, Japan

Shingo Obata (FFPRI, Japan)

Despite the nationwide acquisition of Airborne Laser Scanning (ALS) data in Japan, forest planning still relies heavily on forest management inventories (FMI). While ALS data is widely used for resource assessment and ownership delineation, its application in long-term forest management remains limited. This study explores the integration of ALS data into regional forest planning, focusing on constructing stand density management diagrams (SDMD) and optimizing forest management strategies. Additionally, ALS-derived estimates are compared with FMI data to assess their effectiveness in resource evaluation. The study was conducted in Higashiomi City, Japan, where both ALS and FMI data were available. ALS-derived mean tree height and stand density were combined with FMI data to develop growth models. Timber volume was estimated using ALS-based individual tree measurements and compared with FMI-based estimates. The results showed that FMI-based timber volume estimates were significantly lower than those derived from ALS data, suggesting a systematic underestimation of forest resources in traditional inventory-based assessments. This discrepancy highlights potential limitations in using FMI as the primary data source for forest planning and emphasizes the need to incorporate ALS-derived information for more accurate resource evaluations. Building on these findings, I plan to construct SDMDs using the derived growth and mortality functions to better model stand dynamics. Additionally, a spatially explicit linear programming model will be implemented to determine optimal forest management plans fully based on empirical ALS data.

March 14 (Fri), 2025
14:10～14:40
Benchmark of two AI systems for object detection in remote sensed images, Yolo vs Detectron

Peter Surový (Czech University of Life Sciences Prague, Czech Republic)

Dead tree detection is a critical task in forestry monitoring, enabling early intervention to prevent forest degradation, pest outbreaks, and especially wildfire risks. Advances in AI-driven instance segmentation provide powerful tools for automatization of this process using high-resolution aerial imagery, including near-infrared (NIR) data, which enhances vegetation health differentiation. However, the role of image preprocessing in optimizing segmentation accuracy remains underexplored. This study investigates how various preprocessing techniques, such as normalization, contrast enhancement and spectral transformations, influence the performance of instance segmentation models applied to dead tree detection. Using deep learning frameworks Detectron2 and YOLO, we compare model outputs trained on raw imagery versus preprocessed datasets. The evaluation considers key metrics, including Intersection over Union (IoU), Mean Average Precision (mAP), and processing efficiency, to determine the impact of preprocessing on segmentation accuracy and generalizability. Preliminary findings suggest that preprocessing methods can improve the distinguishing of dead trees from healthy vegetation in NIR false color imagery.

March 14 (Fri), 2025
14:50～15:20
Efficiency Analysis of Experimental Forest Management Using Data Envelopment Analysis (DEA)

Gihyun Park (Seoul National University, Republic of Korea)

Experimental forests are essential resources for advancing forest science and technology development, yet their management and operational systems in South Korea remain suboptimal. This study evaluates the efficiency of experimental forest management using Data Envelopment Analysis (DEA). The CCR (Charnes-Cooper-Rhodes) and BCC (Banker-Charnes-Cooper) models were applied to measure technical efficiency (TE), pure technical efficiency (PTE), and scale efficiency (SE). A slack-based analysis (SBM) was also conducted to identify inefficiencies. The results reveal that while some experimental forests exhibit inefficiencies under the assumption of constant returns to scale (CRS), their efficiency improves under variable returns to scale (VRS). This suggests that inefficiencies arise not only from resource limitations but also from suboptimal management and operational strategies. The findings provide policy insights for improving experimental forest management and serve as a foundation for future systematic management and research promotion.

March 14 (Fri), 2025
14:50～15:20
Spatially Constrained Optimal Harvest Scheduling with Green Pathway for Time-Constrained Production

Ashi Yoshimoto (ISM, Japan)

Sustainable forest management requires optimizing harvest scheduling while balancing economic, ecological, and operational constraints. This study develops a spatially constrained optimal harvest scheduling model that integrates a green pathway to enhance sustainability and mitigate environmental impact. The model incorporates time-constrained production, addressing species-specific harvesting cycles, such as bamboo, which has both minimum and maximum rotation requirements, to ensure continuous resource availability and long-term productivity. By employing spatiotemporal optimization, the model ensures efficient timber and biomass extraction while maintaining biodiversity, soil stability, and regulatory compliance. Computational experiments demonstrate the effectiveness of this approach in optimizing harvest decisions while promoting sustainable landscape management. The findings contribute to advanced forest planning by integrating spatial optimization with dynamic harvest constraints.

March 14 (Fri), 2025
15:30～16:00
The Economics of Social Forestry and Coffee-based Farming System

Bustanul Arifin (University of Lampung, Indonesia)

The research examines the economics of social forestry and its relations with coffee-based farming system in the buffer zones of Bukit Barisan Selatan (BBS) National Park in the Province of Lampung, Indonesia. Field investigations were conducted in the District of Tanggamus, primarily in Sub-districts of Air Naningan, focusing in the villages of Datar Lebuay and Sinar Jawa, which are adjacent to the BBS National Park. Direct interviews were conducted with a total of 123 samples of farmers' households, having coffee farming in the private land and in the state-owned protection forest land. Observations were focused on collecting the data on land-use, land-holding, farming system, multi-purpose tree species (MPTS). Farm-economic analysis is employed to estimate the profitability of coffee farming system under the social forestry policy. The research finds that 54.47 precent of farmers' household in the study area are practicing social forestry and growing coffee agroforestry inside the protection forests, while the rest 45,53 percent are practicing social forestry in the private or community land. The average age of household's head is 42 years old, having 3.44 family members, 17.22 years of farming experience, and the majority is finishing elementary and junior high school. The average age of coffee plant is 13.41 years, amounting 2,919 coffee trees, and the holding size for coffee farming is 1.62 hectare, which is generally quite small. The coffee farming system in the study area has generated household income of Rp 23.5 million per year in the private land and Rp 22.7 million per year in the protection forest. In addition, farmers are also growing non-timber MPTS, primarily jengkol (black-bead), pete (stink bean), durian, avocado and pinang (palm tree), which generates revenue about Rp 0.74 million in private land and Rp 1.39 million in the protection forest. In terms of social forestry performance, farmers in the study sites are really concerned about legal status of agroforestry system, technical guidance on farm production and MPTS, and participation in forestry conservation. In terms of coffee agroforestry system, farmers are concerned about the transparency and accountability of agroforestry farmers' association, security of land access, and access on agricultural extension agents.

March 14 (Fri), 2025
16:00～16:30
Forecasting Coffee Data of Indonesia Using Vector Autoregressive Moving Average (VARMA) – Long Short-Time Memory (LSTM) Hybrid Model

Warsono (University of Lampung, Indonesia)

Forecasting in the preparation of policies related to coffee exports and imports is highly strategic in the context of managing a global economy that is full of dynamics and uncertainty. This research proposes the development of a hybrid model combining the Vector Autoregressive Moving Average (VARMA)-Long Short-Term Memory (LSTM) networks for Forecasting multivariate time series data of Indonesia's coffee export and import values. The proposed hybrid multivariate time series forecasting model proposed represents a significant advancement in predictive analytics, with its ability to effectively capture complex temporal dependencies and nonlinear relationships while maintaining interpretability.

March 14 (Fri), 2025
16:30～17:00
Economic Impact Analysis of Regional Timber Utilization Using the Regional Input-Output Model in South Korea

Eunjeong Ahn (Seoul National University, Republic of Korea)

This study analyzes the economic impact of integrating timber production, processing, and utilization within a region by constructing a regional input-output model. To capture the economic dynamics of the timber industry, industrial sectors were reclassified with a focus on the timber value chain, and inter-industry relationships were examined. The model was applied to Chuncheon City, South Korea, to calculate location quotients and assess the production and employment-inducing effects when timber produced within the region is processed in a local timber industrial complex and subsequently utilized within the city. The results indicate that timber-related industries are specialized in the region with a production-inducing effect of approximately 1.3 times the initial input and an employment-inducing effect of 0.8 jobs per 100 million KRW invested. Chuncheon City possesses the necessary infrastructure to establish a complete timber value chain, spanning from raw timber production to processing and utilization, and strengthening inter-industry linkages could further amplify economic benefits. The findings also confirm that economic ripple effects increase as local timber consumption grows, underscoring the potential of active regional timber utilization in fostering economic revitalization. By providing a quantitative assessment of the economic impact of local timber resource use, this study offers a scientific foundation for developing region-specific forest policies and promoting the timber industry.

March 15 (Sat), 2025
13:00～13:30

Calculation of forest emission/removal factors for implementing REDD+ in the Central Coast and Central Highlands region of Vietnam

Nguyen Dinh Hung (Forestry Inventory and Planning Institute, Viet Nam)

Vietnam has signed an Letter of Intent with LEAF/Emergent to implement REDD+ in the 11 provinces of the Central Highlands and South Coastal Central regions. In this work, the sample plots data collected in the National Forest Inventory, Monitoring and Assessment Project period 2016-2020 were used to calculate the forest emission/removal factors for the whole project area. A stratification system of 12 forest types and 5 non-forest land-use classes was used. The sample plot data were used to calculate the AGB densities of those 12 forest types in the project area. BGB densities of these forest types were calculated using IPCC's default root-to-shoot ratios. IPCC's default values of dead-wood and litters were used together with the calcuated AGB and BGB densities to estimate the forest carbon densities of each forest type. The carbon densities of all non-forest land-use classes were assumed to be zero. Next, the emission/removal factors were calculated for all forest and land-use transitions. Finally, these emission/removal factors were used to develop the crediting level as well as the emission reduction result for the LEAF/Emergent project.

March 15 (Sat), 2025
13:30～14:00

First signs of global saturation of the Harvested Wood Products carbon pool

Nicklas Forsell (International Institute of Applied Systems Analysis, Austria)

Throughout the world, forests play a vital role in the global carbon cycle as well as in the fight against climate change by acting as carbon sinks and storage facilities. Harvested Wood Products (HWP) continue to contribute to the forest's carbon cycle even after trees have been harvested. Wood materials are harvested from forests and used for a variety of purposes, such as furniture, plywood, paper, and even as energy sources. The global carbon stock in HWP has grown significantly over the past two decades, establishing them as one of the most critical reservoirs for combating climate change. However, while numerous studies have shown the future potential in terms of increasing the global size of the HWP carbon pool, first signs are evident in National GHG Inventories that the current size of the carbon pool is being saturated. In this study we will showcase the first signs of the saturation and discuss means to combat this trend.

March 15 (Sat), 2025
14:10～14:40
Economic benefits of mitigating climate change through adaptive planting in forestry

Patrick Asante (Ministry of Forests, BC, Canada)

Previous studies have examined the economic trade-offs of climate change mitigation in forestry. However, most have not explicitly accounted for the impact of climate change on productivity or the value of carbon sequestration when considering the higher costs of adaptive planting. Here we build on previous studies from northwestern Canada, using the Woodstock optimization model to assess the economic trade-offs of the standard and two adaptive planting regimes under historical climate and a severe climate change scenario. We considered planting and harvesting costs and revenue from timber and carbon sequestration over 100 years. The analyses were done at a forest level using a continuous production process to identify the best combination of stand-level management to achieve multiple objectives, because that is consistent with strategic decision-making on public land in North America. Our results showed there are potential negative risks from climate change to: harvest volumes, net present value, growing stock, and ecosystem carbon sinks. Despite increased regeneration costs, we found some risk mitigation through adaptive planting, with the greatest benefits through diversification which had higher net present value, growing stock and ecosystem carbon than historic climate with standard stocking. This was a result of planting more valuable species, higher growth rates in mixed stands, and adaption of novel species to new climates. Adaptation through novel planting regimes is a cost-effective forest management strategy that can potentially offset some negative impacts of climate change.

March 15 (Sat), 2025
14:40～15:10
Estimating the availability of forest biomass resources from aggregated forests in Japan

Kazuhiro Aruga (Utsunomiya University, Japan)

This study estimated the availability of unused materials for woody biomass power generation plants under operation with FIT at the end of June 2020 as the supply potential from the profitable aggregated forests. As a result, supply potentials of used and unused materials were estimated at 65,413,601 m3/year and 13,082,720 m3/year, respectively whereas those availabilities were estimated at 54,202,304 m3/year and 10,840,481 m3/year respectively. Therefore, the rate of the availabilities to the supply potentials was 82.9%. Furthermore, the rate of the availabilities to the demands was 124.8%. With woody biomass power generation plants registered in FIT at the end of June 2020, the rate of the availabilities to the demands was 98.5%. Considering the subsidy rate of 100% to secure the reforestations, the availabilities met the current demands in Japan as a whole.

March 15 (Sat), 2025
15:20～15:50
Urban forest cover and LST change monitoring through optical and thermal remote sensing approach

Nova Deyaen Doyog (Benguet State University, Philippines)

Integrated monitoring of urban forest cover and land surface temperature (LST) can serve as a baseline for urban planners and legislators to assimilate multi-temporal data to interpret the status and trend of reducing carbon emissions from the loss of urban forest cover over time. With the spectral and thermal information that the optical and thermal remote sensing data offer, the forest cover of Baguio City, Philippines in 2010 and 2020 using Landsat-5 and Sentinel-2, respectively, were monitored through random forest (RF) technique and the LST during the cold and hot seasons was estimated using multi-temporal Landsat-5 and 8 imageries through a single-channel algorithm. The atmospheric and illumination effects on the surface reflectance of the Landsat and Sentinel images were corrected using Fast Line-of-sight Atmospheric Analysis of Hypercubes (FLAASH) and Atmospheric and Topographic Correction (ATCOR) methods, respectively. The pansharpening technique was also performed for the Sentinel image and resampling for the Landsat images. The result showed that the forest cover and built-up areas classification in 2010 had an overall accuracy of 0.95 and a kappa coefficient of 0.90 while in 2020 had 0.98 and 0.97. A forest cover loss rate of 0.34%/year was observed from 2010 to 2020 attributed to man-made activities like road widening and construction of business establishments. It was revealed that the forest cover has lower LST and LST changes than the built-up areas and it was observed that the wider the area coverage of the forest cover, the lower the LST and LST change. In conclusion, the forest cover has a cooling effect on the environment and minimizes the LST changes, thus, should be protected and restored. Moratoriums on tree-cutting and reforestation activities are eyed as strategic approaches to preserving, managing, and expanding Baguio City's forest cover. Keywords: image enhancement; optical and thermal multi-temporal data; urban forest degradation; urban temperature

March 15 (Sat), 2025
15:50～16:20
Automatic Identification and Accuracy Evaluation of Wild Boars in Camera Trap Images on the Sandy Beaches of Tokashiki Island Using YOLO Models

Masashi Konoshima (University of the Ryukyus, Japan)

Due to its diverse diet and rooting behavior, the non-native wild boar (Sus scrofa) poses significant conservation challenges worldwide. On Tokashiki Island, Okinawa, Japan, introduced wild boars cause various environmental damages, including predation on rare species and increased red soil runoff. In recent years, concerns have grown over their predation on sea turtle eggs, a key tourism resource. To mitigate this threat, effective and efficient capture methods are essential. Camera trap monitoring provides crucial insights into wild boar predation behavior, helping improve control efforts. However, manually identifying and analyzing wild boars in the vast number of images and videos, most of which are false trigger events, is highly labor-intensive and time-consuming. Recently, deep learning-based object detection techniques have gained attention as promising tools for wildlife monitoring. This study evaluates the accuracy of seven YOLO-based “one-stage object detection” models (GELAN, YOLOv9, and YOLOv10) using image datasets from motion-sensor camera traps set up on sea turtle nesting beaches in Tokashiki Island. The survey recorded a total of 226.6 hours of video, of which 95% (214.4 hours) consisted of empty footage. The videos also captured goats (6.5 hours) in addition to wild boars (2.1 hours). Among the seven models tested, GELAN-C achieved the highest accuracy (Precision: 0.96, Recall: 0.89, AP_0.5: 0.93). For wild boar videos (74 clips), the model correctly identified 92% (68 clips). For empty footage (29 clips), it correctly identified 72% (21 clips). With this accuracy, approximately 70% of the empty footage can be pre-filtered, reducing the required video review time by about 155 hours.

March 15 (Sat), 2025
16:30～17:00
Implication of Silviculture-based Forest Management at Lumbini Province, Nepal

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Silviculture-based forest management is extensively implemented in Lumbini Province of Nepal, with the aim of regulating sustained yield while preserving regeneration and species composition. This study evaluates the regeneration status and timber production of silviculture-based forest management in community, collaborative, and block forests across the 12 districts of Lumbini Province. Data collection involved office records and field inventories. Results indicate that the overall regeneration status at silviculture-based forest management in the province is higher than that reported by national forest inventories of Nepal, with significant variations among the different management regimes and the districts. The seedling and sapling densities varied; in community forests, seedling density was 16000 per hectare which is higher than the density found in block (15000 per hectare) and collaborative (13000 per hectare) forests. Similarly, the sapling density was 7000 per hectare in the Hill and 5500 per hectare in the Terai. There occurred a significant difference in timber production between the Terai and Hills regions. The average annual timber production from community forests was 3869.1 cft and 7797.7 cft in the hills and Terai, respectively. The study underscores the importance of regeneration management, advocating for equal focus on regeneration and regeneration felling. It recommends maintaining species composition based on natural growth patterns and suggests conducting panel studies to support policy interventions promoting silviculture-based forest management in the future.

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Site species suitability of Anes (Fimbribambusa horsfildii (Munro) Widjaja) and Banos (Cyrtochloa toppingii (Gamble) S. Dranf.) using GIS

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Anes (Fimbribambusa horsfieldii (Munro) Widjaja) and Banos (Cyrtochloa toppingii (Gamble) S.Dranf.) are climbing bamboos that have potential in economic value and forest restoration. Both of the species serve as a substitute for wood and rattan not only in the handicraft industry but also in the making of furniture like chairs and tables. For sustainability and increase of production and distribution of this species, this study was therefore conducted to develop a species-site suitability map for F. horsfieldii and C. toppingii in Benguet to identify areas that are most suitable for the crop matching its species' silvical requirements and also, to serve as a basis for future reforestation and biodiversity conservation activities. To identify the species' silvical requirements, specific locations of F. horsfieldii and C. toppingii were collected in Banayakeo, Atok, Benguet where the bamboos dominantly grow. Thematic maps of soil texture, land use and land cover, topography, climate, and slope of Benguet were generated and used as parameters for site suitability analysis. The weights of each parameter were assessed using the Analytic Hierarchy Process (AHP). Afterwards, a species-site suitability analysis for the whole Benguet province was done using a GIS platform using weights of each site factor. Results showed that the municipalities of Itogon, Tuba, Buguias, Mankayan, Bokod and Atok have more highly suitable areas for F. horsfieldii and C. toppingii signifying that the species can be productive within the existing environmental conditions of the identified areas. Among them, Itogon has the most dominant areas that are highly suitable with an area of 18,820.24ha which equates to 6.64% of the total province area. Whereas, Kibungan has the least areas that are highly suitable with 69.16 ha representing 0.02% of the total province area. Furthermore, Bakun was identified to have the most dominant areas that are not suitable for the bamboo species with a total area of 13, 864.42 ha representing 4.89% of the total province area. Keywords: sustainable bamboo production; AHP; handicraft industry.