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Thesis/Practicum Reports
Institute of Renewable Natural Resources
2023

Title:	**The Recreational Value of the Manila Baywalk Dolomite Beach Philippines**
Author:	**Abregana, Kevin Daryl Malibiran**
Adviser:	**Calderon, Margaret M.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The Manila Baywalk Dolomite Beach Project (MDBP) is a beach nourishment project of the Department of Environment and Natural Resources (DENR) and Department of Public Works and Highways (DPWH). Despite the massive disapproval and calls to halt the project due to its perceived environmental and economic costs, no benefit-cost analysis (BCA) has been conducted to assess whether the project is worthwhile. This study estimated the benefits derived from the Manila Baywalk Dolomite Beach (MBDB) by developing the recreation demand function and estimating its annual recreational value using the individual travel cost method (ITCM). It was found that MBDB visitors generally have a positive overall mood when visiting the beach, a good present image of the Manila Baywalk, obtain health benefits in all dimensions from visiting the beach, and have positive perceptions about the MDBP. The estimated annual recreational value of MBDB is PhP 116.28 million per year. The study findings can be used by the MBDB management in improving the management and sustainability of MDBP. Researchers may also use the estimated values in valuing similar ecosystems using value transfer and in doing the BCA of MDBP.

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Title:	**Development and Evaluation of Diameter-Height Models For Selected Forest Stands in Mt. Makiling Forest Reserve (MMFR), Philippines**
Author:	**Altamerano, Robbie Marc Calleja**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Production and Industrial Forestry**
Type:	**Thesis**
Abstract/Executive Summary:	Height-diameter relationships play a crucial role in understanding forest dynamics and sustainable management. In this study, thirteen nonlinear models were tested to establish height-diameter relationships for the trees in Mt. Makiling Forest Reserve (MMFR). The models considered were Asymptotic, Exponential, Gompertz, Logarithmic, Logistic, LogLogistic, Lorentz, Michaelis-Menten, Modified Gompertz, Polynomial, Power, Weibull I, and Weibull II. Data collection was conducted at three study sites within MMFR, namely PFLA 1, PFLA 2, and PFLA 3. The variables measured were tree height and diameter at breast height, which were later divided into a training set (70%) and a validation set (30%). The training set was utilized for model development using the RStudio NLS function, which facilitated parameter estimation. To assess the performance of the developed models, various fit statistics, including R2, Adjusted R2, R2 Difference, RMSE, MSE, RSE, MAE, and RAE, were employed. The evaluation criteria results were ranked according to the method proposed by Poudel and Cao (2013). Consequently, the best-fit models for each study site were identified as follows: Logistic Model for PFLA 1, Modified Gompertz Model for PFLA 2, and Quadratic Polynomial Model for PFLA 3. Subsequently, the identified best-fit models underwent data validation using the remaining 30% of the data. The validation process revealed that the predicted values from the models were not significantly different from the observed values, indicating a high degree of accuracy. Thus, the Logistic Model, Modified Gompertz Model, and Quadratic Polynomial Model were deemed suitable functional models for height-diameter relationships in the MMFR forest stands. These findings contribute valuable insights into the forest management practices in Mt. Makiling Forest Reserve, enabling better

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	prediction of tree heights based on diameter at breast height. Furthermore, the developed models provide a foundation for assessing forest dynamics and supporting decision-making processes for sustainable forest management.
Title:	**Examining the Profile, Tree Diversity, and Functions of Plaza Rizal Greenery in Lapu Lapu City, Cebu, Philippines**
Author:	**Ballesteros, Sophia Julia Mallare**
Adviser:	**Andrada, Rogelio T., II**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Urbanization is an undeniable global force reshaping landscapes, and Metro Cebu, Philippines, exemplifies the challenges associated with rapid urban expansion. Within this dynamic urban context, Lapu Lapu City stands as a prominent hub, emblematic of urban sprawl. To address the pressing issues of biodiversity loss and urbanization impacts, the Global Future Cities Programme (GFCP) emphasizes sustainable planning with a focus on urban green spaces. Urban forests, essential for mitigating urbanization's adverse effects, play a pivotal role in ecosystem services and environmental quality. Despite their significance, knowledge of urban tree diversity and ecological functions in Lapu Lapu City remains limited. This study concentrates on Plaza Rizal, the city's sole public park, to analyze tree diversity, distribution, condition, and management. The park serves as a crucial urban green space offering various ecosystem services, including air purification, microclimate regulation, and noise reduction, enhancing human well-being and disaster resilience. Utilizing a mixed-methods research design encompassing qualitative and quantitative approaches, this research assesses Plaza Rizal's greenery. The inventory reveals remarkable diversity with 10 families and 38 species documented, dominated by the Fabaceae family. Notably, White Teak, Mahogany, Mabolo, and Trumpet trees emerge as key species, contributing significantly to the park's composition. These trees primarily function as shade and boundary plants, enhancing the park's aesthetic and functional aspects, and ensuring a delightful experience for visitors. The inventory findings underscore the importance of preserving and nurturing diverse tree species within the park, contributing to ecological

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	integrity and overall well-being. In a rapidly urbanizing world, this research takes a critical step toward understanding urban trees' contribution to urban dwellers' well-being and city resilience. It advocates for proper tree management and informs distribution strategies, offering a new paradigm for urban development. By shedding light on the significance of urban green spaces, this study encourages sustainable practices crucial for the urban future.
Title:	**Tree Height and Merchantable Volume Models for Molave (*Vitex parviflora* Juss.) in Makiling Botanic Gardens, UPLB**
Author:	**Barcellano, Emerson Cleo Jr. Granado**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Developing height and volume models for a particular species aid decision-making in forest management and reduce the time and effort of conducting forest inventories. This study developed tree height and merchantable volume models for Vitex parviflora in Makiling Botanic Gardens, UPLB. There were 258 trees with a >5 cm DBH recorded in the 4.849 hectares of Molave Plantation. The six nonlinear height-DBH models used in developing tree height were the Chapman-Richards, Exponential, Korf/Lundqvist, Modified Logistic, Schnute, and Weibull. In terms of volume, simple and multiple linear regression models were used. Model evaluation criteria used in the study were R2, Adj. R2, RMSE, MAE, Ē AMD, and AIC to evaluate the candidate models' performance and accuracy. Poudel and Cao's ranking method determined the best models for tree height and merchantable volume. The best models were further validated using paired sample t-Test using the test data (52 trees). Results showed that the Korf/Lundqvist model was the best in predicting tree height, while the least preferred was the Schnute model. Regarding volume, the V4 model (adjusted R2 = 0.8152559), a multiple linear regression model with two predictors (DBH and MH), had the optimal result. Further, paired sample t-Test revealed non-significant results (p-value> 0.05) in the observed

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	and predicted values for both tree height and merchantable volume. Thus, the Korf/Lundqvist was recommended for estimating tree height and the V4 model, a multiple linear regression model, for merchantable volume for V. parviflora.
Title:	**Exploration of the Recreational Carrying Capacity of Manila Baywalk Dolomite Beach in Manila, Philippines**
Author:	**Bual, Justine Joyce Amolato**
Adviser:	**Andrada, Rogelio T., II**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The aim of this study was to investigate the physical and socio-cultural carrying capacity of Manila Baywalk Dolomite Beach (MBDB). The goal was to develop strategies to manage user numbers and prevent overcrowding in MBDB. To determine the physical carrying capacity of MBDB, the study utilized Boullon's Carrying Capacity Mathematical Model (BCCMM), as adopted by Calanog (2015). The model took into account factors such as the operational area, social distancing requirements, and various limitations to calculate the physical carrying capacity. The study determined that the basic carrying capacity, potential carrying capacity, and real carrying capacity of MBDB were 1,467, 8,800, and 5,827 users per day, respectively. Additionally, the socio-cultural carrying capacity of MBDB was assessed through an on-site survey questionnaire. The survey aimed to evaluate the perceived level of crowding and the importance of beach conditions and facilities. The results showed that 64.1% of the respondents considered a crowd of 50 or more individuals per 500 square meters as an acceptable level of crowding in the beach area. Users at MBDB displayed a higher tolerance for crowded areas, which could be attributed to factors such as the absence of entrance or resource-use fees, the natural environment, and the psychological benefits. When considering the importance of existing and hypothetical beach conditions and facilities, users emphasized the significance of factors that contribute to their enjoyment and convenience, such as

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	cleanliness, litter-free areas, and information programs. By determining both the physical and socio-cultural carrying capacity, the study aimed to ensure that the number of users in MBDB does not surpass its capacity to provide a positive and enjoyable experience. This information can be used by MBDB management to maintain an optimal visitor-to-space ratio and enhance the overall experience for users.
Title:	**Assessment of the Covid-19 Impacts on the Ecotourism of Biak-na-Bato National Park**
Author:	**Capalad, Edriz Brilliantes**
Adviser:	**Lo. Frechie Belle O.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The COVID-19 virus which started in Wuhan, China and was later declared as a global pandemic has inflicted unprecedented impacts on one of the ecotourism sites in the Philippines, the Biak-na-Bato National Park. In this study, the social, economic, and environmental impacts of the COVID-19 pandemic on the BNBNP was assessed to formulate strategies that will be resilient to withstand the shocks emerging from the crisis such as the COVID-19 pandemic. This study used a qualitative method to gather in-depth insights on the ecotourism of BNBNP during the pandemic. Between October and November 2022, the data were collected through interviews and focus group discussions, and were analyzed using thematic analysis. Results show that the COVID-19 pandemic has generally caused a wide range of negative impacts on the study site, particularly on the economic aspect. Although there was no serious effect on the budget and on the number of staff in the park, there was a significant drop in the revenue generated at the time of the pandemic. The social and environmental impacts on the other hand were both positive and negative. The lockdowns and travel restrictions allow the park, particularly the wildlife and natural resources to thrive, and reduce the negative social impacts allowing the caves within the site to recover from tourism activities. However, the suspension

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	of the operation in the park due to the pandemic exposed the natural ecosystems and protected species to the risk of illegal activities wherein there was an increase in illegal activities such as poaching of bats and selective illegal tree cutting. The effects on other parts are mainly negative including stolen and destroyed facilities, trespassing, and vandalism; while the positive impacts are temporary as the adverse human impacts on the park could rebound, especially now that the park has resumed its tourism activities. The findings of this study can have implications for the ecotourism stakeholders to develop more effective and sustainable management strategies that can help not only the BNBNP but also the other ecotourism sites to withstand crises such as the COVID-19 pandemic. Furthermore, it can help the local communities affected by the pandemic in providing them opportunities that can improve their livelihood and well- being amidst the crisis.
Title:	**Estimation of Potential Soil Loss in the Upper Marikina River Basin Protected Landscape Using Invest (Integrated Valuation of Ecosystem Services and Tradeoffs)**
Author:	**Castro, Luke Joshua Domingo**
Adviser:	**Dida, Jan Joseph V.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The study aimed to estimate and identify the total potential soil loss and sediment export in the Upper Marikina River Basin Protected Landscape (UMRBPL), a major watershed stream resource in the National Capital Region. The UMRBPL is a major watershed stream resource in the provinces of Antipolo, Rodriguez, San Mateo, and Tanay, which benefits from the natural riches provided by the watershed. The main threats facing the Protected Landscape area are rapid urbanization, population growth, improper land use management, rapid loss of water resources, and stakeholders lacking the capacity and resources for workable development solutions. The study used the Integrated Valuation of Ecosystem Services and Tradeoffs

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	(InVEST) Sediment Delivery Ratio Model to determine the potential soil loss, sediment export, and sediment retention of the watershed. Geographic Information System (GIS) software, particularly QGIS and ArcGIS, was used to process the total potential soil loss, sediment export, and sediment retention. The findings indicate that UMRBPL has a high annual potential soil loss of around 4 million tons per year, indicating a higher vulnerability to environmental risks and hazards. Local action from stakeholders and decision-makers
Title:	**Documentation and Assessment of Agroforestry Systems in Barangay Bukal, Nagcarlan, Laguna, Philippines**
Author:	**Coronado, Jessa Esmejarda**
Adviser:	**Baliton, Romnick S.**
Stream:	**Social Forestry and Agroforestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The Philippines is known for having 14.9 million hectares of upland areas (Tacio, 2005 as cited in ERDB-DENR, 2010). Currently, these upland areas are experiencing pressures due to unsustainable farming practices. To mitigate that, agroforestry is used as intervention, however, the scope of adoption of agroforestry is still unpredictable. Hence, this study documented and assessed the existence of agroforestry systems in Barangay Bukal, Nagcarlan, Laguna. It was found out that there were five specific types of agroforestry systems existing in Bukal which are multi-storey cropping system, vegetable-based agroforestry system, live trellis system, boundary planting system, and boundary-live trellis system. Among these five systems, multi-storey and vegetable-based agroforestry systems were the most dominant in which each of these systems are established in 26 farms. In terms of farm components, chayote was the primary agricultural crop that is integrated across all types of agroforestry systems. Meanwhile, coconut, lanzones, and madre cacao were the most dominant woody perennials that are integrated in agroforestry farms. However, farmers were having problems in management of existing agroforestry farms in which they

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	experience long rainy days and presence of fruit flies and crop rot. In terms of the contributions of existing agroforestry systems to the socio-economic status of farmers, these five systems have low to medium contribution only based on nine indicators namely educational attainment, occupation, land holding, annual income, animal possession, household, material possession, livelihood support, and socio-political participation.
Title:	**Influence of Tree Traits on Urban Microclimate: A Case Study of Selected Tree Species in Naga City, Camarines Sur, Philippines**
Author:	**De La Cruz, Shiela Mae Adan**
Adviser:	**Visco, Roberto G.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The study was conducted to assess the cooling effect capacity of individual trees located along the main streets of Naga City, Camarines Sur, Philippines, 4400, particularly at the Panganiban Drive and Pan Philippine Highway with a length totaling to 5.1 kilometers. The independent variables used are the tree traits including DBH, height, crown base height, crown height, crown diameter, crown volume, crown density and LAI, while the dependent variables are the cooling effect and measured ambient, land surface temperature, relative humidity, dew point and wet bulb temperature. The traits were compared and analyzed using multiple forest regression analysis using the R package Random-Forest. Variable importance was used to have a correct estimate of the cooling capacity of each trait of the tree species and identify the order of importance. The correlation between the numerical tree traits measured and the cooling effect and its significance were assessed using the Pearson Product-Moment Correlation. The species with the highest abundance on the site is Samanea saman which also had the highest values of measured tree traits. Trees reduced ambient and surface temperature significantly from sun-exposed to tree shaded areas by a maximum of 5.176°C and 21.86°C, respectively. Moreover, the

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	lower the tree crown base height and the higher the DBH and crown density percentage, the higher ambient temperature reduction. Crown density has the highest influence on surface temperature, followed by tree DBH wherein increase in these traits results in higher surface temperature reduction. Relative humidity was found to be affected by DBH while dew point and wet bulb temperature have no direct correlation with any of the tree variables measured.
Title:	**Evaluation of Ecological and Local Benefits, Issues and Success in Mangrove Forest Restoration and Rehabilitation in Barangay Papaya, Nasugbu, Barangay Lagadlarin and Barangay Olo-lo in Lobo, Batangas**
Author:	**Dela Cruz, Reyvin Javier**
Adviser:	**Tingson, Keshia N.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	This thesis presents an evaluation of the ecological and local benefits, issues, and success of mangrove forest restoration and rehabilitation efforts in Barangay Papaya, Nasugbu; Barangay Lagadlarin, and Barangay Olo-Olo in Lobo, Batangas. Mangrove forests are vital coastal ecosystems, providing various ecological services and supporting the livelihoods of local communities. However, these ecosystems are threatened by human activities and natural disturbances, necessitating effective restoration and rehabilitation measures. Using a comprehensive approach, this study integrates the guidelines and comprehensive framework for sustainable mangrove rehabilitation adapted from Primavera et al., 2012 into the study sites to evaluate their suitability. Secondary data from previous studies, reports, and relevant sources were utilized to gather information on mangrove species composition, structural characteristics, and ecological indicators. The results highlight significant differences in the survival rates of seedlings among the study sites. Barangay Papaya exhibited a significantly lower survival rate than Barangay Lagadlarin and Barangay Olo-Olo. This finding emphasizes the need for further investigation into the factors contributing to the lower survival

	rate in Barangay Papaya and the implementation of targeted interventions to improve seedling survival. findings of the study provide valuable information on how to enhance the restoration and rehabilitation of degraded coastal forests. They underscore the importance of considering site-specific conditions and local community engagement to achieve higher success rates in restoration efforts. The study also highlights the significance of continuous monitoring and adaptive management strategies to ensure the long-term sustainability of mangrove restoration initiatives. This research contributes to the mangrove forest restoration and rehabilitation knowledge base, offering insights for policymakers, practitioners, and local communities engaged in coastal ecosystem conservation. The findings serve as a valuable resource for improving the effectiveness of restoration practices and promoting the sustainable management of degraded coastal forests in Barangay Papaya, Nasugbu; Barangay Lagadlarin, and Barangay Olo-Olo in Lobo, Batangas.
Title:	**Greenhouse Gas Inventory of the UPLB College of Forestry and Natural Resources**
Author:	**Dela Cruz, Svetlana Castro**
Adviser:	**Racelis, Diomedes A.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The equilibrium in earth's climate no longer exists due to the extreme amount of greenhouse gases in the atmosphere, resulting in climate change, which has been an extremely significant problem the world has been dealing with. One way of addressing the problem is by conducting greenhouse gas inventories, which is a way to determine what GHG sources need to be maintained or reduced. Higher education institutions, like the College of Forestry and Natural Resources, have a responsibility in being carbon-neutral. This study, with the baseline year of 2021, noted that the college only emitted 472.50781 Mg CO2e yr1 in total. Scope 1 had the lowest emission and only took up 5.6% or 26.47 Mg CO2e yr1 while Scope 2 comprised more than half of the

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	total with 72.3% or 341.60 Mg CO2e yr1. Lastly, Scope 3 made up 22.1% or 104.44 Mg CO2e yr1
Title:	**The Analysis of Ecotourism Management Towards the Sustainability of Lagadlarin Mangrove Forest in Brgy. Lagadlarin, Lobo, Batangas, Philippines**
Author:	**Dela Viña, Marygail Garet Malana**
Adviser:	**Lo, Frenchie Belle O.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Ecotourism is intricately entangled to sustainability as the concept must adhere to being environmentally-sound, socially inclusive, and economically viable. In Lobo, Batangas, the Lagadlarin Mangrove Forest (LMF) has been a growing ecotourism site where tourists can enjoy the scenic view of the beach while exploring the mangroves on site. Spanning 17 hectares, the site is managed by a People's Organization known as the Samahan ng Maliliit na Mangingisda Para sa Pangangalaga ng Kalikasan sa Brgy. Lagadlarin (SMMPPKBL). As an environmentally sensitive area due to the presence of mangroves, the study aims to analyze the sustainability of the ecotourism management of Lagadlarin Mangrove Forest through the lenses of social, economic, and environmental dimensions, as perceived by the community members of Brgy. Lagadlarin, Lobo, Batangas, as well as the People's Organization responsible for the management of the ecotourism site. Key findings reveal that the local community members of Brgy. Lagadlarin express a need for enhanced community involvement and better operational capacity of the ecotourism site for quality experience of tourists. Barriers to growth include the lack of an operational plan, community participation, visitor management strategies, and financial planning. The assessment of LMF's management highlights areas for improvement, particularly in natural resource management, visitor management, and equitable income distribution. Findings and analysis also suggest an under-optimized capacity of the SMMPPKBL in managing LMF,

	necessitating better management strategies and community involvement. Despite its potential socio-economic and environmental contributions, negative community perceptions pose challenges to sustainability. The study inferred that although the concept of ecotourism is what the community aims to achieve, its current management towards sustainability is not realized. The study underscores the importance of inclusive, participatory approaches in ecotourism management to ensure the long-term sustainability of LMF. It advocates for a holistic approach centered on economic viability, environmental protection, and social equity to realize the full potential of ecotourism in the mangrove forest.
Title:	**Carbon Stock Assessment and Valuation in the Calauan-Nagcarlan Watershed, Philippines Using the Integrated Valuation of Ecosystems Services and Tradeoffs (InVEST) Model**
Author:	**Dungan, Tristan Carlo Paguinto**
Adviser:	**Codilan, Analyn L.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The potential of forests to sequester greenhouse gases is crucial to mitigate climate change effects. Studies showing the link between land use and land cover (LULC) changes and carbon stock and sequestration have been gradually increasing; however, little is known about the impacts of LULC change on stored carbon in the Calauan-Nagcarlan watershed. Located in the Laguna province in the Philippines, the Calauan-Nagcarlan watershed may be subjected to agricultural expansion in the following years. To determine these effects on carbon stock, LULC maps in the years 2010 and 2020 were developed using the Landsat 5 TM and Landsat 8 OLI images, respectively. The developed LULC maps were utilized to develop a hypothetical agricultural expansion scenario in 2030 using the InVEST scenario generator model. The carbon stock and sequestration model of INVEST was used to capture the amount of carbon stock per LULC map and the monetary value per sequestered

	carbon. Results showed that from 2010 to 2020, the forest has the largest LULC area extent in the Calauan-Nagcarlan watershed, followed by the grassland, agriculture, open/bare, and built-up LULC classes. The developed future scenario map showed a decrease of 147.24 ha in combined forest lands, grassland, and open/bare LULC classes. The forests also had the largest amount of carbon being sequestered from 2010 to 2020, followed by the grassland and agriculture. In the future scenario map, the forest also had the largest share in sequestered carbon. The sequestered carbon from 2010 to 2020 was 240,696.13 t C ha1, while from 2020 up to the hypothetical agricultural expansion scenario, it diminished to -39,369.23 t C ha-1. The price of sequestered carbon from 2010 to 2020 was PhP 564,248,459.00, while the price of sequestered carbon from 2020 to the hypothetical agricultural expansion scenario amounted to PhP 92,273,987.00. The findings of this study highlighted the importance of forests in carbon sequestration and the implications of obtaining a higher social cost of carbon. This ends with implications and recommendations to further improve carbon stock monitoring and assessment in the Calauan-Nagcarlan watershed.
Title:	**Spatial and Temporal Analyses of Land Use Land Cover Change and Its Effect on Land Surface Temperature in Tagaytay City**
Author:	**Eusebio, Johanna Caresse Rosello**
Adviser:	**Racelis, Diomedes A.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	This study analyzes the effects of land use and land cover change on land surface temperature (LST) in Tagaytay City, Philippines, using remote sensing and GIS techniques. Rapid urbanization, economic growth, and increased tourism have led to environmental degradation and rising temperatures. The study aims to generate land use and land cover maps for 2014 and 2023, analyze LST trends, and identify drivers of land use

	change. QGIS 3.18 with Semi-Automatic Classification Plugin (SCP) was used for data processing. Cloud masking techniques were employed due to the unavailability of cloud-free images. The spectral angle mapping algorithm produced land use and land cover maps, while the mono-window method derived LST maps. Analyses revealed significant urban expansion, with built-up areas increasing to 20.64% of the land. Vegetation decreased to 73.18%, and open land increased to 6.18%. LST values showed an overall increase in 2023, with built-up areas experiencing the highest temperature change. Urban expansion and conversion of natural land cover to impervious surfaces contributed to increased LST. These findings provide insights into the impacts of urbanization on local climate and may aid decision-makers and planners in managing land cover and surface temperatures in Tagaytay City.
Title:	**Market Research for *Antidesma bunius (L.) Spreng* (BIGNAY) Products in Selected Municipalities in Laguna, Philippines**
Author:	**Eusebio, Kelsey Mae Tamban**
Adviser:	**Codilan, Analyn L.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	This study was conducted to assess the market of Bignay products in selected municipalities in Laguna, specifically in San Pablo City, Santa Cruz, and Los Baños where Bignay producers and sellers were identified. The specific objectives of this study are 1) identify the available Bignay products in Laguna; 2) determine the awareness and behavior of locals in selected municipalities in Laguna towards Bignay products; 3) determine the marketing practices of the producers of Bignay products identified in Laguna; and 4) identify the strength, weaknesses, opportunities, and threats in the marketing of Bignay products in Laguna. A total of four Bignay products producers and sellers were identified which are St. Ambrose and Dalagita Wine and Beverage from San Pablo City, Capernaum from Santa Cruz, and

	UPLB - Institute of Food Science and Technology in Los Baños. There is also one seller only of Bignay products from Los Baños which is UPLB One Town, One Product Hub. There was a total of 107 local respondents from the three municipalities which are proportioned to the population of each municipality. They were interviewed face-to-face. The collected data were analyzed using descriptive statistics such as frequency count, average, and percentage. The results showed that 59 respondents (55%) are familiar with Bignay products which are further subdivided into 41 respondents for Bignay wine (38%), 21 respondents for Bignay juice (20%), 11 respondents for Bignay vinegar (10%), 10 respondents for Bignay jam (9%), and none for Bignay jelly. However, only 36 respondents have actually tried Bignay products (34%). Furthermore, most of the respondents only tried Bignay products once only in their life. Also, only 6 of them bought the Bignay products personally (6%). The Bignay products that the respondents are willing to buy are wine (79%), juice (97%), vinegar (95%), and jam and jelly (94%).
Title:	**Plant Species Composition and Carbon Stock Assessment in Doña Leonila Urban Park in San Pablo City, Laguna, Philippines**
Author:	**Gonzales, Michelle**
Adviser:	**Tingson, Keshia N.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The Philippines, one of the top worldwide conservation areas and one of the world's biodiversity hotspots. However, there are threats in biodiversity such as increasing resource use and consumption. The demand for more resource is generated through converting forestlands or wildlife habitat into agricultural and urban land. On the other hand, the Philippines have existing green spaces which improve air quality, store carbon, and enhance biodiversity. San Pablo City being a commercialized area have green spaces like urban parks. This study generally aims to assess the diversity and conservation

	status of plant species and to assess the carbon stock of Doña Leonila Urban Park in San Pablo City, Laguna. Thirteen plots were identified which is covered by vegetation in the area. Trees with the minimum diameter of 5 cm, soil cores, necromass, understorey and herbaceous were used to compute for the above ground biomass, below ground biomass, carbon content, carbon sequestered, carbon density, relative abundance and importance value. A total of thirty-three (33) plant species coming from the twenty (20) families were recorded. The most abundant plant species is Syzygium myrtifolium with 107 individuals recorded. Furthermore, the Pterocarpus indicus forma echinatus was categorized as Endangered (EN). Tree species with the highest Importance Value is the Leucaena leucocephala with 70.10%. The total biomass of 0.38 ha is 324.98 ton/ha and the total carbon content is 162.54 ton/ha, total carbon dioxide sequestered is 596.51 ton and the total carbon dioxide density is 1569.76 ton/ha. The total diameter at breast height (DBH) was correlated to total carbon content (ton/ha) of a tree species (r=0.89), in result, very strong positive linear relationship. An increase in total DBH have also increase in total carbon content of a tree species. This study provided recommendations for the management of Doña Leonila Urban Park through regular monitoring and basic tree risk assessment of tree species.
Title:	**Growth Response of *Aquilaria cumingiana* (Decne) Ridl. to Various Fertilizer Applications**
Author:	**Guevarra, Niño Angelo Buenaflor**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	A study was carried out using eight months old, rooted cuttings of Aquilaria cumingiana (Decne) Ridl. as among the agarwood-producing tree species that grows naturally in the Philippines. The rooted cuttings were subjected to (4) different treatments [T1-biogroe fertilizer treatment, T2-urea (46-0-0) fertilizer treatment, T3 - horse manure compost, and T4 -control

	or zero fertilizer application] in a completely randomized design (CRD). Survival rate and morphological characteristics; including diameter, height, and number of leaves were assessed in the study. Recording of the counts and measurements of the different parameters was conducted after (60) sixty days. Collected data were recorded and analyzed using Microsoft Office Excel and R version 4.0.4 statistical software. For morphological characteristics, results of the analysis of variance (ANOVA) revealed a non-significant effect of the treatments in diameter ($P=0.84$, $p>0.05$) and height ($P=0.50$, $p>0.05$). On the other hand, significant effect was observed on the number of leaves ($P=0.016$, $p<0.05$) of A. cumingiana rooted cuttings, specifically between T2 and T3, and T2 and T4. Considering the mean values, the biggest mean diameter (0.35 cm) was recorded at T1, while the tallest mean height (8.58 cm) and highest leaf count (8.75 leaves) were recorded at T3. In terms of survival rate, no significant difference ($P=0.20$, $p>0.05$) was also observed across all treatments. However, T3 gave the highest percentage (100%) for the rooted cuttings. This study identified horse manure compost as the best fertilizer in achieving optimal growth of A. cumingiana rooted cuttings, which will help in seedling and cloned-seedling production of this high-valued forest tree species.
Title:	**University Students' Buying Behavior Towards NTFP-Based and Synthetic-Based Cosmetic Products**
Author:	**Lit, Rowen Charles Ilagan**
Adviser:	**Calderon, Margaret M.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The awareness of the respondents about non-timber forest products (NTFPS) and their buying behavior towards NTFP-based cosmetics and synthetic-based cosmetics were the main focus of this study. The sociodemographic profiles of the respondents was described to assess their gender, age, year level, monthly budget, budget allocation for cosmetics, source of their

	budget, and the university they were attending. To determine their knowledge regarding NTFP, respondents were asked if they had any knowledge regarding these products and commonly seen NTFP ingredients in cosmetics along with their source of knowledge. For the respondents' use of cosmetic products, the types of cosmetics they are using along with the frequency of purchasing, location of purchases, types of cosmetic products they purchased, and brands of cosmetics they know were assessed. Furthermore, the factors affecting their buying behavior were analyzed with their preference of cosmetics, influences in using certain types of cosmetics, factors in purchasing cosmetics, and disliking factors of the two types of cosmetics. To summarize all of the categories, thematic analysis was done in order to fully understand the decision-making of the respondents towards their purchase intention of NTFP-based cosmetics. Overall, the majority of them were willing to purchase NTFP-based cosmetics in the next five years.
Title:	**Assessing the Knowledge on Ecotourism among the Tourism Students of Laguna State Polytechnic University Los Baños Campus**
Author:	**Makiling, Coleen Joyce Navales**
Adviser:	**Lo, Frechie Belle O.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	This paper investigated the knowledge on ecotourism among the tourism students from the College of Hospitality Management and Tourism of Laguna State Polytechnic University Los Baños Campus. The study was undertaken to assess whether such students enrolled in a tourism degree program, especially in the Philippines, possess knowledge about ecotourism, a more sustainable form of tourism, as well as acquaint students with the specialized and technical knowledge and skills that the tourism sector requires. The results of this study aim to contribute to this field in a way that an assessment of ecotourism knowledge would contribute to pursuing environmental sustainability.

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	Results of the online questionnaire survey indicated that respondents have a good level of awareness of the various ecotourism conceptual definitions and its underlying principles. This study also revealed that the tourism students, as tourists, had tried engaging in many ecotourism activities, most especially hiking, camping, and swimming. Furthermore, the respondents reported positive attitudes toward ecotourism in the context of the Leave No Trace principles. Meanwhile, the respondents' related factors, specifically age, sex, year level, and civil status, have a negligible and not significant relationship with the different variables used. Overall, the tourism students are knowledgeable about ecotourism. Henceforth, this study implies the contribution of awareness and more detailed information regarding tourism students' knowledge on ecotourism, as there is a lack of sufficient data on this topic. Indeed, it is vital to determine, based on an educational perspective whether tourism students comprehend the subject, have relevant experiences, and have either favorable or unfavorable attitudes about ecotourism. Most importantly, to establish ecotourism as an effective instrument for safeguarding the environment with positive outcomes for the community at large, including a wide variety of satisfactions, adequate ecotourism education and proper comprehension of the right concepts and principles of tourism students are required.
Title:	**Landscape Maintenance Activities at the University of the Philippines Los Baños Laguna, Philippines**
Author:	**Marza, Grizelle Marie Penales**
Adviser:	**Visco, Roberto G.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Practicum Report**
Abstract/Executive Summary:	Our quality of life is improved by the surrounding landscape. It also plays important roles in the economic, social, cultural, and ecological spheres. Therefore, to accomplish these purposes, landscapes must be properly maintained. This report details the landscape maintenance tasks performed on the University of the

	Philippines Los Baños lower campus during the student's mid-year practicum. Under the direction of the UPLB-UPMO Landscaping Section and Tree Maintenance Section, the primary practice was carried out from mid-year July until August of 2022. The locations were the UPMO ornamental plant nursery and different landscape tree places on campus. Through a variety of activities offered by the host agency, the practicum intends to provide a first-hand understanding of landscape maintenance operations. It specifically seeks to applying information and abilities from the classroom, practicing maintenance procedures in the actual landscape activities in UPLB, documenting the landscape maintenance activities, and making suggestions for how to make the practicum even better are the four primary objectives of the given task. The practicum period included a variety of activities, including inspection and pest control work, pruning, indoor and outdoor landscaping, and nursery operations. As a result, the student was able to identify obstacles and restrictions during the practicum. The student's exposure to these activities helped her understand urban forestry. Additionally, she will benefit from this expertise in managing and mentoring others. It is an excellent way for students to learn about the different job prospects available in this field. At the end of the major practice, students gained technical expertise and practical experience in a variety of landscape maintenance tasks, particularly in tree pruning, various propagation methods, and landscape labor management.
Title:	**Profiling Recreational Users of the Manila Baywalk Dolomite Beach**
Author:	**Milar, Catherine Joyce Lasim**
Adviser:	**Andrada, Rogelio T., II**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The Manila Baywalk Dolomite Beach has gained significant popularity as a recreational spot since it was made accessible to the public. The large influx of visitors to the area, as evidenced

	by the daily records, indicates that MBDB attracts diverse individuals. This study aims to characterize the site's users, identify user segments based on sociodemographic factors, and subsequently develop management strategies responsive to the needs and preferences of the users. A face-to-face survey was conducted in the area, with 415 respondents selected through purposive sampling. The findings indicate that the majority of individuals visiting the site are female, with varying age groups and a high level of education. These users are primarily from the National Capital Region and are middle-wage earners employed in the private industry. Cluster analysis was also used to identify similar characteristics among the users and establish segments. The results suggest that the users of MBDB can be classified into two distinct segments: relaxation seekers and nature seekers. The first cluster, the relaxation seekers, predominantly consist of males who desire to reduce stress to improve their health and well-being. The second cluster, nature seekers, were primarily female and characterized by their desire for sightseeing and connection with nature. Regarding visitor preferences, the results show that the views the MBDB offers are its most appealing characteristics, while the presence of trash along the beach is its least preferred attribute. In terms of recreational activities, many users preferred including water-based and sports activities in MBDB in the future. Following the findings, recommendations pertaining to the area's cleanliness, recreational activities, facilities, and management were also formulated. The results of this study could offer a framework for MBDB managers to develop products and services and management strategies that align with users' needs and preferences.
Title: Author: Adviser: Stream: Access:	**Mapping Typhoon-Induced Forest and Land Cover Change in Catanduanes Watershed Forest Reserve Through Multi-Temporal Analysis** **Morales, Jade Alezandra Lobo** **Padrones, Jenielyn T.** **Environmental Forestry** **Restricted**

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Type:	**Thesis**
Abstract/Executive Summary:	Typhoons are one of the most common climate-related hazards experienced. The country lies within the "Pacific typhoon belt," an area in the Pacific Ocean where nearly one-third of the world's typhoons originate. About twenty (20) tropical cyclones enter the Philippine Area of Responsibility every year. With this frequency of natural hazard occurrence, damages to most sectors of society are assessed and studied. However, as of now, there are very few accounts of the changes in land cover due to typhoon damages to Philippine forests, and there are limited studies available for such. This study was aimed at determining the changes caused by typhoons on forest structure and dynamics in the study area, mapping the typhoon-induced land cover changes in Catanduanes Watershed Forest Reserve caused by Typhoon Rolly, and utilizing multi-temporal analysis to determine the extent of the overall forest and land cover changes caused by recent tropical cyclones. The analysis was done in QGIS ver 2.16.3, where the Landsat 8 images collected were subjected to the Semi-automatic Classification, Modules for Land Use Change Simulations plugin, and the NDVI analysis. Results of this study show that after the typhoon's landfall, there was a significant decrease in water areas, agricultural land, and shrublands, while a slight increase in forests, grasslands, barren, and built-up areas was also observed. Furthermore, the transition in land cover detected was most evident in the municipalities of Virac and Bato, the most heavily affected areas in CWFR. This study may also serve as a basis for studies by providing insight into the current and possible emerging trends in forest and land cover change for future disaster planning and studies.
Title:	**Analysis of the Uses and Market Potential of *Antidesma ghaesembilla* Gaertn. (Binayuyu) in Selected Municipalities in Calabarzon, Philippines**
Author:	**Nanit, Michelle Tamban**
Adviser:	**Codilan, Analyn L.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**

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Abstract/Executive Summary:	Indigenous fruits are an essential source of vitamins, minerals, fiber, and protein, contributing to rural people's income. However, some of these fruits are not yet fully utilized and are not commercially available. Hence, this study aimed to analyze the uses, and market potential of the selected indigenous fruit tree, Antidesma ghaesembilla Gaertn (Binayuyu), in selected municipalities in CALABARZON (Region IV-A), Philippines. The study areas were identified through random sampling. The indigenous fruit tree is found to be distributed only in Nasugbu Batangas, Cavinti Laguna, Dolores, and Pagbilao Quezon. Out of the 102 respondents, 41.2% (42) were aware of Binayuyu. Only 34.4% of the respondents utilized Binayuyu for food and non-food consumption, indicating that the fruit is underutilized within the region. Binayuyu fruits are eaten fresh and processed into wine. It also treats various diseases, including diabetes, UTI, kidney problems, fever, etc. The indigenous fruit is not being sold in the market, however, the presence of respondents and the number of uses identified indicates that it has existing demand, but people are unaware of it. Since Binayuyu possessed the same characteristics and benefits as Bignay fruit, it could also be processed or developed to produce products and become commercially available.
Title:	**Predicting the Habitat Sustainability of Philippine Cockatoo (*Cacatua haematuropygia*) with Species Distribution Models**
Author:	**Oca, Garry Moises**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Philippine Cockatoo (Cacatua haematuropygia S. Muller) is one of the bird species in the country classified by the International Union for Conservation of Nature as critically endangered. Studies proved that the conservation of wildlife. species provides benefits to the economy and biodiversity. Hence, the development of strategies to further conserve the Philippine Cockatoo is necessary. One of the helpful tools in doing this is

	theSpecies Distribution Model for it helps identify the response of a species to its surrounding environment. Hence, this study aimed to identify the environmental factors that affect the habitat suitability of the Philippine Cockatoo and to generate potential habitat suitability maps of this species by using two algorithms that only require presence and background data which are the Maximum Entropy (Maxent) and the Ecological Niche Factor Analysis (ENFA). Among the different environmental variables that were included in the modeling, the climatic factors, particularly temperature annual range, annual precipitation, and precipitation of the driest quarter have the highest influence on the habitat suitability of the Philippine Cockatoo. In addition, the habitat suitability maps generated the high and optimal suitable habitats for Philippine Cockatoo are concentrated in some provinces in the country but realistic with the ecology of Philippine Cockatoo. The common provinces that belong in the top 5 of Maxent and ENFA are the province of Palawan, Bohol, and Siquijor. Lastly, the Maxent algorithm obtained a higher AUC value than the ENFA algorithm which is an indication of it being the better. The findings of this study can be used by managers as they craft plans for the conservation of the Philippine Cockatoo.
Title:	**Tree Components and Management Practices of Urban Greenspace in Ninoy Aquino Parks and Wildlife Center**
Author:	**Ocampo, Madeline Baon**
Adviser:	**De Luna, Ma Jennalyn O.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The environment had various changes with urbanization and industrialization especially that establishments are structured anywhere, especially in cities. Extinction of flora species, as well as fauna species can occur when urban green areas are converted to other urban land uses. This study aims to assess the tree components in line with the management practices of Ninoy Aquino Parks and Wildlife Center through the provided data and interview. The Fernando's Scale of Biodiversity will be used in assessing the biodiversity indices parameters such as Shannon-Weiner, Simpsons, and Evenness Index. The species

	located in NAPWC consists of 3,769 tree species. The researcher processed the data to determine if the NAPWC has a standard diversity in terms of 10-20-30 diversity rule by Santamour (2020) in which no species should acquire 10% of the total population, no genus should have 20%, and no family should have 30% of the total number of families in the park. The findings show that Mahogany (Swietenia macrophylla), the most dominant species, makes up nine percent (9%) of the overall population still under 10%. Meanwhile, the most dominant genus is Swietenia which is fifteen-point three percent (15.3%) of the total population and still under twenty percent (20%). Five-point five percent (5.5%) make up Fabaceae as the most dominant family of species in the park which is under 30%. With these findings, the management practices of the park were also assessed. Findings show that Ninoy Aquino Parks and Wildlife Center's good management practices have a big influence on how the park is maintained, and it is evidence of the management's efforts. There are not many downsides besides the budget restrictions, which have an impact on the management's ability to develop more. However, the management's inventiveness in maintaining, preserving, and conserving the park's biodiversity ensures that the beneficial effects are unaffected. Furthermore, this shows that the park is high and rich in biodiversity which implies less vulnerability to diseases. Conducting a tree risk assessment can assist in assessing the trees to determine their level of risk and, for those which include, it serves as a foundation for developing alternatives. The assessment of tree risks may also provide direction on how to keep the trees in good health. A thorough inventory should be carried out every two to three years to further track the park's biodiversity. It is also important to include the park's lagoon in the analysis. The Ninoy Aquino Parks and Wildlife Center should investigate the potential for determining the eligibility of additional species to determine species apart from those that are already present. Along with managing and reducing the planting of Fabaceae, planning should be done to identify other suitable endangered species.
Title:	**Assessing the Recreational Perceptions of the Manila Baywalk Dolomite Beach Visitors**
Author:	**Ortiz, Lindsay Bonquin**

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Adviser:	**Andrada, Rogelio T., II**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Visitors' recreational perception is useful for authorities in formulating strategies for integrated management. Therefore, as a new recreational site, knowing the perception of Manila Baywalk Dolomite Beach visitors is significant for the management and improvement of the area. This study examines the socio-demographic and trip characteristics of MBDB visitors and their recreational perception through a face-to-face survey. A purposive sampling was carried out, and the sample consisted of 415 respondents. The survey result shows that visitors strongly agree with the recreational value of the MBDB. Most of them supported the continuous development of facilities and implementation of new management strategies in the area. However, respondents disagree with some statements, mainly with regard to crowding. Among the socio-demographic and trip characteristics, only sex has a significant association with the overall agreement rating. While civil and employment status have no association, and the other variables have a weak association. With that, strategies for the effective and responsive management of MBDB were formulated, and recommendations for future studies were provided.
Title:	**Analyzing and Forecasting Land Use and Land Cover Dynamics in the Calauan Sub-Basin Using QGIS Molusce Plugin**
Author:	**Pabilona, Marc Danielle Dolauta**
Adviser:	**Tiburan, Cristino L., Jr.**
Stream:	**Production and Industrial Forestry**
Access:	**Restricted**
Type:	**Thesis**

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Abstract/Executive Summary:	Land use and land cover change (LULC) studies have become a significant concern due to their profound impacts on the environment, society, and the economy. LULC can primarily provide significant inputs to making better decisions in planning and help in identifying appropriate strategies for the sustainable management of resources that both the present and future generations can benefit. This particular study aims to understand the effects of land use change, particularly on urbanization and deforestation, focusing on the Calauan Sub-basin within the Pasig-Laguna River Basin. The area is already currently experiencing rapid urbanization and conversion of forested land into agricultural and other land uses. Sentinel-2 imageries and Google Earth Engine were utilized to generate land cover maps for 2016, 2019, and 2022. The random forest classifier algorithm was applied in the image classification process. Subsequently, the MOLUSCE plugin in QGIS was employed to create a transition potential map using the Multi-layer Perceptron Artificial Neural Network (MLP-ANN) and simulated future LULC maps for 2031 and 2049 using Cellular Automata Artificial Neural Network (CA-ANN). Various explanatory variables, including DEM, slope, distance to existing built-up areas, distance to road networks, and built-up areas, distance to road networks, and population density, were incorporated to develop the transition potential model within the tool. The results indicated that the model achieved an overall accuracy of 72%. Distance to existing built-up areas and DEM were found to significantly influence LULC changes, particularly urban expansion. Analysis between 2016 and 2049 revealed a consistent expansion of built-up areas at an annual rate of 3.16%. In contrast, agricultural areas were projected to decline by 2% annually until 2049, while grasslands were expected to experience a 6.3% annual increase. Forests, on the other hand, are likely to experience a decline of 1.3% per year. Water bodies exhibited relatively stable dynamics throughout the entire period, with a marginal decrease of about 0.5%. The results of the study can be utilized in the crafting or updating of management plans of local government units, especially for the different municipalities within the sub-basin.

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Title:	**Floristic Documentation and Diversity of Terrestrial and Riparian Flora Communities Along Mankayan, Benguet Landscape**
Author:	**Penuliar, Jumaribo Roces, Jr.**
Adviser:	**Tingson, Keshia N.**
Stream:	**Environmental Forestry**
Access:	**Restricted**
Type:	**Thesis**
Abstract/Executive Summary:	Biodiversity is critical to nature's balance. It provides so many advantages and services that humanity cannot survive without it. Its reluctance to change acts as a safety net in times of tragedy and calamity. The number of various species interacting with one another determines the health of an ecosystem. The Mankayan watershed is an important floral and faunal habitat due to its water source and its natural resources. That is why it is important to study and record its species composition and diversity of the ecosystem to better understand the situation of the species living within its boundaries. The study was conducted to assess and document the status of the biodiversity of the plant communities in Mankayan, Benguet. There are two main areas where the study was conducted - the terrestrial area and the riparian zone. After establishing the various sampling areas, within the established site, the plant species where then identified and documented. Method of documentation include floristic collection, illustrations or photographs, and academic herbaria plant specimens and related data used for scientific study a collection of Results of the study showed that the terrestrial ecosystem has a Shannon Diversity Index and Pielou's evenness score 1.573 and 0.2095 respectively, which indicates that it has a very low and low floral diversity respectively on the biodiversity scale while the riparian ecosystem scored a 2.768 and 0.3983 in Shannon Diversity Index and Pielo's Evenness Index respectively, meaning that both has a moderate floral diversity score. The Simpson's Diversity value has a score of 0.5661 and 0.8399 for the terrestrial and riparian ecosystems respectively. It is translated as moderately high and high diversity respectively. The study also showed a noteworthy species - Saurauia

	bontocensis Merr which is and endemic species and categorized as vunerable in the IUCN Redlist. The study recommended the establishment of necessary programs and projects or improve current strategies to better preserve the biodiversity of the area. This could help the ecosystem to be more resistant to abrupt change in environment and provide sustainable services both in the present and the future.
Title:	**Assessment on the Impacts of Land Cover Changes to the Water Quality of Iyam-Dumacaa River in Lucena City, Philippines Using Water Quality Index**
Author:	**Raagas, Shania**
Adviser:	**Tingson, Keshia N.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The Iyam-Dumacaa River serves as the main source of water in Lucena City, Quezon, however land cover changes may cause the water quality to exceed its potential. In order to determine whether the parameters of the river still adhere to its water quality standards, the researcher used CCME WQI to represent its overall status, and statistical analysis to assess the impacts of land cover changes (between 2017 and 2022) to the river water quality. Statistical analysis claimed that there was a non-significant very small difference between the land cover changes in which water, forest, and built-up areas have increased over the years. On the other hand, temperature, DO, phosphate, and chloride concentrations have significant differences where DO has a negative correlation with other parameters as high concentrations indicate a favorable condition to aquatic life. The CCME WQI indicated that the Iyam-Dumacaa River has a poor water quality due to the following: 1) informal settlements, 2) nearby establishments caused by increased built-up areas, and 3) climate change that may be the contributing factors in the impacts of land cover changes to the water quality of Iyam-Dumacaa River through time.

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Title:	**A Comparative Study Between 2019 and 2021 Makiling Botanic Gardens Facebook Page Analytics**
Author:	**Rala, Kyla Angela Atanacio**
Adviser:	**Andrada, Rogelio T., II**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	This study examines the analytics of the Makiling Botanic Gardens (MBG) Facebook page between the years 2019 and 2021; specifically, the Reach, Visits, and New Likes of the MBG Facebook page. Descriptive bivariate analysis (correlation analysis and t-test analysis) was used to analyze the gathered data. The 2021 data of the MBG Facebook page was attained through the MBG Facebook page meta business suite, however, 2019 data was based on the previously conducted study by Albayda & Andrada (2021) due to the limitation given by the Facebook meta business suite. Findings have shown that MBG Facebook page Visits and New Likes have a strong positive correlation with Reach in the year 2021. In terms of comparison, the Reach and Visit of MBG's Facebook page in the year 2019 was significantly different from the year 2021. It was also discovered that the frequency of published content was a major contributor to the engagement of MBG's Facebook page. Utilization of the features in the Facebook meta business suite when publishing content is highly encouraged provided that MBG is an academic and recreational institution. Moreover, it is essential to publish more enticing and engaging content to further enhance the engagement of the page in providing education and promoting recreation institutions.
Title:	**Development of Tree Volume and Height Models from Mixed Species Forest Stand in Mt. Makiling Forest Reserve, UPLB**
Author:	**Rimas, Don Benito Antonio Panganiban**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Production and Industrial Forestry**

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Access:	**Restricted**
Type:	**Thesis**
Abstract/Executive Summary:	This study examines the correlation between tree height, diameter, and tree volume in the Permanent Field Laboratory Areas in the Mt. Makiling Forest Reserve. The objective is to develop models for height and volume that can be utilized to estimate the tree volume and tree height of comparable forest stands with somehow similar species composition and structure, local environments, and natural resources. In order to attain the objective, a forest inventory was carried out in PFLA 1, 2, and 3 with a sampling intensity of approximately 30%. The gathered data were subjected to a number of statistical analyses, including fitting linear and non-linear regression equations, utilizing the candidate models selected for each variable. The models that have been developed have undergone a model evaluation and selection process to determine their accuracy. The process aimed at identifying the most optimal model, which was subjected to model validation to obtain the best fit. The final model equation served as the foundation for subsequent analyses. After subjecting independent variables using the candidate models, the findings indicated a positive correlation among the variables. The analysis revealed that the Hohenadl model equation was the most suitable fit for tree volume, while the Power model was the best fit for tree height. The results also showed that displaying multiple evaluation metrics was imperative for acquiring diverse criteria to evaluate the optimal models that serve as the foundation for developing the Volume and Height models for mixed species forest stands in Mt. Makiling. The discoveries of this study have practical implications for developing a reliable and effective tool for predicting Tree Volume and Tree Height in comparable local ecosystems and natural resources. This could offer a more streamlined and convenient approach to obtaining allometric data from a forest stand.
Title:	**Assessment on the Current State of Kaong (Arenga Pinnata Wurmb. Merr.) Along a Portion of the Boundary of Mount Makiling Forest Reserve Los Baños, Laguna, Philippines**
Author:	**Salcedo, Daniella Marie Togonon**
Adviser:	**Bantayan, Nathaniel C.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**

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Type:	**Thesis**
Abstract/Executive Summary:	The primary goal of this research was to assess the current state of Kaong (Arenga pinnata) along a portion of the boundary of Mount Makiling Forest Reserve that is managed by the University of the Philippines Los Baños. Kaong (Arenga pinnata), a palm species native to the Philippines, has ecological and socio-economic importance along its surrounding municipalities. The research study aims to assess the population of the kaong (Arenga pinnata) and the different factors that can directly affect the decline of kaong (Arenga pinnata). It was assessed through a combination of a single continuous strip plot measuring 40 x 160 m and a quadrat method was used to systematically establish sixteen (16) subplots with a dimension of 20 x 20 meters - totaling an area of 0.64 hectares and a generated distribution map. A total of 247 individuals of kaong (Arenga pinnata) were counted and recorded within the established plot. However, looking at the distribution map of the established plot. It was observed that kaong (Arenga pinnata) were only dominated in subplots 1, 2, 3, and 4. The remaining subplots from subplots no. 5 to 16 exhibited few to none of kaong (Arenga pinnata) occurrences. Upon being a forest reserve, overpopulation still is a big problem that affects the natural resources. The people and their anthropogenic activities such as kaingin system, conversion of forest to agricultural land, and introduction of invasive species were found in the area. Thus, this research paper is a contribution to informed decision-making in conservation efforts for Kaong (Arenga pinnata). This paper also enumerated recommendations to improve the policies and management to result in a long-term sustainable forest management.
Title:	**Geospatial Approach on Carbon Stock Assessment of a Mangrove Reforestation Site in Barangay Malaking Patag, Culion, Palawan, Philippines**
Author:	**Santos, Carl Ak Del Rosario**
Adviser:	**Tiburan, Cristino L., Jr.**
Stream:	**Production and Industrial Forestry**
Access:	**Restricted**

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Type:	**Thesis**
Abstract/Executive Summary:	Mangroves sequester substantially more carbon dioxide than any other forest type, which makes reforestation of these stands crucial in climate change mitigation. Despite this potential, the country's mangrove reforestation has been very limited over the past years. The Philippine Forestry Statistics of 2015 and 2020 showed an increase of about 0.26% only in mangrove areas in the country. Moreover, mangrove's carbon stock estimation is also just gaining attention these recent years. Thus, this study aimed to assess the carbon stock of a 25-hectare reforestation site in Brgy. Malaking Patag, Culion, Palawan, before and after the implementation of the GCash-GForest Mangrove Rehabilitation Project. The study utilized available aboveground biomass density (AGBD) in 2000 from NASA-CMS and Normalized Difference Vegetation Index (NDVI) in the same year to generate a non- linear model and establish their relationship. The coefficient of correlation (R), coefficient of determination (R2), and Root Mean Squared Error (RMSE) values were also calculated. The generated model was then used to estimate the carbon stock of the study area in 2022 and 2023. Results revealed that a total carbon stock of 135.42 tons and 141.16 tons were estimated before and after the project implementation. The reforestation effort has yielded approximately around 4.24% increase in carbon stock from 2022 to 2023 alone. With proper care and maintenance, this is expected to increase further by the end of the project's second phase in 2024. In terms of its estimated price value, the carbon stored in the mangrove area can be roughly estimated at around P1.1M to P2.3M. This somehow affirms the significance of mangrove forests as an important carbon sink. Future studies may consider a total estimation of the blue carbon in the area so that all possible sources of carbon are accounted for and conduct valuation studies also of ecosystem services derived from mangrove forests.
Title:	**Estimation of Aboveground Biomass and Carbon Stocks of Mangrove in Barangay Matandang Sabang Kanluran, Catanauan, Quezon, Philippines**
Author:	**Segovia, Zandro Vispo**
Adviser:	**Tiburan, Cristino L., Jr.**

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Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Mangroves are considered one of the most important types of forest that are usually situated in tropical and subtropical regions on earth. They can provide countless ecosystem services, sequester carbon, improve water quality, provide habitat to various fishes, create opportunities for ecotourism and recreational activities, and protect the coastline against natural hazards such as tsunamis and storm surges, among many others. While studies related to mangrove forests in the country have been gaining attention over the past decades, some areas still need to be explored. Hence this study led to investigating the mangrove forest in Barangay Matandang Sabang Kanluran in Catanauan, Quezon, which was believed to have been established 30 years ago. The mangrove extent map in the area was initially determined by utilizing the 2020 land cover map of NAMRIA. A field inventory was also conducted to determine the different species in the area, and their aboveground biomass and carbon stock were likewise estimated. Based on the study, a total of six (6) species were recorded during the field inventory in the 20 sampling plots that were established, namely, Rhizophora apiculata, Rhizophora mucronata, Avicennia officinalis, Ceriops tagal, Sonneratia alba, and Scyphiphora hydrophyllacea. The mangrove area is approximately around 93.72 ha, that yielded an estimated total aboveground biomass of around 8,487.28 tons and an aboveground carbon of about 4,243.64 tons C. The result of this study also indicated that the mangroves in Brgy. Matandang Sabang Kanluran stores a significant amount of aboveground biomass and carbon, hence the need to maintain and properly manage the site. Lastly, other relevant studies can be explored as well in the future which may include blue carbon to account for the total carbon stock in the area, and valuation of mangroves in terms of the different ecosystem services they provide.
Title:	**Urban Flood Risk Modeling Using InVest (Integrated Valuation of Ecosystem Services and Tradeoffs) in Marikina City, Philippines**

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Author:	**Sobrevega, Elmar Fernandez**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Flooding is caused by significant rain events that produce stormwater runoff that exceeds the capacity of streams and inundates low-lying land in which water cannot drain away as fast as it accumulates. Marikina city is located on a low-altitude estuary and as such is regularly exposed to flooding, and is at risk from sea level rise. Using the urban flood risk mitigation model of InVEST, only the land use and land cover, soil hydrologic group, rainfall depth, and the curved number value of the soil hydrologic group to the land use and land cover are used. Flood risk map would be made, and the evaluation would be followed. Lastly, comparative analysis of the result was done to the validation of maps from secondary and primary sources. The overall accuracy indicates the percentage of items that are properly classified, whereas the Kappa Coefficient measures the agreement between two flood maps. The flood map (Ondoy) has an overall accuracy of 36.75% and a Kappa Coefficient of 7.33%. The flood susceptibility map has an overall accuracy of 46.39% and a Kappa Coefficient of 7%. The model produced a flood risk map out of the average runoff index. However, it needed to be more accurate compared to the flood and susceptibility maps. Not all models are helpful, especially those with limited data input. For instance, slope and elevation data, which are crucial elements for flood hazards, are not required by the model. Inaccurate outcomes and bad decision-making may emerge from this.
Title:	**Investigation of Water Quality and Aquatic Community Structure in Selected Rivers in Mankayan, Benguet**
Author:	**Sulit, Ian Richard Ardieta**
Adviser:	**Tingson, Keshia N.**
Stream:	**Environmental Forestry**

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Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	The Municipality of Mankayan in Benguet is endowed with rich resources and such as minerals like copper which were used for trade in as early as the twelfth century. Eventually, it became a primary source of metals in the Philippines since the Spanish Regime through mining. Mining is an activity and industry that involves extraction of useful minerals form the Earth. It is a business that positively affects both the government and private sectors due to the amount of profit it yields. However, if poorly managed, can lead to environmental pollution and devastation of biodiversity which, in turn, negatively affects the economy, food sources, and especially freshwater sources. Out of all the water on Earth, only 3 percent is freshwater which is the used primarily for human consumption. Currently, there is insufficient data and published studies regarding aquatic studies in selected rivers in Mankayan, Benguet. In this study, water quality and aquatic communities (macrobenthic invertebrates and plankton) were used to assess the ecological health of the selected sampling sites. It was determined that the water from the rivers are not recommended for direct consumption mostly due to the low oxidation reduction potential of these waters. On the other hand, out of the six rivers observed for macro-benthic invertebrates, only Nayak River and Guellong Creek 1 were deemed as not ecologically healthy due to low amounts of dissolved oxygen which is the primary requirement of aquatic species in order to survive.
Title:	**Microclimatic Effects of Different Land Uses in Lipa City, Batangas**
Author:	**Tumbaga, Jestine Mea Autos**
Adviser:	**De Luna, Ma. Jennalyn O.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**

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Abstract/Executive Summary:	This examines the effect of different land uses in the microclimate of Lipa City, Batangas. In this study, land uses, including greenspace (Lipa Community Park), residential (Mabini Homes Subdivision), and commercial (Lipa City Public Market) were measured for air temperature, light intensity, and relative humidity. The measurements were made on 23 plots established for the land uses mentioned above in the morning, noon, and late afternoon from March to June 2023. In light of this, it was found that greenspaces generally have a cooler microclimate than residential or commercial areas. The measured mean light intensity and air temperature were lower in the greenspace. On a land-use basis. greenspace has a mean light intensity that ranges from 1707.7 lux to 2649.2 lux. On the other hand, residential areas typically have light levels between 4425.1 and 62961.4 lux. The commercial's mean light intensity ranges from 2231.7 lux to 57849.1 lux. Similarly, the greenspace had the lowest mean air temperatures, ranging from 22.42 to 30.26 C. In contrast, residential areas had mean light intensities from 29.66 and 37.46 C. Conversely, the commercial has a mean air temperature range of 27.35 to 37.53 degrees Celsius. Consequently, regarding relative humidity values, greenspace had the highest mean measurement ranging from 61.12% to 80.36%. In comparison, the commercial and residential had the lowest values ranging from 62.43% to 40.31% and 60.33% to 40.79%, respectively. Incorporating evidence from prior studies, this research shows that greenspace improves the local climate in an urban area and provides cooling and humidifying effects and thermal comfort. Further, this study sought to examine the relationships between each microclimatic parameter and the trends in microclimate across different times and land uses. The results of this study revealed that light intensity and air temperature have a positive relationship with an R-value of 0.678 and a p-value of 4.97E- 45. In contrast, a negative linear relationship was observed between relative humidity and air temperature with an R-value of -0.832 and p-value of 3.02E-84, as well as between relative humidity and light intensity, with an R-value of -0.518 and a p-value of 1.23E-23. Moreover, the microclimate measured in the greenspace differed significantly from other land uses. Additionally, light, air, and temperature increase as one moves farther from a greenspace while relative humidity decreases. The study revealed that greenspace is an

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	important factor in ameliorating microclimate in the urban setting. On this basis. comprehensive land use plans and design should include establishing a larger greenspace or establishing mixed land use that balances residential and commercial areas with green space.
Title:	**Predicting Habitat Sustainability of Aquilaria spp. in the Philippines Using Species Distribution Models**
Author:	**Villanueva, Clio Elizandre M.**
Adviser:	**Reyes, Tomas D., Jr.**
Stream:	**Production and Industrial Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Agarwood (Aquilaria spp.) has traditionally been ingrained in the culture of Southeast Asian countries. Due to their resinous heartwood, these species are heavily exploited, which causes a drastic decline in population. These species are classified as vulnerable and critically endangered on the IUCN Red List. The Species Distribution Model is one of the essential strategies in conservation planning since it helps identify how species react to its environmental space. This study used various species distribution model algorithms, such as Maximum Entropy (MaxEnt), Generalized Linear Model (GLM), and Ecological-Niche Factor Analysis, to predict the habitat suitability of Aquilaria spp. throughout the Philippines. Based on the MaxEnt and GLM algorithms, the significant predictors that greatly influence the distribution of Agarwood species are mean temperature of driest quarter, precipitation seasonality, precipitation of coldest quarter, normalized difference vegetation index, and elevation. In addition, findings from ENFA algorithm suggests that Agarwood habitat differs significantly from the average environmental parameters of the study area and has a narrow niche range in comparison to available conditions. The areas with high suitability classification are concentrated in two major islands of the Philippines which are Visayas and Mindanao. Provinces such as Leyte, South Cotabato, Bukidnon, and Agusan Del Sur had the largest high suitability areas from at

	least two habitat suitability maps in the study. Kappa Statistics, as an additional measure for accuracy, showed that there is a substantial rate of accuracy in the prediction of categorization between presence and absence of Agarwood using GLM. Overall, among the algorithms used in the study, the MaxEnt algorithm gained the highest AUC values, indicating that it is the best model and has developed an accurate species distribution model.
Title:	**Impacts of Greenspaces on Youth's Psychological Well-being and Physical Activities Amidst Pandemic at Lipa City Community Park, in Batangas**
Author:	**Villasanta, Mel Micosa**
Adviser:	**De Luna, Ma. Jennalyn O.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Greenspaces provide several benefits including a refuge for emotional warmth, relaxation, and for boosting physical wellness. Various mental health issues among young adults have been reported during the covid-19 pandemic. And Lipa City Community Park in Batangas was chosen as the study site. It was discovered that due to benefits that the urban park and the greenspaces could offer, such as its benefits to the overall well-being that it helps in relieving stress, for enjoyment, relaxation, and encourages performing physical activities, also to the environment itself, the attributes of the park that attracts them, and enhancing socialization are the main motivations on why they visit the park. Moreover, the results revealed that the majority of the respondents: 16.7% started visiting the park in 2018; 51.7% learned the park through their families; 38.7% visits the park everyday; 36.4% spends two to four hours inside the park; 25.9% travel for 10-20 minutes to go to park; 57.1% are fond of visiting parks; 72.5% were experiencing stress pre-pandemic; 70.4% were stressed during the start of pandemic; and 29% were stressed in 2022. Majority also of the respondents (381/385) believed that urban greenspaces help in relieving

	stress, and motivates them to exercise (91.6%). The data analysis also showed highly significant relationships between respondents' visitation & travel time (r=0.14; p value=0.0062), time travel & time spent (r=0.17; p value=0.0010), stress level & time spent (r=0.14; p value=0.0045), and overall experience & decrease in stress level (r=0.21; p value=0.00003). In addition to this, 97.9%, will continuously visit urban parks. Therefore, this study suggests establishing urban parks in all highly urbanized areas as this proves that urban greenspaces contribute to psychological and physical well-being.
Title:	**Assessment of Urban Tree Risk in Freedom Park, Daet Camarines Norte, Philippines**
Author:	**Zamudio, Mikaela Belardo**
Adviser:	**Visco, Roberto G.**
Stream:	**Environmental Forestry**
Access:	**General Public**
Type:	**Thesis**
Abstract/Executive Summary:	Urban trees play a vital role in enhancing the quality of urban environments, providing numerous benefits such as improved air quality, reduced urban heat island effect, and aesthetic value. However, urban trees also pose potential risks, particularly in densely populated areas, where their structural integrity and health can impact public safety and property. This study aimed to assess the urban tree risk in Freedom Park, Daet, Camarines Norte, Philippines, with a focus on identifying hazardous trees and implementing appropriate management strategies to mitigate potential risks. The assessment involved a comprehensive survey of the trees within Freedom Park, considering factors such as tree species, age, health, structural stability, and proximity to high-traffic areas. Visual inspections, along with equipment and techniques, were employed to evaluate tree health, identify signs of decay or structural weaknesses, and assess the likelihood of tree failure. The results of the assessment revealed a diverse urban tree population within Freedom Park, consisting of various species. While the majority of trees displayed good health and structural stability, a subset of trees exhibited signs of decline,

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	decay, or poor structural integrity, posing potential risks to park visitors, infrastructure, and adjacent properties. Based on the risk assessment, 44 trees have low risk, 10 trees with moderate risk, and 5 trees with high risk. Consequently, recommendations of arboricultural treatment were developed to address the identified risks. This included tree pruning, hazard pruning, and implementation of regular monitoring and maintenance practices. Further, the findings of this study highlight the significance of proactive tree risk assessment and management in urban environments. The assessment outcomes can serve as a valuable reference for urban planners, arborists, and policymakers in similar urban areas, emphasizing the importance of incorporating tree risk assessment and management strategies into urban planning and maintenance practices. Ultimately, this study contributes to the development of sustainable and safe urban landscapes, fostering a harmonious coexistence between urbanization and nature.