

Conference Paper

Analytical Hierarchy Process-Based Selection of Native Trees for Land Restoration and Carbon Sequestration in Indonesia

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ABSTRACT

Ecological restoration of forests is an effective strategy for improving ecosystem quality while reducing atmospheric carbon levels. This study aims to identify priority native tree species for land restoration and carbon sequestration in Indonesia using the Analytical Hierarchy Process. Species were assessed based on three primary criteria: 1) propagation ability (growth potential, seedling growth uniformity, and seedling growth rate), 2) growth performance (survivability, height, and diameter increment), and 3) carbon sequestration capacity (carbon storage and carbon absorption). Species prioritization was conducted using the Analytical Hierarchy Process (AHP), integrating expert judgment for weighting with quantitative evaluation of species performance. Results from six experts indicated that growth performance had the highest relative weight (38.00%), followed by propagation ability (32.97%), and carbon sequestration capacity (29.03%). The consistency ratio (CR) of 6.98% indicated acceptable reliability. Within the growth category, survivability contributed most to the weight (70.52%), whereas carbon storage was the dominant factor in the carbon sequestration (87.50%). Pairwise comparisons of species alternatives showed perfect consistency ratio (CR = 0.00). Based on the composite AHP score, five species emerged as the most suitable for restoration and carbon sequestration initiatives: *Terminalia bellirica* (0.141), *Pterospermum javanicum* (0.112), *Litsea garciae* (0.095), *Anisoptera marginata* (0.095), and *Diospyros frutescens* (0.072).

Keywords: Analytical Hierarchy Process (AHP), ecological restoration, carbon sequestration, Native tree species, Forest recovery

Introduction

Designing forest restoration strategies must take ecological characteristics into account, particularly in the selection of tree species (Locatelli et al., 2015; Meli et al., 2014). Native plant species are preferred because they have undergone long natural successional processes and are therefore capable of maintaining ecosystem integrity and resilience (Leger et al., 2021; Gairola et al., 2023). Similarly, in the Indonesian context, the identification of native species is essential to address the major challenges of high deforestation rates and carbon emissions. CO₂ emissions from the Land Use, Land-Use Change, and Forestry (LULUCF) sector in Indonesia reached 467.91 Mt CO₂ in 2022, the second highest globally after the Congo (Climate Watch, 2025). Given Indonesia's exceptionally high ecological diversity, the species selection for reforestation must be tailored to the environmental context of each region.

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Indigenous species with strong potential for carbon-sequestration are especially important for enhancing long-term ecosystem sustainability.

Policies governing tree species selection in Indonesia, although not explicitly regulating restoration mechanisms, have been in place since the issuance of the Ministerial Regulation in 2020 (Pemen, 2020). According to this regulation, criteria for land rehabilitation species include long life span, deep rooting systems, low evapotranspiration rates, timber species that are endemic/native/local or that have previously occurred naturally, and/or non-timber forest products (NTFPs) that are native and/or usable by local communities. Several researchers have simplified these rehabilitation criteria. For example, Meli et al. (2014) proposed three main criteria for selecting reforestation species, including ecological (dominant and adaptive species), social (economic value), and technical (ease of propagation). The aspirations of companies and local communities in selecting species for greening programs often emphasize the availability of planting materials. Another important criterion is the selection of species with economic value and strong marketability (Artati et al., 2019; Meli et al., 2014).

Given the wide range of criteria, it is necessary to determine the most appropriate ones based on robust scientific justification. One widely used method for multi-criteria decision making, incorporating both quantitative and qualitative considerations, is the Analytical Hierarchy Process (AHP) (Saaty, 1994; Brunelli, 2015). This technique integrates expert judgment with scientific evidence to strengthen final decision-making (Bravo-Bello et al. 2018). AHP has been extensively applied in forestry research, including the prioritization of tree species for urban environmental restoration (Li et al., 2011; Asgarzadeh et al., 2014; Bravo-Bello et al., 2018), the selection of suitable plant species for agroforestry systems (Rahmawaty et al., 2022), and the identification of medicinal plant species (Rahmawaty et al., 2022), and the identification of medicinal plant species (Wati et al., 2020). However, AHP has limitations, particularly related to criteria determination and data inconsistency when an excessive number of criteria or alternatives are compared (Whitaker, 2007; Song & Kang, 2016).

This study seeks to modify the conventional AHP approach by combining expert-based weighting of criteria and sub-criteria with real-value comparisons of each alternative (tree species). This approach is intended to minimize data inconsistency in the decision-making process. Consequently, this paper aims to produce an optimal priority list of native tree species for land restoration and carbon sequestration in Indonesia.

Material and Methods

Study area

This study used samples of native tropical lowland trees of Indonesia. The Bogor Botanical Gardens collection served as the primary reference for tree species identification and selection due to its accurate Collection Registration System. Empirical data for each tree species refers to the previous studies by Purnomo et al. (2022), Purnomo (2024), and Purnomo et al. (2024).

Species selection

The selection of tree species for this study was conducted through a comprehensive screening process of the Bogor Botanic Gardens Collection (2018). Initially, 3,156 species were evaluated, which were narrowed down to 2,907 native species. The focus was further refined to 978 species native to lowland regions (0–1000 m asl) characterized by a significant height (exceeding 20 m). In the end, 152 species produced many seeds year-round reliably. From this subset, 15 species were selected based on additional criteria, including their potential for timber, fruit, ornamental value, or other economic uses, and their ecological suitability for growth under the conditions at the Cibinong Botanic Gardens experimental site (Appendix 1).

Selection criteria determination

The selected species' potential for land restoration and carbon sequestration was evaluated based on three primary criteria: propagation capability, growth performance, and carbon sequestration capacity. The propagation capability was assessed using three sub-criteria: maximum growth potential, seed growth uniformity, and Seedling Growth Rate. Growth performance includes three sub-criteria: survival rate, diameter growth rate, and height growth rate. The carbon sequestration capacity was evaluated using two sub-criteria: carbon storage potential and carbon absorption potential (Table 1).

Table 1. Criteria and sub-criteria for tree species selection

Criterion	Sub-Criteria	Description	Source
Propagation Capability	1. Maximum Growth Potential	The percentage of germinated seeds is calculated as the number of germinated seeds divided by the total number of seeds sown.	1, 2, 3, 4, 5
	2. Seedling Growth Uniformity	The percentage of normal seedlings emerging between the first and second observations is divided by the total number of seeds sown.	2, 3,
	3. Seedling Growth Rate	Daily increase in the percentage of normal seedlings from the beginning to the end of the germination period.	2, 3, 4
Growth Performance	1. Survival Rate	Seedling survival under field conditions is calculated as the number of living seedlings divided by the total number planted.	3, 4, 5, 6, 7
	2. Diameter Growth Rate	Seedling survival under field conditions is calculated as the number of living seedlings divided by the total number planted.	3, 5, 7
	3. Height Growth Rate	Rate of increase in plant height from planting (age 1 year) to age 8 years in the experimental plot.	3, 5, 6, 7
Carbon Sequestration Capacity	1. Carbon Storage Potential	Carbon storage potential is estimated from plants' total biomass content at 8 years of age.	7, 8
	2. Carbon Absorption Potential	Carbon absorption potential is estimated from the amount of carbon fixed during the photosynthesis process in leaves.	7, 9, 10, 11

Note: 1: Widjaya *et al.* 2021; 2: Nasrul & Fridayanti 2014; 3: Meli *et al.* 2014; 4: Lu *et al.* 2016; 5: Lu *et al.* 2017; 6: Elliot *et al.* 2003; 7: Purnomo *et al.* 2024; 8: Lutz *et al.* 2018; 9: Purnomo *et al.* 2023; 10: Lailati 2013; 11: Daud *et al.* 2019.

Propagation capability

Propagation capability is a critical criterion for selecting tree species for land restoration (Meli *et al.*, 2014; Lu *et al.*, 2016). The germination procedures followed the protocol established by the Seed Bank Unit of Bogor Botanic Gardens. Seeds from each species (100 seeds per species) were sown simultaneously under uniform nursery conditions and cultivated until they reached a height of 1–1.5 meters (approximately one year old), at which point they were ready for transplantation into the experimental plots. During the nursery phase, ease of propagation was assessed using three indicators: maximum growth potential, seed growth uniformity, and Seedling Growth Rate (Nasrul & Fridayanti, 2014). The propagation scores for each species were obtained from Purnomo (2024) (Appendix 1).

Growth performance and carbon storage potential

Growth and carbon storage measurements were conducted on a total of 150 one-year-old seedlings (approximately 1 m in height), consisting of 15 species with 10 replicates each, planted in the experimental plots at the Cibinong Botanic Gardens. During field establishment, three key growth parameters were measured: survival rate, height growth rate, and diameter growth rate. These parameters represent essential criteria for identifying species suitable for land restoration (Elliot *et al.*, 2003; Lu *et al.*, 2017).

The survival rate refers to the proportion of living seedlings in the plot, calculated as the number of surviving individuals divided by the total number of planted seedlings. **The diameter growth rate (VD)** indicates the rate of stem diameter increase from the time of planting (at one year of age) through year eight. **The height growth rate (VH)** reflects vertical growth over the same period. Purnomo (2024) reported the growth performance values for each species (Appendix 1).

Carbon storage potential

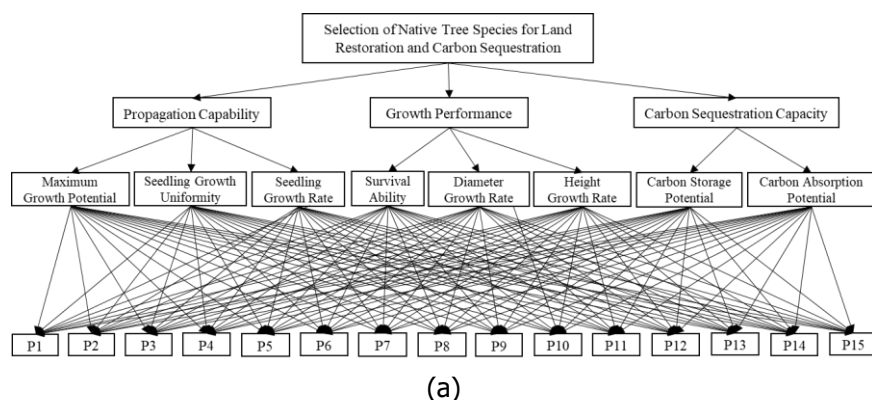
Carbon storage potential represents the capacity of a species to accumulate carbon in the form of biomass. The total biomass includes all major plant components: stem and bark, branches (primary offshoots from the stem), twigs (secondary offshoots), leaves, and roots. The biomass-based carbon storage values for each species have been presented by Purnomo et al. (2024) (Appendix 1).

Carbon absorption potential

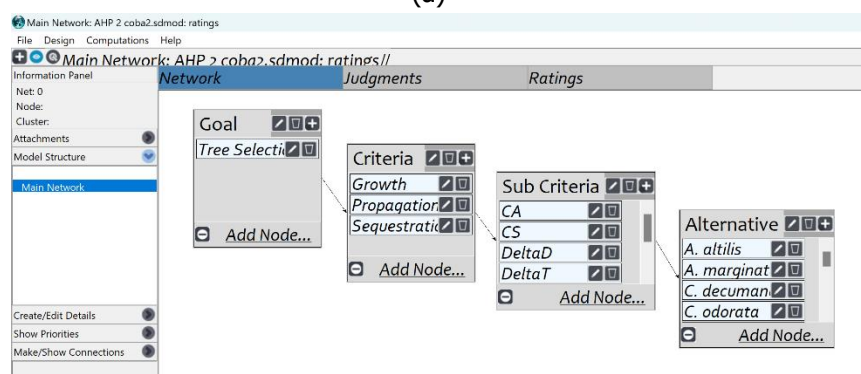
Carbon absorption potential, also referred to as the carbon absorption capacity, denotes a plant's ability to absorb atmospheric carbon through leaf-level photosynthesis. This parameter was estimated using a non-destructive leaf sampling method and carbohydrate analysis (Lailati, 2013; Daud et al., 2019; Purnomo et al., 2022). The absorption capacity data for each species have been reported by Purnomo et al. (2023) (Appendix 1).

Data analysis

The Analytical Hierarchy Process (AHP) was applied to assign weights to each criterion and sub-criterion, followed by scoring the 15 selected tree species based on their actual performance values for each criterion (Figure 1). The AHP process, the software *SuperDecisions 3.2*, was used to facilitate the AHP process (Brandalise et al., 2019; Stofkova et al., 2022). A non-parametric Spearman's correlation analysis was conducted to ensure that the sub-criteria within the same criterion were not correlated.



(a)



(b)

Figure 1. (a) AHP hierarchical structure and (b) SuperDecisions 3.2 interface used in the decision-making process for selecting native tree species for land restoration and carbon sequestration.

Pairwise comparison

The pairwise comparisons started with the criteria (level 1) (Figure 2), followed by the sub-criteria (level 2) (Figure 3), and finally, the alternatives (level 3) (Figure 4). At level 3, the comparisons were no longer based on expert opinions but used real measurement values. The pairwise comparisons of criteria and sub-criteria involved judgments from decision makers (six experts, consisting of three

botanists and three ecologists). Comparisons were made by evaluating the relative importance of one element compared to another (Table 2).

Table 2. Pairwise comparison rating scale in AHP

Importance intensity	Description
1	Both elements are equally important.
3	One element is slightly more important than the other.
5	One element is more important than the other.
7	One element is significantly more important than the other.
9	One element is absolutely more important than the other.
2,4,6,8	Intermediate values between two adjacent judgment values
Reciprocal	If element i is assigned a value compared to element j, then j has the reciprocal value compared to i

The 1-9 rating scale is central to decision making, transforming qualitative aspects into quantitative measures, eliminating doubts about comparisons between closely related criteria, and providing clear priorities for decision making (Bravo-Bello et al., 2018). After six experts have rated each criterion/sub-criterion on a 1-9 scale, the scores are averaged using the geometric mean, as AHP requires only one response for each criterion/sub-criterion/alternative to be compared (Saaty, 1994).

Assessment consistency

The consistency ratio (CR) was used to test the consistency of experts' judgments. A comparison was considered consistent if $CR < 0.1$. If the comparison is not consistent, data collection must be repeated. Once consistency was achieved, the next step involved entering the actual values for each criterion corresponding to the different tree species. At this stage, expert opinions are no longer used, and the focus shifts to the values of each alternative (tree species). The final normalized values and rankings indicated the priority of each tree species for land restoration and carbon sequestration in lowland forests in Indonesia.

Results and Discussion

Comparison between criteria

In the comparison between criteria (level 1), the growth performance criterion received the highest weight (38%), followed by ease of propagation (32.97%), and carbon sequestration potential (29.03%) (Figure 3). A consistency ratio of 6.98% ($<10\%$) indicates consistent judgments, allowing for further analysis (Saaty, 1994). Most experts assigned that growth performance to be a greater determinant of restoration success than other factors. Growth performance is critical criteria for land restoration species, as they are related to the species' adaptability to the environment (Elliot et al., 2003). Referring to land conditions in Indonesia, this weighting variation is fairer than the studies by Lu et al. (2016) and Lu et al. (2017), which gave equal weights to the growth and propagation criteria.

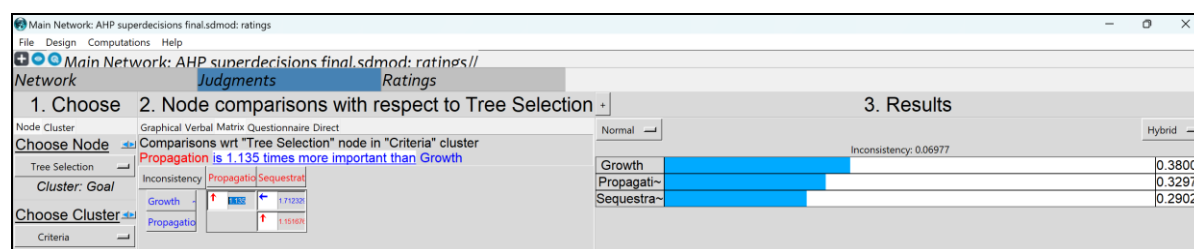


Figure 2. The process of filling in the pairwise comparison values between criteria (level 1) using the SuperDecisions 3.2 software

Comparison between sub-criteria

In the comparison between sub-criteria (level 2), all consistency ratio values met the requirements ($<10\%$) (Figure 3; Table 3). The most significant weights observed were survival

rate (70.52%) for the growth performance criterion and carbon absorption capacity (58.04%) for the carbon sequestration potential criterion. Most experts firmly state that the survival rate provides a guarantee of the effectiveness of restoration activities compared to tree size (diameter and height). Therefore, a low survival rate is a strong reason for eliminating a species from the priority list for various reasons, including high replanting costs and significant variations in environmental factors (Elliot et al., 2002; Roman-Danobeytia et al., 2012). Meanwhile, experts prefer carbon absorption capacity because this criterion shows a spontaneous and measurable response over a certain period to increased CO₂ concentrations in the atmosphere.

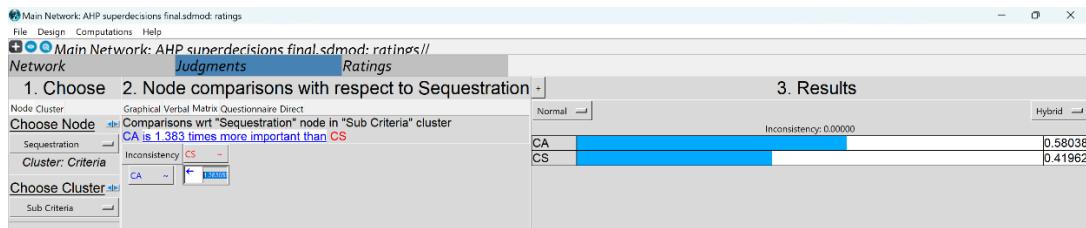


Figure 3. The process of filling in the pairwise comparison values between sub-criteria (level 2) for the carbon sequestration potential criterion using the SuperDecisions 3.2 software.

Table 3. Weights and consistency ratios between sub-criteria

Sub-criteria	Weight (<i>Eigen value</i>)	Consistency ratio
Criterion: Propagation Capability		
Maximum Growth Potential (MGP)	0,4465	0,0024
Seedling Growth Rate (SGR)	0,3850	0,0024
Seedling Growth Uniformity (SGU)	0,1686	0,0024
Criterion: Growth Performance		
Survival Rate (SV)	0,7052	0,0394
Diameter Growth Rate (DGR)	0,1847	0,0394
Height Growth Rate (HGR)	0,1101	0,0394
Criterion: Carbon Sequestration Potential		
Carbon Storage (CS)	0.4196	0,0000
Carbon Absorption (CA)	0.5804	0,0000

Comparison between alternatives

The comparison between alternatives using AHP resulted in weight values for each tree species under each sub-criterion (Figure 4; Table 4). The consistency ratio was highly convincing, approaching absolute consistency (CR = 0.00) because it compares the actual values of each tree species. The comparison between species is even more evident in the final values and rankings (Figure 5).

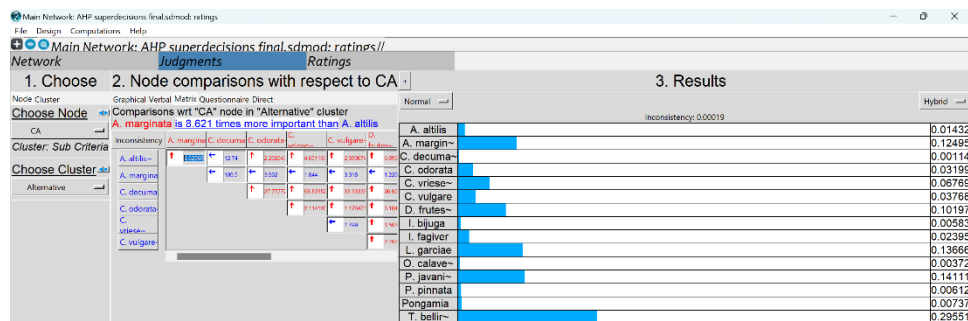


Figure 4. The process of filling in the pairwise comparison values between alternatives (level 3) for the carbon sequestration potential criterion using SuperDecisions 3.2 software.

Table 4. Priority weight and consistency ratio of the pairwise comparisons among alternatives

Alternatives	Propagation capability			Growth potential			Carbon sequestration capacity		Final value	P
	MGP	SGU	SGR	SV	DGR	HGR	CS	CA		
<i>A. altilis</i>	0,0631	0,0780	0,0942	0,0318	0,0728	0,0738	0,0384	0,0143	0,0494	10
<i>A. marginata</i>	0,0842	0,0751	0,0708	0,0897	0,0874	0,0899	0,1049	0,1249	0,0933	4
<i>C. decumanum</i>	0,0666	0,0649	0,0379	0,0476	0,0425	0,0552	0,0131	0,0011	0,0381	14
<i>C. odorata</i>	0,0822	0,0982	0,0832	0,0706	0,0944	0,1031	0,1094	0,0320	0,0767	5
<i>C. vrieseanum</i>	0,0586	0,0723	0,0425	0,0449	0,0607	0,0693	0,0910	0,0677	0,0597	8
<i>C. vulgare</i>	0,0548	0,0477	0,0538	0,0449	0,0546	0,0477	0,0233	0,0377	0,0446	13
<i>D. frutescens</i>	0,0617	0,0636	0,0423	0,0834	0,0425	0,0489	0,0251	0,1020	0,0656	6
<i>I. bijuga</i>	0,0509	0,0390	0,0152	0,0598	0,0740	0,0827	0,0662	0,0058	0,0453	11
<i>I. fagiver</i>	0,0646	0,0295	0,0496	0,1047	0,0493	0,0459	0,0534	0,0240	0,0614	7
<i>L. garciae</i>	0,0636	0,0670	0,0407	0,0897	0,1110	0,0944	0,1857	0,1367	0,0997	3
<i>O. calavensis</i>	0,0411	0,0523	0,0380	0,0449	0,0303	0,0343	0,0068	0,0037	0,0308	15
<i>P. javanicum</i>	0,0857	0,0755	0,1796	0,0897	0,0850	0,0859	0,0850	0,1411	0,1073	2
<i>P. pinnata</i>	0,0822	0,0957	0,1039	0,0467	0,0462	0,0467	0,0392	0,0061	0,0541	9
<i>Pongamia</i>	0,0734	0,0993	0,0749	0,0467	0,0462	0,0281	0,0062	0,0074	0,0448	12
<i>T. bellirica</i>	0,0672	0,0419	0,0735	0,1048	0,1031	0,0940	0,1523	0,2955	0.1291	1
Consistency ratio	0,0003	0,0009	0,0079	0,0037	0,0043	0,0012	0,0733	0,0002		

Note: MGP: Maximum Growth Potential (%); SGU: Seedling Growth Uniformity (%); SGR: Seedling Growth Rate (%/etmal); SV: Survival Rate (%); DGR: Diameter Growth Rate (cm/bulan); HGR: Height Growth Rate (cm/bulan); CS: Carbon Storage Potential (kg); CA: Carbon Absorption Potential (g/jam); P: Priority

Based on the final AHP values (Figure 5), *Terminalia bellirica*, *Pterospermum javanicum*, *Litsea garciae*, *Anisoptera marginata*, and *Diospyros frutescens* are recommended as the top five tree species for land restoration in tropical lowlands in Indonesia. The second priority includes *Cananga odorata*, *Inocarpus fagifer*, *Canarium vrieseanum*, *Pometia pinnata*, and *Artocarpus altilis*.

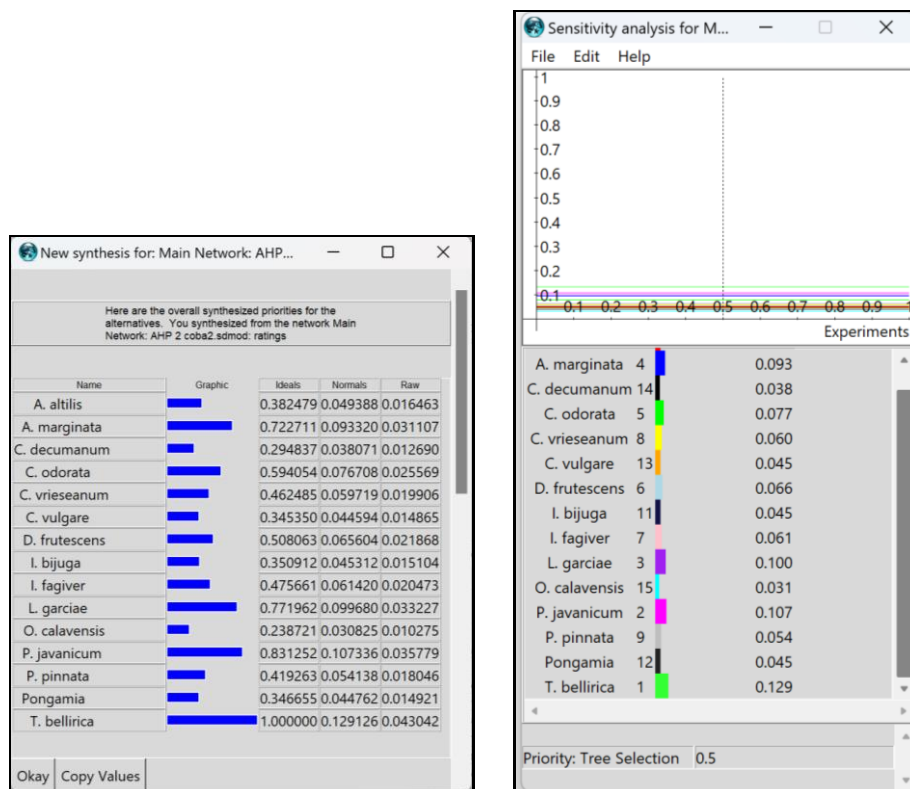


Figure 5. Final values (the overall synthesized priorities) and rankings (priority) for each tree species based on AHP results using SuperDecisions 2.8.

Terminalia bellirica, in line with previous study by Aggarwal and Chauhan (2014) and Dhyani et al. (2021), has high carbon sequestration in India. It also has above-average carbon sequestration capacities among naturally growth vegetation in a mining recovery project in Indonesia (Purnomo et al. 2022). Besides that, all priority tree meets the criteria of being adaptive to environmental conditions. *Terminalia bellirica* is able to adapt to a wide variety of habitat types, such as seasonal forest, deciduous-mixed forest and deciduous dried-leaf dipterocarp forest at 2000 m asl (Lim 2011; Kumari et al., 2017). *Pterospermum javanicum* is recorded as having the highest carbon storage in agroforestry (Ariyanti et al., 2018). Even though in the case of the tropical abandoned land, *P. javanicum* instability in biomass growth (Karyati et al., 2019). *Litsea garciae* is reported very adaptive to various condition and commonly found in sandy soil of disturbed mixed dipterocarp forest along river margins to sloping hills of 200 m asl (Lim, 2011). Meanwhile, *Anisoptera marginata* and *Diospyros frutescens* are tolerant of various environmental conditions, especially in lowland mixed dipterocarp forests (Otsamo, 1998; Ng, 2002).

Conclusion

The AHP results from the evaluations of 6 experts indicated that the growth potential criterion had the highest weight (38%), followed by propagation ease (32.97%) and carbon sequestration ability (29.03%) with a consistency ratio of 6.98% (consistent). The comparison results for the subcriteria (level 2) showed that all consistency ratio values met the requirements (<10%). The most significant weights were survival rate (70.52%) for the growth potential criterion and carbon absorption rate (87.5%) for the carbon sequestration ability criterion. The comparison of alternatives using real measurement values (not expert perception) yielded a highly convincing consistency ratio (close to absolute consistency, CR = 0.00). Five tree species were recommended for land restoration and carbon sequestration due to their highest relative weight or eigenvector value, namely: *Terminalia bellirica* (0.141), *Pterospermum javanicum* (0.112), *Litsea garciae* (0.095), *Anisoptera marginata* (0.095), and *Diospyros frutescens* (0.072). The second priority group included *Cananga odorata* (0.070), *Inocarpus fagifer* (0.059), *Canarium vrieseanum* (0.058), *Pometia pinnata* (0.051), and *Artocarpus altalis* (0.047). These findings address the study's objective by providing a prioritized list of native tree species based on growth performance, propagation ease, and carbon sequestration potential.

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Appendix 1. Propagation Capability, Growth Performance, and Carbon Sequestration Capacity on Native Trees of Indonesia with Potential for Land Restoration and Carbon Sequestration

No	Species name	Family	Propagation Capability (Purnomo 2024)			Growth Performance (Purnomo 2024; Purnomo et al. 2024)			Carbon Sequestration Capacity (Purnomo et al. 2024; Purnomo et al. 2022)	
			MGP (%)	SGU (%)	SGR (%/etmal)	SV (%)	DGR (cm/bulan)	HGR (cm/bulan)	CS (Kg C)	CA (gC/jam)
1	<i>Anisoptera marginata</i> Korth.	Dipterocarpaceae	95,56 ± 1,93 ^a	57,78 ± 5,09 ^b	3,08 ± 0,02 ^e	60	0,15 ± 0,04 ^{abc}	12,67 ± 2,99 ^a	34,59 ± 37,18 ^{abc}	130,17 ± 82,15 ^a
2	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Moraceae	70,00 ± 3,33 ^{cd}	60,00 ± 3,33 ^b	4,30 ± 0,24 ^c	20	0,12 ± 0,04 ^{cdef}	10,40 ± 5,26 ^{abc}	13,92 ± 12,84 ^{abc}	61,77 ± 55,29 ^b
3	<i>Cananga odorata</i> (Lam.) Hook. f. & Thomson	Annonaceae	93,33 ± 3,34 ^a	75,56 ± 1,93 ^a	3,62 ± 0,14 ^d	50	0,17 ± 0,02 ^{abc}	13,65 ± 2,21 ^a	34,27 ± 30,02 ^{abc}	59,78 ± 35,42 ^b
4	<i>Canarium decumanum</i> Gaertn.	Burseraceae	75,56 ± 5,09 ^{bc}	50,00 ± 5,77 ^{bc}	1,65 ± 0,07 ^{hi}	30	0,07 ± 0,02 ^{gh}	7,95 ± 0,82 ^{bcd}	4,11 ± 1,76 ^c	54,75 ± 47,39 ^b
5	<i>Canarium vrieseanum</i> Engl.	Burseraceae	67,78 ± 5,09 ^{cd}	56,66 ± 5,77 ^b	1,85 ± 0,11 ^{gh}	30	0,10 ± 0,04 ^{defg}	9,90 ± 2,27 ^{abc}	28,51 ± 34,23 ^{abc}	44,64 ± 32,5 ^b
6	<i>Canarium vulgare</i> Leenh.	Burseraceae	62,22 ± 6,94 ^{de}	36,67 ± 8,82 ^{de}	2,34 ± 0,10 ^f	30	0,09 ± 0,02 ^{efgh}	6,69 ± 2,87 ^{cde}	7,31 ± 8,96 ^{bc}	29,69 ± 31,27 ^b
7	<i>Diospyros frutescens</i> Blume	Ebenaceae	70,00 ± 3,33 ^{cd}	48,89 ± 6,94 ^{bc}	1,84 ± 0,06 ^{hi}	60	0,07 ± 0,02 ^{gh}	6,96 ± 1,48 ^{cde}	8,50 ± 6,49 ^{bc}	16,50 ± 20,46 ^b
8	<i>Inocarpus fagifer</i> (Parkinson ex F.A.Zorn) Fosberg	Fabaceae	73,33 ± 0,00 ^c	22,22 ± 1,92 ^{fg}	2,16 ± 0,23 ^f	70	0,08 ± 0,02 ^{efgh}	6,43 ± 2,27 ^{cde}	7,083 ± 5,86 ^{bc}	14,03 ± 10,15 ^b
9	<i>Intsia bijuga</i> (Colebr.) Kuntze	Fabaceae	57,78 ± 5,09 ^{ef}	30,00 ± 6,67 ^{def}	0,66 ± 0,13 ^j	40	0,12 ± 0,04 ^{bcde}	11,81 ± 2,70 ^{ab}	20,72 ± 13,96 ^{abc}	10,50 ± 7,78 ^b
10	<i>Litsea garciae</i> Vidal Count	Lauraceae	72,22 ± 5,09 ^c	50,00 ± 5,77 ^{bc}	1,77 ± 0,13 ^{hi}	60	0,18 ± 0,04 ^a	13,21 ± 1,52 ^a	58,23 ± 30,34 ^a	6,37 ± 6,15 ^b
11	<i>Pometia pinnata</i> J.R. Forst. & G. Forst.	Sapindaceae	93,33 ± 3,34 ^a	73,33 ± 6,67 ^a	4,11 ± 0,16 ^c	30	0,07 ± 0,02 ^{gh}	6,66 ± 1,91 ^{cde}	9,75 ± 8,12 ^{bc}	3,23 ± 1,09 ^b
12	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	83,33 ± 6,67 ^b	77,78 ± 8,39 ^a	2,96 ± 0,25 ^e	30	0,07 ± 0,01 ^{gh}	3,83 ± 1,35 ^e	1,39 ± 0,15 ^c	2,68 ± 2,45 ^b
13	<i>Pterospermum javanicum</i> Jungh. Count	Sterculiaceae	96,67 ± 3,34 ^a	56,67 ± 10,00 ^b	8,60 ± 0,10 ^a	60	0,14 ± 0,02 ^{abcd}	12,17 ± 2,64 ^a	26,63 ± 21,79 ^{abc}	2,55 ± 1,58 ^b
14	<i>Terminalia bellirica</i> (Gaertn.) Roxb. Count	Combretaceae	76,67 ± 3,34 ^{bc}	32,22 ± 3,85 ^{def}	3,20 ± 0,13 ^e	70	0,17 ± 0,04 ^a	13,29 ± 3,92 ^a	55,17 ± 46,69 ^{abc}	1,60 ± 1,45 ^b
15	<i>Ormosia calavensis</i> Azaola ex Blanco	Fabaceae	46,67 ± 3,34 ^g	41,11 ± 8,39 ^{cd}	1,49 ± 0,09 ^{hi}	30	0,05 ± 0,03 ^h	4,90 ± 1,02 ^{de}	2,12 ± 1,54 ^c	0,50 ± 0,16 ^b

Note: MGP: Maximum Growth Potential; SGU: Seedling Growth Uniformity; SGR: Seedling Growth Rate; SV: Survival Rate; DGR: Diameter Growth Rate; HGR: Height Growth Rate; CS: Carbon Storage Potential; CA: Carbon Absorption Potential. The values of MGP, SGU, SGR, SV, DGR, HGR, CS, and CA are mean and standard deviation (Mean ± SD), values in the same column followed by different superscript letters differ significantly at P<0.05.