



The Non-Detriment Findings (NDF) Report for *Dalbergia latifolia* in Java and West Nusa Tenggara, Indonesia



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- Cover : Left: *D. latifolia* stands to belong to the community in Central Java, Upper right: A pile of *D. latifolia* legal logs, middle right: Products of *D. latifolia*, and lower right: Discussion on the NDF Preparation. Photo by T Setyawati and S Nurjanah
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On behalf of the project team,

Dr. Kusumadewi Sri Yulita
Project Team Leader

ACRONYMS AND ABBREVIATIONS

BAP	Investigation Report (<i>Berita Acara Pemeriksaan</i>)
BKPH	Forest Management Unit (<i>Bagian Kesatuan Pengelolaan Hutan</i>)
BKSDA	Conservation for Natural Resources Regional Office (<i>Balai Konservasi Sumber Daya Alam</i>)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm	centimeter
D.	<i>Dalbergia</i>
FSC	Forest Stewardship Council
GANISPH	Technical Staff for Wood Inspection (<i>Tenaga Teknis Pengelolaan Hutan</i>)
GERHAN	The Indonesian Movement of Forest and Land Rehabilitation Mechanism (<i>Gerakan Rehabilitasi Hutan dan Lahan</i>)
ha	hectare
i.e.	stands for the Latin <i>id est</i> , or 'that is'
KLHK	Ministry of Environment and Forestry Indonesia (<i>Kementrian Lingkungan Hidup dan Kehutanan</i>)
KPH	Forest Management Unit (<i>Kesatuan Pengelolaan Hutan</i>)
m asl	meters above sea level
m ³	cubic meter
mm	millimeter
NDF	Non- Detriment Findings
Perhutani	State-Owned Forestry Company (<i>Perusahaan Hutan Negara Indonesia</i>)
PermenLHK	Minister of Environment and Forestry Regulations (<i>Peraturan Menteri Lingkungan Hidup dan Kehutanan</i>)
POLRI	The Indonesian National Police (<i>Kepolisian Negara Republik Indonesia</i>)
PT	Limited Liability Company (<i>Perseroan Terbatas</i>)
RKT	The Annual Work Plan (<i>Rencana Kerja Tahunan</i>)
SAKR	Wood transport letter (<i>Surat Angkutan Kayu Rakyat</i>)
SATS-DN	Document for Domestic Transport of Wild Plants and Animals (<i>Surat Angkut Tumbuhan dan Satwa Dalam Negeri</i>)

SATS-LN	Document for Foreign Transport of Wild Plants and Animals (<i>Surat Angkut Tumbuhan dan Satwa Liar Luar Negeri</i>)
SETJEN	Secretariat General (<i>Sekretariat Jenderal</i>)
SIPUHH	Information Systems of Forest Product Administration (<i>Sistem Informasi Penatausahaan Hasil Hutan</i>)
SK	Decision letter (<i>Surat Keputusan</i>)
SKAKR	Timber Transportation Certificate (<i>Surat Keterangan Angkutan Kayu Rakyat</i>)
SKSHHK	Certificates of Legitimacy for Forest Products (<i>Surat Keterangan Sahnya Hasil Hutan Kayu</i>)
SM	Wildlife Reserves (<i>Suaka Margasatwa</i>)
SVLK	Timber Legality Verification System (<i>Sistem Verifikasi Legalitas Kayu</i>)
TJKL	Other Timber Plants (<i>Tanaman Jenis Kayu Lain</i>)
TN	National Park (<i>Taman Nasional</i>)
TNI	The Indonesian National Military (<i>Tentara Nasional Indonesia</i>)
TPK	Timber Hoarding Place (<i>Tempat Penimbunan Kayu</i>)

EXECUTIVE SUMMARY

The rosewood which is scientifically known as *Dalbergia latifolia* is one of the high-quality timber that is highly demanded in the international market. The main distribution of this species in Indonesia is in Java and West Nusa Tenggara. The population of *D. latifolia* in Indonesia is predominantly found in plantations or private lands. Their existence in many parts of Indonesia is mainly due to the past land rehabilitation programs undertaken in the 1970s. The sources of *D. latifolia* wood for export in Indonesia come from plantations owned by a state-owned forestry company (Perhutani) and community-owned lands.

This species has been listed in Appendix II of CITES since 2017. Since its listing, country members of CITES would require the prior grant and presentation of an export permit for any specimens of a species listed in the Appendix. The Scientific Authority of the exporting country is obliged to advise that such export will not be detrimental to the survival of that species. Following this convention, the exporting countries restrict international trade of *D. latifolia* to levels that are not detrimental either to *D. latifolia*'s survival or to its role within the ecosystems in which the species is found. Even though the harvest and trade in *D. latifolia* from Indonesia were from plantations/non-native populations categorized as source code Y. This NDF assessment was carried out to ensure that the trade in *D. latifolia* was from sustainable harvest.

This report contained a discussion on the management of harvest and trade, as well as the conservation status of *D. latifolia* in Java and West Nusa Tenggara. The NDF assessment was initiated by conducting "a nine-step process for Making Non-Detriment Findings for Timber/Tree Species Listed in CITES Appendix II (Wolf *et al.*, 2018). The NDF assessment followed the "Guidance for CITES Scientific Authorities: Checklist to assist in making non-detriment findings for Appendix II exports" (Rosser & Haywood, 2002), with modification of some parameters adjusted to conform to the condition of *D. latifolia* in Indonesia. A total of twenty-two indicators from six parameters were selected and four indicators and one parameter were excluded from the assessment. The six parameters used were biological characteristics, distribution and population, threat status, harvest management, harvest control and monitoring, and protection from harvest. Each indicator comprised 5 criteria with a score of 1-5 where score 1 is the lowest risk and 5 is the highest risk. After scoring the indicators, a radar plot was prepared to visualize the scoring. Of the 22 indicators, 4 indicators received negative impacts (score 3-5), and 18 indicators received positive impacts (score 1-2). The high scores of the four indicators reflect that the indicators have negative impacts on the management of *D. latifolia* in Java and West Nusa Tenggara, Indonesia, if no further actions and regulations are taken on the indicators. The low scores of the 18 indicators showed positive impacts on the management of *D. latifolia* in Java and West Nusa Tenggara. These 18 indicators are needed to be maintained for the sustainable use of the *D. latifolia* harvest and trade.

The data and information used in the NDF assessment were collected from direct field surveys, literature reviews, interviews conducted with interested stakeholders, and meetings (virtual and physical). The additional information/data that could not be collected directly due to the travel restrictions enforced during the Covid-19 pandemic were obtained by hiring local enumerators who used the guideline developed by the Project Team.

The results from the field survey on the island of Java showed that the potential standing stock of *D. latifolia* in the Perhutani area is estimated at 841,629.12 m³ and the AAC for a 20-year harvesting cycle is 42,081.46 m³. Meanwhile, the total export of *D. latifolia*'s wood from Indonesia in 2021 was 88,100.04 m³. If the estimated percentage of export from Perhutani is 20% of the total export, then the estimated export from Perhutani would be 17,620.01 m³, with the remaining 70,480.03 m³ from community-owned lands. Therefore, *D. latifolia* export from Java is non-detriment.

In addition, the production from Perhutani only accounted for 20% while the balance of 80% is from the community-owned lands. However, there is a lack of data on the potential standing stock of *D. latifolia* present in the community-owned land, and hence, the AAC could not be estimated from the harvest regime. Further surveys and studies need to be conducted on community-owned lands, as well as a need for national-level data on the available standing stock of *D. latifolia*.

1. Introduction

1.1. The need for non-detriment findings

Dalbergia latifolia, locally known as *Sonokeling*, is a durable wood with decorative texture and motifs that make it suitable for furniture, veneer, handicrafts and other luxurious products. In Indonesia, this tree species is commonly found in the lowland non-native forest or artificial plantations, and a few are found in undisturbed forests. In the non-native forest, *D. latifolia* grows as monoculture stands. According to the CTIES Resolution 10.13 (Rev CoP18) paragraph f “timber or other parts or derivatives of trees grown in monospecific plantations be considered as being artificially propagated in accordance with the definition contained in Resolution Conf. 11.11 (Rev CoP18)”, thus it has a source code A. *D. latifolia* grows also in mixed plantations with minimal human intervention and is usually planted with other trees species such as teak, mahogany and sengon (*Paraserianthes falcataria*), and in farmland/agroforestry or gardens owned by local farmers. The trees from such plantations are categorized as plants obtained through “assisted production” with a source code Y. The *D. latifolia* trees from Indonesia that are being traded in the domestic and international markets are from the state-owned forestry company (Perhutani) and community-owned land.

The increasing global market of *D. latifolia* has resulted in an increasing demand for its wood from Indonesia, particularly since the listing of *D. latifolia* in Appendix II of CITES in 2017. As stated in point 2a of Article IV of the Convention “The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met: Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species” (CITES website, 2022)¹. Following this Convention, the exporting countries have restricted the international trade in *D. latifolia* to levels that are not detrimental either to *D. latifolia*’s survival or to its role within the ecosystems in which the species is found. Even though the harvest and trade in *D. latifolia* from Java and West Nusa Tenggara were from plantations/non-native populations, this NDF assessment was carried out to ensure that the trade in *D. latifolia* was from sustainable harvest.

1.2. Non-detriment findings procedure

The NDF assessment was initiated by conducting a nine-step process for Making Non-Detriment Findings for Timber/Tree Species Listed in CITES Appendix II (Wolf *et al.*, 2018). After conducting trials and in-depth studies, this method was inappropriate to apply in Indonesia because the *D. latifolia* grows in community-owned lands which are non-monoculture plantations and not from natural forests.

¹ <https://cites.org/eng/disc/text.php>

The NDF assessment followed the “Guidance for CITES Scientific Authorities: Checklist to assist in making non-detriment findings for Appendix II exports” (Rosser & Haywood, 2002). The checklist consisted of two tables that should be followed for species listed in Appendix II of CITES, i.e., **Table 1P** for undertaking an initial review as in **Annex 1** and **Annex 2** for undertaking an in-depth review. Based on the initial review, the Project Team concluded that:

- (i) The first source of export of *D. latifolia* from the artificial plantation (source code A) from Indonesia has medium confidence in the sustainability of the harvest as most of the components in the table could be filled even though some used a simple thick (commercial destination and percentage) and the estimated quantity of “Relative level of the harvest” (include a number of quantity if known).
- (ii) The second source of export of *D. latifolia* from Indonesia is from tenure/ownership land in the form of community-owned land and state-owned forestry company (Perhutani) with minimal human interference. As such, it does not fit into the definition of ‘artificial plantation’ and hence could not be filled using the table. This source is categorized as “assisted production” (source code Y). Therefore, the NDF assessment was only carried out for species with a source code Y.

Following this stage, the Project Team conducted an in-depth review using Table 2 from Rosser & Haywood (2002) with several modifications that were adjusted to *D. latifolia* occurring in Indonesia. In total there were 22 indicators used for these 6 parameters (**Annex 2**), i.e., lifeform, regeneration ability, dispersal efficiency, habitat, distribution (Java and West Nusa Tenggara), abundance and density, quality of information regarding distribution and population, major threats, illegal harvest and trade, history of harvest management, management plan, the objective of the management plan, harvest quota, harvest in the license area or area with secured tenure or ownership, harvest in the conservation area and protected areas, harvest in areas with open access, the confidence level in harvest management, the method to monitor harvest, the confidence level in harvest monitoring, proportion strictly protected, the effectiveness of strict protection measures, and regulation of harvest effort.

Modification of parameters and indicators

Modifications are made to the following parameters and indicators:

- (i) Parameters:
 1. The use of distribution and population to replace national distribution since the scope of this report is not at the national level but for Java and West Nusa Tenggara only.
- (ii) Indicators:
 1. Category on regeneration capacity to replace regeneration potential with modification of its criteria by adding more detailed information regarding the propagation method (**Annex 2**), such as fast regeneration through vegetative propagation.

2. Criteria for the category on dispersal efficiency were modified by adding more detailed information on dispersal mode, such as criteria efficiency: seed dispersed to a distant area.
3. Criteria for the category of habitat (ecological adaptability) were presented in more detail describing the adaptability to *D. latifolia*'s habitat.
4. Category on the abundance and density is to replace national abundance because the scope of this report is not at the national level but for Java and West Nusa Tenggara. The criteria for this category are also detailed by adding a range of numbers of trees/ha.
5. The criteria for the category of the quality of information, major threat, illegal harvest and trade, and objective of the management plan were presented in more detail (**Annex 2**).

Excluded parameters and indicators

Some parameters and indicators were excluded from the assessment due to the following reasons:

- (i) Population trend
The population trend could not be assessed because there was no record of population monitoring of *D. latifolia* in Java and West Nusa Tenggara, particularly in the harvest areas. Thus, this indicator was excluded from the radar plot.
- (ii) Utilization compared to other threats
There were Insufficient data to declare that harvesting of *D. latifolia* was causing threats to other species.
- (iii) Incentives for species conservation
Harvesting of *D. latifolia* was carried out in specific areas of its distribution, namely, in community-owned land and the state-owned forestry company (Perhutani). Therefore, if incentives for species conservation are applied, such incentives would only be applied at the local level, but not at the national level. Thus, this indicator was excluded from the assessment.
- (iv) Incentives for habitat conservation
There are regulations related to the incentives for the utilization of tree species in conservation areas, but the allocation of these incentives is not only for the conservation areas but also for other areas. Hence, this indicator was excluded from the assessment.

The draft NDF report was disseminated at a “Workshop on the Dissemination of the Non-Detriment Findings Report (NDF) for *Dalbergia latifolia* in Java and West Nusa Tenggara, Indonesia” that was held on 30 May 2022 in Bogor, Indonesia. The purpose of the workshop was to gather inputs from stakeholders, such as the coverage and distribution of *D. latifolia* that were not covered by the study, trade and harvest at the regional level, and regulations related to the current management practices. The inputs obtained from the workshop were used to finalize the NDF report.

2. Biological Characteristics

D. latifolia is mostly found in non-native/artificial forest stands, mixed plantations, and agroforestry land. This species is planted with other tree species and as understory plants, such as *Swietenia* species, *Mangifera* species, *Terminalia catappa*, *Vitex pinnata*, *Gluta rengas*, *Oralndicumndicum*, *Hibiscus spetomentosemna elastics*, *Artocarpus elasticus*, *Pithecellobium jiringa*, *Dysoxylum* species, *Alstonia scholarisAmericanaomelon dao*, *Perserea americana*, *Albizzia* species, *Durio zibethinus*, *Falcataria moluccana*, *Nephelium* species, *Gnpouringnemon*, *Syzygium* species, bamboo, porangradingrphophispidmuelleri), and gadung (*Dioscorea hispida*). *D. latifolia* can grow in various types of habitats with precipitation, humidity and substrate as the most affecting factors for growth and wood quality. Although considered as slow growing, this species could coppice in large quantities by root suckers.

2.1. Species identity

D. latifolia along with approximately 250 other species belong to the genus *Dalbergia*, order Fabales, the group Fabaceae (<http://www.mobot.org/MOBOT/research/APweb/>)² Sasidharan 2011), and the *Dalbergieae* tribe Bronn ex DC (1825) (Sunarno, 1996). The name *Dalbergia* L. f. was created by Carl von Linnaeus in honour of two Swedish botanist brothers, Carl Gustav Dalberg (1753 to 1775) and Nichloas Dalberg (Arunkumar *et al.*, 2022). It has a pantropical distribution (Groves & Rutherford, 2015) and is considered a complex genus (Espinoza *et al.*, 2015). This is because it has 546 scientific names for the genus *Dalbergia* (including synonyms), 278 are valid, and 49 of them are for the infraspecific rating level (The Plant List, 2013)³.

2.2. Lifeform and growth

As a tree, *D. latifolia* can grow up to 15 m in height and 100 cm in diameter. It has a single stem, the bole is cylindrical to grooved, and branches start at a height of 3 m. However, *D. latifolia* that grows from the remaining stump can grow multi (compound) stems. *D. latifolia* has an annual increment ranging from 0.7–1.4 cm per year (Fambayet *et al.*, 2022). Meanwhile, its wood with narrow heartwood is of lower quality than those with wide heartwood.

2.3 Regeneration ability

D. latifolia regenerates using regenerative and vegetative systems. Regenerative regeneration produced viable seeds that can germinate and grow as mature trees. Vegetative

² <http://www.mobot.org/MOBOT/research/APweb/>

³ <http://www.theplantlist.org/>

regeneration is more common than regenerative regeneration. The field surveys conducted by the Project Team only found a few populations that were able to produce viable seeds, i.e., in West Java (Sukabumi and the Majalengka Regency), Lombok, and Sumbawa island. Most of the populations that can produce seeds have relatively narrow heartwood. The flowering seasons in Java occur from October to November, while in West Nusa Tenggara it is from September to October. However, in some areas in Java (Rembang, Cepu, and Bojonegoro), *D. latifolia* flowers in May. The fruiting seasons commence after the flowering seasons.

With regard to vegetative regeneration, *D. latifolia* can be easily propagated from root suckers (**Figure 1**). The people of Cikongga, West Java, considered this species as "the plant which drags the soil", this is because the plant that dominates an area with saplings easily grows along the roots emerging from the ground. The density of the saplings is between 1,000–200,000 saplings /ha. The sapling also grows from shoots that emerged from the tree stumps.



Figure 1. Natural vegetative propagation through root shoots. Photo by HH Rachmat

Based on the propagation study, the percentage of seeds that germinated as mature seeds was 70% (**Figure 2a**). It was also found that regenerative propagation could also be carried out with natural saplings. The percentage of success in growing *D. latifolia* seeds in the nursery could reach 100% for healthy tillers with an initial size of <20 cm. Although the species grows slowly, it can expand in large quantities using root suckers (**Figure 1**). This vegetative regeneration is more abundant in the wet season and open areas. The regeneration by root shoots is the most common propagation technique used in West, Central, and East Java, as well as West Nusa Tenggara. **Figure 2b** showed that the most promising vegetative artificial propagation is root cuttings with a percentage of up to 60-90%. The artificial propagation by shoot cuttings is less successful (<10%). If the source of cutting materials (pruning garden) is located nearby, the rate of rooting could reach up to 70%.

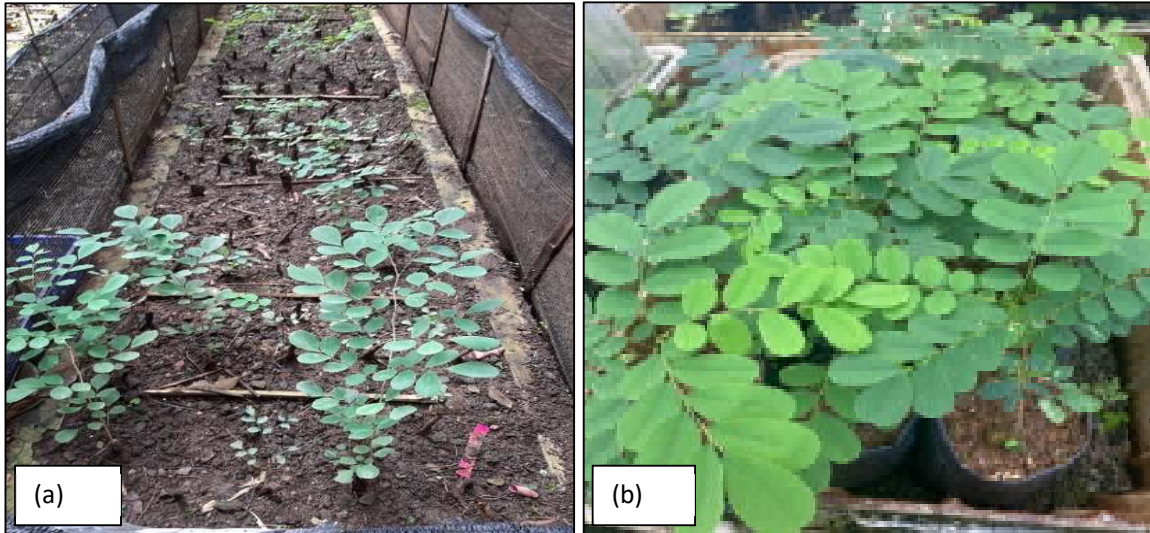


Figure 2. Seedlings propagated through (a) vegetatively by root cuttings, and (b) generatively by seeds. Photo by HH Rachmat

D. latifolia can also form high coppice when the main stem is cut down with varying coppicing abilities (**Figure 3**). Individuals with a stem diameter of >2 cm produce a coppice of up to >20 pieces. When there is no disturbance to the coppice shoots, the coppice shoots will slowly decrease in number and those that survive will develop into a "new" stem to replace the main/first individual stem that has been felled. Therefore, the plantation of *D. latifolia* can be established by using the coppice system. In this case, the planting is only performed once at the beginning of the establishment of the plantation. After harvest, replanting is not necessary because this species will grow from tree stumps or shoots from roots. Therefore, the planting costs are only incurred at the initial phase of plantation establishment.

From this finding, it could be concluded that the regeneration ability of *D. latifolia* is high through regenerative and vegetative propagation, as well as fast coppicing.

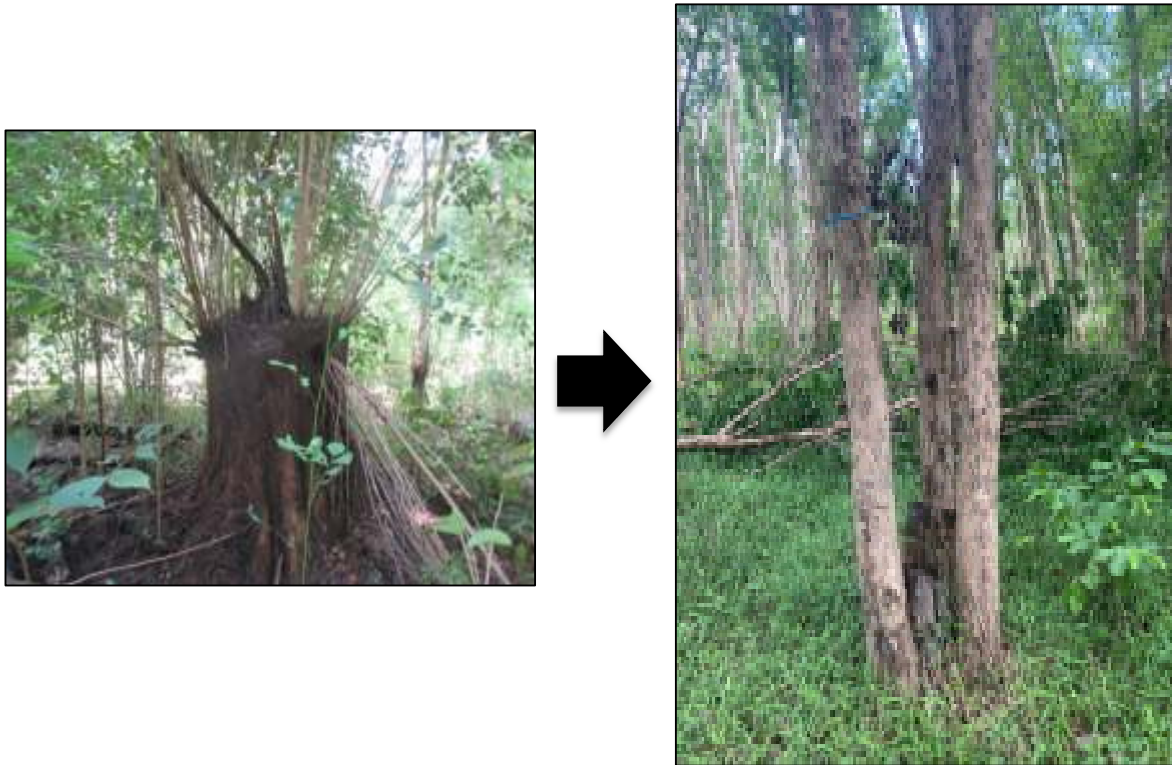


Figure 3. Copping ability of *D. latifolia*. Photo by HH Rachmat

2.4. Dispersal efficiency

The dispersal of *D. latifolia* seeds is by wind and is restricted to a certain distance, usually around the parent trees. However, *D. latifolia* can easily colonize the habitat after the area is harvested because of its ability to coppice.

2.5. Habitat

D. latifolia is found in a flat-steep topography at an altitude of 20 to 686 m asl. The species can grow in various soil and moisture conditions, and it grows well on mineral soils. *D. latifolia* is also found to grow on sedimentary parent rock, limestone, karst, volcanic and alluvial with soil texture ranging from sandy to clay. In Java and West Nusa Tenggara, the tree is generally found on soils with low fertility and an acidity ranging from pH 4.8 to 7.7 (Figure 4). The species grows well with strong adaptability in various habitats such as in areas with low rainfall of less than 1,000 mm/year to areas with high rainfall that could reach up to 4,000 mm/year.

The role played by *D. latifolia* in its habitat includes its ability to nitrogen-fixing from the atmosphere which increases soil fertility. It also has a role as a water catchment and in preventing landslides due to its root architecture.



Figure 4. *Dalbergia latifolia* habitat in Java and West Nusa Tenggara. Photo by TD Atikah

3. Distribution and Population

The description presented here only referred to Java and West Nusa Tenggara, and therefore, it does not represent the status of the distribution and population of *D. latifolia* at the national level.

3.1. Distribution

The distribution of *D. latifolia* is considered widespread and contiguous in Java and West Nusa Tenggara. The distribution of this species also covers outside Java and West Nusa Tenggara, including East Nusa Tenggara, Bali, Lampung, Sulawesi, East Kalimantan and North Kalimantan (Ardhana & Sunardi, 2013; Dwianto *et al.*, 2019; Hani & Suryanto, 2014; Hidayat, 2017; Mando *et al.*, 2019; Nufus *et al.*, 2020; Pramesthi & Haryanto, 2010) (**Figure 5**). The major distribution of *D. latifolia* in Java is from the western to the eastern part and from the north to the southern coast of the island (**Figure 5**). The distribution of *D. latifolia* in West Nusa Tenggara is in Lombok (West, Central and Eastern part), and the Sumbawa Island (Bima, West Sumbawa and Sumbawa Besar Regency) (**Figure 5**). *D. latifolia* is also distributed on the island of Sumatra, especially in Lampung and South Sumatra, and South and East Ogan Komering Ulu Regency.

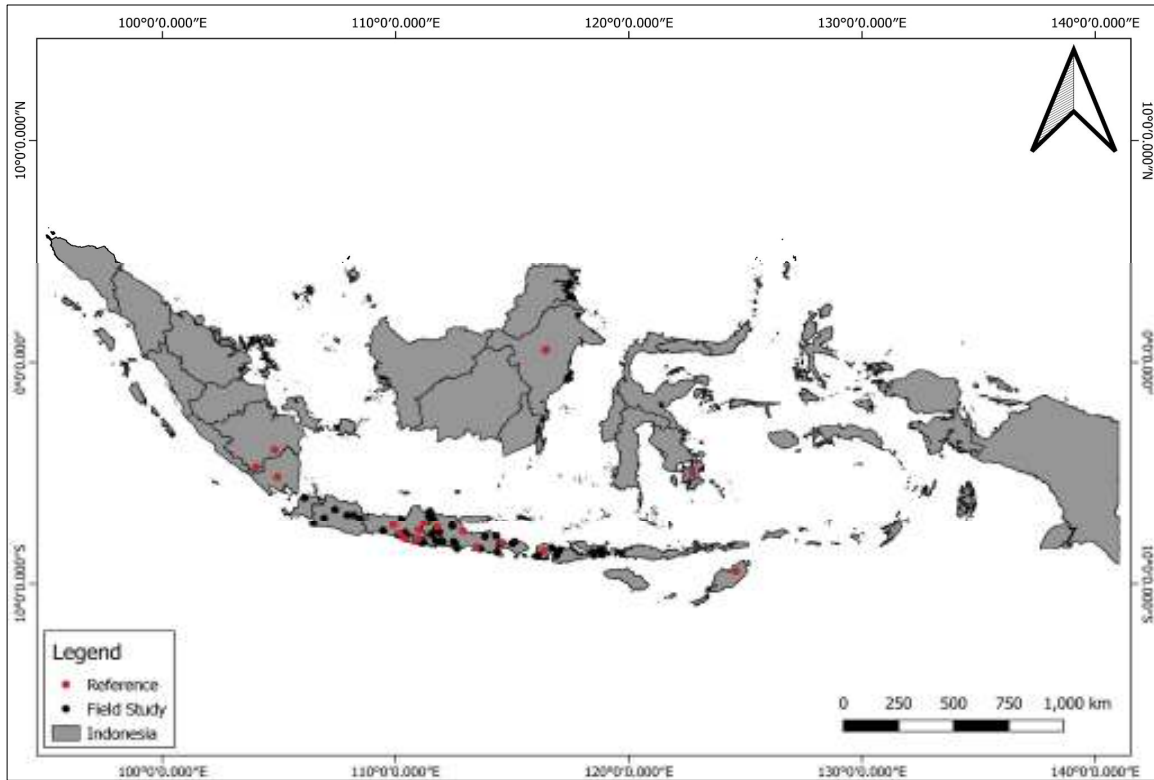


Figure 5. Distribution of *D. latifolia* in Indonesia

3.2. Population density

The total potential standing stock of *D. latifolia* was estimated from direct samplings in 109 sampling points (Table 1) and from secondary sources. The estimated population density in non-conservation areas for both production forest and community-owned land was 278 trees/ha (Table 1 and Figure 6), while the density in the conservation area was 8 trees/ha (Table 1 and Figure 7). Therefore, the total population density was 286 trees/ha which was considered high.

Table 1. Estimation of population density data in Java and West Nusa Tenggara based on field surveys

Land type	Area (ha)	Number of individuals	Density/ha	Potential Stock (m ³)
Non-conservation (community-owned land and Perhutani)	230.01	63,863	278	691,345.90
Conservation areas	1,607.69	13,284	8	3,436.26
Total	1,837.70	7,7147	286	694,782.16

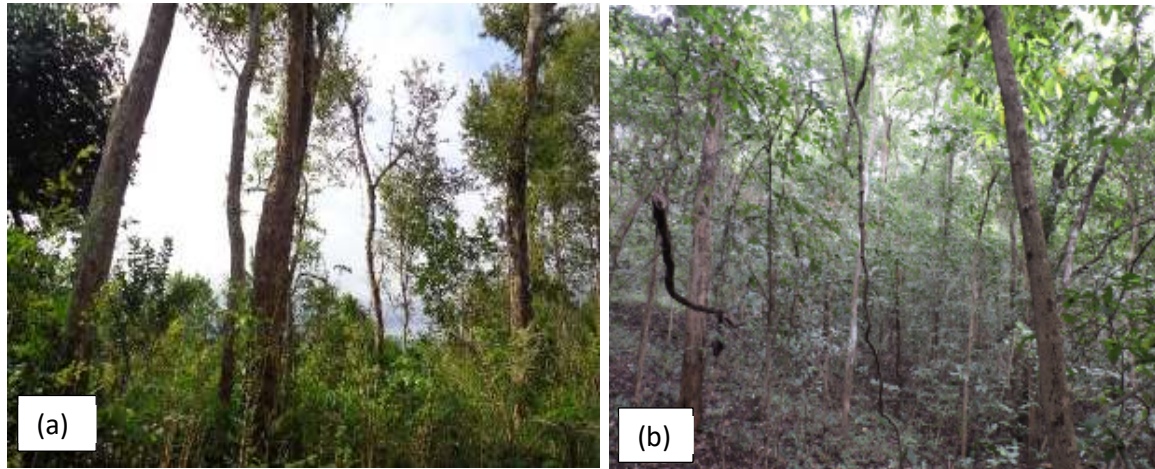


Figure 6. Examples of *D. latifolia* stand in non-conservation areas of (a) community-owned land, and (b) state-owned forestry company (Perhutani). Photo by T Setyawati and S Nurjanah



Figure 7. *Dalbergia latifolia* tree stands in a conservation area of the Cikepuh Nature Reserve in West Java

The factors that affect the population density are the four different cropping systems used in Java and West Nusa Tenggara as elaborated below.

Planting systems of D. latifolia in Java and West Nusa Tenggara

From the fieldwork, it was observed that there are four planting systems of *D. latifolia* used in Indonesia, i.e., monoculture forest (*D. latifolia* \geq 80% of the number of trees in the area),

mixed plantation and agroforestry where *D. latifolia* is planted as hedges or mixed with annual crops, and in the savanna.

Monoculture: This type of landscape can be classified as monoculture when the number of *D. latifolia* trees in the area exceeds 80% of the total number of individuals on the constituent tree. Monoculture plantations are relatively rare in Java but are common in West Nusa Tenggara.

Mixed plantation: This landscape is the most common for the growth of *D. latifolia*. In the mixed plantation, *D. latifolia* grows together mostly with teak and mahogany. Mixed plantations of *D. latifolia* are found in Yogyakarta, including the Protected Forests of the Wonogiri Resort, Bukit Bintang or Bukit Patuk, Langgeran Hills, Nglegi, Kediwung, Cereme Block Protected Forests, Prambanan Hills-Sleman, and a few areas in West Nusa Tenggara.

Agroforestry: In this type of landscape, *D. latifolia* is commonly found to grow with mixed annual crops, generally planted on the edges of the gardens as boundary trees, or in the pathway or rice field bunds. Furthermore, *D. latifolia* is also planted along the sides of residential or village roads as a reinforcing plant to prevent soil erosion/landslide. This is because its roots are strong in retaining the soil structure, especially on the steep contours or the side ravine of the road.

Savanna: The Project team recorded the occurrence of *D. latifolia* in the savanna of the Alas Purwo National Park, East Java, a habitat for protecting the Javanese bull (*Bos javanicus*).

3.3. Quality of information

The information used in this section was derived mostly from direct observation in a number of sampling locations. The data were collected from September 2020 to May 2022 in 109 locations. The secondary data on the population density was obtained from the BKSDA office and other stakeholders, mainly from Perhutani. The collected data on locations and the number/volume of *D. latifolia* attainable for harvest were from their operational area. The Project Team also collected information through interviews with the technical staff for wood inspection (GANISHPH), nursery keepers and researchers of Perhutani, as well as farmers, and management of cooperations and associations of entrepreneurs of *D. latifolia*. The Project Team re-confirmed the secondary information whenever possible by carrying out additional field surveys at the sites.

4. Threat Status

4.1. Major threats

The major threats to *D. latifolia* are as follows:

- (i) Illegal logging of tree stands, especially those located in protected areas, either in concession areas of business license holders such as Perhutani or other protected areas

such as national parks and wildlife reserves (Cikepuh Wildlife Reserves (West Java), Bali Barat Nasional Park (Bali), and Way Waya protected forest (Lampung, Sumatra).

- (ii) Fungal attack and stem infected by fungi were observed in several study areas. This may cause the tree's death. This condition is made worse because *D. latifolia* reproduces through the roots. Whether the fungal infection can spread through the root system and attack individual clonal plants is still uncertain.
- (iii) Land use change, mostly occur in community-owned land.

The major threats are considered to be limited and irreversible as the populations would not be able to recover fully because *D. latifolia* is slow growing and needs a longer time to reach maturity before it could be harvested (> 20 years).

5. Harvest Management

5.1. Illegal harvest

Illegal harvests include harvesting wood from conservation and protected areas and those that are transported without any official transport documents. *D. latifolia* in Indonesia is located in production forest areas or community-owned lands. The information on illegal trade was obtained from the national annual reports on the implementation of CITES Indonesia and several media. The media began to publish news about the illegal logging of *D. latifolia* in 2017. Based on the 2019 annual report, it was evident that 2,934 *D. latifolia* logs did not have a CITES permit. The results of gathering information from the news in the media showed there were increasing incidents of illegal logging from 2020 to 2022 (**Figure 8**), mostly occurring in Java, and in particular, in East Java (**Figure 8**). Illegal logging from the Perhutani production areas reached a total of 118 logs of various sizes^{4,5,6,7,8,9,10} ..

⁴ <https://jateng.inews.id/berita/gerebek-pencurian-kayu-sonokeling-di-hutan-rembang-1-pelaku-ditangkap-3-kabur/2>

⁵ <https://regional.kompas.com/read/2021/06/08/155841778/polisi-ringkus-3-pencuri-kayu-gelondongan-bawa-29-kayu-sonokeling-diduga>

⁶ <https://news.detik.com/berita-jawa-timur/d-5664919/polisi-amankan-14-potong-kayu-sonokeling-hasil-pembalakan-liar-di-pasuruan>

⁷ <https://radarbanyuwangi.jawapos.com/berita-daerah/situbondo/21/02/2022/polisi-ciduk-tiga-warga-pencuri-kayu-sonokeling/>

⁸ <https://solo.suaramerdeka.com/solo-roya/pr-052908182/pencuri-kayu-hutan-wonogiri-ditangkap-polisi-nyaris-gondol-17-batang-kayu-sonokeling?page=2>

⁹ <https://faktualnews.co/2022/04/24/polhutmob-kph-bondowoso-gagalkan-pencurian-21-gelondong-sonokeling-ilegal-di-situbondo/314354/>

¹⁰ <https://suaraIndonesia.co.id/news/peristiwa-daerah/627a1eea3b7ee/Tim-Hantu-Rimba-Berhasil-Gagalkan-Pencurian-Kayu-Sonokeling-di-Bondowoso>

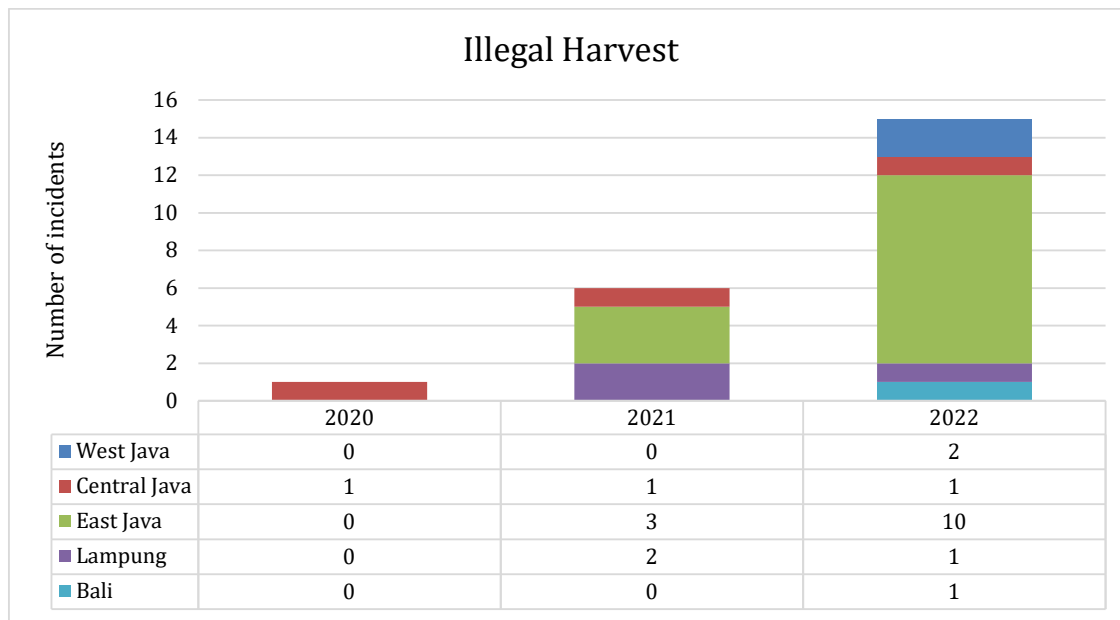


Figure 8. Illegal harvest of *D. latifolia* from the news media during 2020-2022

The illegal logging that occurred in the protected areas such as Perhutani, national parks, nature reserves, wildlife reserves, and protected forests reached a total of 208 logs of various sizes^{11,12,13,14,15,16,17}. Meanwhile, from outside of Java, only one case had been recorded from Bali involving 24 *D. latifolia* logs from the West Bali National Park area. Another illegal logging was recorded from Lampung involving 173 *D. latifolia* logs, and one case of illegal logging in a protected forest with a volume of 40.78 m³¹⁸. As for illegal harvesting originating from conservation areas, 4 stands (18 logs) were seized from the Mount Ciremai National Park, West Java in 2017¹⁹, 44 logs of *D. latifolia* from the Alas Purwo National Park and Forest Management Unit or KPH South Banyuwangi, East Java in June 2021²⁰, 28,78m³ from the

¹¹ <https://malang.hallo.id/malang-raya/pr-544057987/2-pelaku-pencurian-kayu-sonokeling-di-ngantang-malang-ditangkap-di-kediri>

¹² <https://mediaindonesia.com/humaniora/484656/sidang-pembalak-kayu-sonokeling-dari-tn-alas-purwo-dan-kph-banyuwangi-selatan-segera-digelar>

¹³ <https://www.solopos.com/8-batang-kayu-sonokeling-rp650-juta-dicuri-dari-hutan-bulu-sukoharjo-1212318>

¹⁴ <https://infakta.com/polisi-amankan-seorang-terduga-pelaku-pencurian-kayu-sonokeling/>

¹⁵ <https://betahita.id/news/detail/7348/penebang-sonokeling-ca-gunung-jagat-diancam-5-tahun-penjara.html.html>

¹⁶ <https://www.balipost.com/news/2022/04/20/263834/Diamankan,Pelaku-dan-Puluhan-Kayu...html>

¹⁷ <https://www.ngopibareng.id/read/komplotan-pencuri-kayu-sonokeling-di-jember-dibekuk>

¹⁸ https://www.menlhk.go.id/site/single_post/4253/pelaku-kasus-kayu-sonokeling-illegal-di-lampung-siap-disidangkan

¹⁹ <https://merahputih.com/post/read/kayu-sonokeling-di-taman-nasional-gunung-ciremai-dicuri>

²⁰ https://www.menlhk.go.id/site/single_post/4749/ditindak-gakkum-klhk-tersangka-kasus-kayu-ilegal-sonokeling-dari-taman-nasional-alas-purwo-dan-kph-banyuwangi-selatan-segera-disidangkan

Waywaya Protected Forest Area, Lampung in 2021²¹, and 98 logs from the Cikepuh Wildlife Reserve, West Java in 2022²².

The scoring for illegal harvest in this NDF report was made by comparing the estimated potential standing stock of *D. latifolia* with illegal trade data obtained from the 2019 national annual report of CITES (this is the latest annual report of CITES on the illegal harvest from Indonesia). The estimated standing stock of *D. latifolia* in the production forests in Java (Perhutani) is 841,629.12 m³. Meanwhile, the estimated illegal trade based on the 2019 national annual report of CITES was 2,934 logs. Based on the volume table prepared by Siswanto and Imanuddin (2008), for an assumed diameter of 15 cm and a height of 5 m, the value of 2,934 logs is equal to 205.38 m³; and for an assumed diameter of 20 cm and a height of 5 m, the value of 2,934 logs is equal to 366.75 m³. These estimated volumes that equal to 0.29% and 0.52% respectively compared to the legal export of *D. latifolia* from Indonesia would be categorized as having low evidence of illegal harvest and trade.

5.2. History of harvest management

Before the listing of *D. latifolia* in CITES Appendix II, *D. latifolia* was considered least attractive compared to teak or mahogany. The harvesting system used by Perhutani which is the only large-scale plantation for *D. latifolia* is different from the system implemented by the community-owned land. In some community-owned land, this species is considered a weed species whose root suckers often encroach on other crops. The trees were planted as fences to the farm or shade trees for other crops, while the seedlings are used for cattle fodder. Therefore, this species has spread easily to nearby areas.

The *D. latifolia* originating from the community is generally managed on a small scale in community-owned lands planted with other plants and is cut only based on urgent needs. Usually, the buyer will contact the owner of the plantation directly, requesting a copy of the legal title of land tenure for the arrangement of the transport letter (SAKR), including the issuance of the SATS-DN. The prerequisites for this document are limiting factors in timber harvesting. In some areas, there is a timber distribution model through cooperatives which indirectly affects the management of harvesting from plantations. The cooperative provides services to its members in the form of recording stand ownership and managing logging documentation required for the sale of *D. latifolia* logs. The owners of *D. latifolia* stands who are members will not cut the trees unless they have been measured and recorded in the cooperative, and have a buyer. One example is the cooperative in the Semoyo Village, Gunung Kidul Regency, in Yogyakarta. The other example is the Kostajasa Cooperative in the Kebumen Regency. Currently, the Kostajasa Cooperative is terminating its services because the management fee is still too high.

²¹ <https://mediaindonesia.com/humaniora/421987/tersangka-kasus-kayu-sonokeling-illegal-siap-disidangkan>

²² <https://regional.kompas.com/read/2022/04/08/202918778/polisi-tangkap-pencuri-pohon-sonokeling-di-suaka-margasatwa-cikepuh>

In accordance with the national regulations, the management of plantation forest production on state land, such as in Perhutani concession areas must have a long-term plan (10 years) and a short-term (annual) plan approved in advance by the government. The management planning in Perhutani includes, among others, mapping of production areas with their tree species, scheduling of treatments along with equipment and labour, planning for logging, replanting, as well as preventing environmental damage, and rehabilitating the logged-over forests. Every detail of the planning as well as the implementation report must be submitted to the government as this is a prerequisite for obtaining the next harvesting permit. However, *D. latifolia* is not the main crop in Perhutani so no forest management unit (KPH) is registered with the *D. latifolia* as a separate timber class and therefore requires separate planning documents. Although there are monoculture blocks of *D. latifolia*, most of the stands in the Perhutani concession area are intercrops planted between the main plantation blocks, especially teak. Trees planted in this manner are called Other Timber Plants (TJKL), whose management is not explicitly planned. The TJKL is included in the plan to receive the same maintenance treatment as the main crop in the area but is not subject to a production volume target. If the main crop has reached the time for harvesting, the surrounding *D. latifolia* can also be harvested by first enumerating and measuring the volume together with the main crop. Similarly, for replanting and maintenance, the *D. latifolia* stands will receive the same treatment as the main crop, such as fertilization and thinning. Currently, the wood that is cut is generally wood that has been planted \pm 50 years ago. After harvesting, the stump is allowed to sprout and the best shoots will be selected for further maintenance.

The management practices described above are still in practice today and have been informally applied to community-owned lands. After the listing of *D. latifolia* in CITES Appendix II, additional documentation is needed which for the business people will require additional time and costs for its management. This has had little impact on the management and harvesting practices other than extending the waiting period for transport.

5.3. Management plan

The management plan in the state-owned forestry company (Perhutani) is aimed at optimal utilization without damaging the environment or reducing its main functions. Therefore, harvest in Perhutani concessions is carried out in a planned manner, applying harvest rotation, and immediately following it up with replanting. This plan is applied to the main tree species categorized as company class, while *D. latifolia* is not included in this category. However, there are certain locations in the concession area with monoculture blocks of *D. latifolia* which are managed in the same way as the main tree species.

One of the major activities in plantation forest management is logging the plantation blocks that have entered the cutting period. The logging activities in the concession areas are carried out by following the prescriptions in the annual work plan (RKT). The RKT was prepared based on the results of the standing inventory and harvest plan. The RKT contains information related to maintenance, planting and harvesting activities. The RKT that has been prepared is

then submitted to the KLHK. The purpose of management planning is to develop and maximize the potential yield of the *D. latifolia* stands. Furthermore, the planning activities also ensure the availability of seeds through the management of parent stands as seed sources. This will enhance propagation activities and the provision of seed stocks for other purposes, such as conservation and reforestation programs. In addition, the planning activities will also determine the potential harvest and future seed needs so that the management of *D. latifolia* can be undertaken sustainably. Perhutani has made efforts to propagate *D. latifolia* and has permanent nurseries, among which the KPH Kuningan had planted *D. latifolia* in an area of 40 ha in 2019. The supply of seeds is fulfilled by the nursery section of the area manager (KPH) who has a large number of *D. latifolia* stands, assisted by the Research Center in Cepu.

The harvest of *D. latifolia* on community-owned land tends to be unplanned because it is based on the owner's needs. The *D. latifolia* stands are planted together with other tree species, sometimes with minimal maintenance once the stands mature. However, the more knowledgeable farmers usually plant *D. latifolia* in an intercropping crop to optimize their land use for various commodities like teak, mahogany, and sengon (*Paraserianthes falcataria*) as secondary crops. In addition, they also maintain the availability of seeds by trying to propagate independently by separating the shoots from the parent tree. In the West Nusa Tenggara Province, special plots have been established as sources of *D. latifolia* seeds, and in West Java, Sukabumi, there are parent stands of *D. latifolia* as seed sources. This effort is carried out in the context of sustainable management and utilization of *D. latifolia*.

5.4. Objectives of the management plan

The objectives of a management plan are to develop and maximize potential standing stock (economic yield), ensure the availability of seeds by managing parent stands for replanting, conservation, and reforestation needs, and maintain landscape functions and sustainable production, particularly those in the Perhutani areas. However, *D. latifolia* is not the main crop in Perhutani, so no forest management unit (KPH) is registered with the *D. latifolia* as a separate timber class and therefore requires separate planning documents.

5.5. Quota

There is no harvest quota is set for *D. latifolia* since the source of harvest from this species om source codes A and Y. The harvest from source code A does not need a quota but the production is restricted by the restriction of maximum harvest yields. The same mechanism is already applied to animals that are bred in captivity. While the harvest from source code Y has not been regulated in CITES regulations, Indonesia has also anticipated it.

6. Control of Harvest

6.1. Harvest in the licensed area (Perhutani) or area with secured tenure or ownership (community-owned land)

Licensed area

The harvest in the licensed area (state-owned forestry company, Perhutani) is highly controlled by carrying out a series of licensing applications, reporting and evaluation by Perhutani to the ministry. Every harvest is planned and required government approval in the previous year (RKT logging). The harvest plan would include location, areas, number of logs per species, and the estimated volume. All logs are tagged and distributed according to the timber class with proper documentation. The harvest area would be re-planted with the same species. The production blocks are maintained for optimum production. In addition, certain areas within the concession company are earmarked for conservation.

The documentation that accompanies the transportation of wood from state forests is the Certificate of Legal Timber Products (SKSHHK), as described in the Minister of Environment and Forestry Regulation No. 8 of 2021 concerning forest governance and the preparation of forest management plans, as well as forest utilization in protected forests and production forests that replaced the Regulation of the Minister of Environment and Forestry P.67/MENLHK/SETJEN/KUM.1/10/2019 Administration of Timber Forest Products Derived from Plantation Forests in Production Forests that was previously enforced. This SKSHHK is valid for one transportation and one destination so a new letter will be issued each time the wood is moved. The issuer of this letter is the technical personnel competent in measuring and inspecting timber (GANISPH) who works in Perhutani and whose name is registered in the system established by the Ministry of Environment and Forestry. Completeness of transportation documentation reporting includes those assessed in the evaluation of forest concession permits. With this condition, every transportation of harvested products from the Perhutani area will be monitored (**Figure 9**).

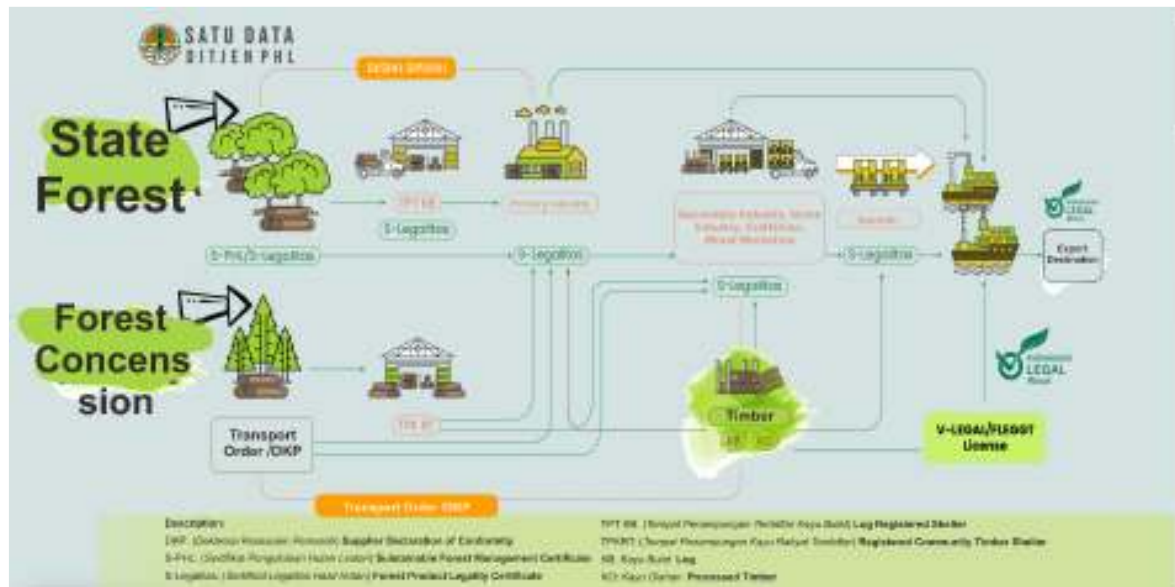


Figure 9. Flow chart illustrating harvest control (Source : Directorate General Sustainable Forest Management²³)

Secured tenure area or ownership area (community-owned land)

In community-owned land, quantitative control of harvest cannot be carried out because there is no legal basis to allow the state to regulate the production of timber from proprietary land. However, the harvest is tightly controlled by ensuring that the chain of custody follows the national regulations.

Currently, the national regulations relating to harvesting from proprietary land are also contained in the Minister of Environment and Forestry Regulation Number 8 of 2021 concerning forest governance and the preparation of forest management plans, as well as forest use in protected forests and production forests, that replaced P.85/MENLHK/SETJEN/KUM .1/11/2016 and as amended by P.48/MENLHK/SETJEN/KUM.1/8/2017 concerning the transportation of cultivated timber from private forests. The regulation states that forest stands from private forest/community-owned lands do not require a logging permit, and the transportation of forest products, both timber, and non-timber, uses an independent declaration in the form of a People's Timber Transport Letter or SAKR. The letter in question is valid for one transportation and one destination, containing the name of the species along with the number of logs and their volume, origin of transport, and destination, and attached with proof of timber ownership in the form of a land certificate or other evidence of control from the place of origin of the stand. In West Nusa Tenggara, the ownership of *D. latifolia* stands must also be verified by three agencies, namely, the BKPH, TNI and POLRI. The verification results are in the form of an investigation report (BAP) of the harvest potential which is then compiled by the Forestry Service. In addition, domestic transportation of wood from the CITES-listed species in

²³ <https://phl.menlhk.go.id/>

Appendix II must be accompanied by a SATS-DN document issued by the local BKSDA office, as regulated in SK 447/Kpts-II/2003 concerning the administration of collection or catching and distribution of wild plants and animals. The BKSDA officer will verify the condition of the goods to be transported and includes it in the investigation report (BAP) before the SATS-DN is issued. The owner of the timber to be transported must also show an explanation letter from the Village Head confirming land ownership. This CITES transport letter is only issued to distribution permit holders registered with the BKSDA. With these transport conditions, harvesting of *D. latifolia* is more complicated compared to other types of wood. As a result, wood-owning farmers usually hand over the licensing arrangements to the buyers who will transport timber from their land. Some communities collectively organize tree registration for these smallholders and aid them to sell their logs, including permits and licensing (**Figure 10**).

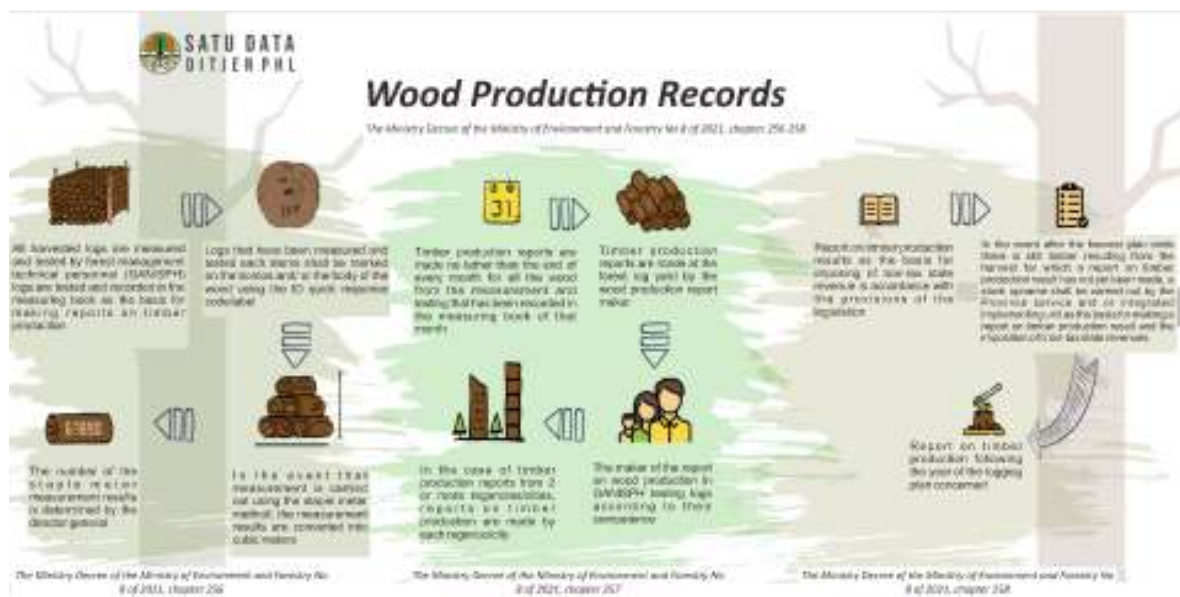


Figure 10. Flow chart of Timber Production Registration in community-owned lands (Source : Directorate General Sustainable Forest Management²⁴)

6.2. Harvest in conservation areas and protected forests

There is no harvest recorded in the conservation and protected areas.

6.3. Harvest in areas with open access

Areas with open access include city parks, roadside, and urban forests. In this regard, *D. latifolia* was planted as part of the forest and land rehabilitation movement (GERHAN) in various locations, including open access areas. There are minimal harvesting activities in these areas although harvesting can occur due to unplanned activities, such as road widening or land use changes. However, harvest control is similar to community-owned land. The transportation from such a location uses a transport note issued by the holder of a business

²⁴ <https://phl.menlhk.go.id/>

license which is verified by the authorized local agency and is valid for one transportation. It must still be accompanied by a SATS-DN from the local BKSDA. With the stringent requirements for timber transport documents, it is also not easy to cut trees from such land, and as such, it is mostly carried out by the authorities. Hence, the volume of trees harvested in these areas is considered low.

6.4. Confidence level in the harvest management

The harvesting in the concession areas of Perhutani is relatively more planned and organized where the traceability level is high with the approval of permits from the Ministry of Environment and Forestry. In contrast, the harvesting in community-owned lands is unpredictable and unplanned, except for those in West Nusa Tenggara and some community-owned lands in Java with joint cooperatives which include Kostajasa and Wana Lestari Menoreh in Kebumen, and the cooperative in the Semoyo village, Yogyakarta. Nevertheless, the legal harvesting activities can be traced from the transportation documentation recorded through the SIPUHH of business license holders and those recorded at the BKSDA. There have been efforts made by the government through the local government and from the BKSDA to collect data on the locations of tree stands that have the potential to be harvested which will make it easier to verify the transportation later. If the government is going to make *D. latifolia* one of the national priority products, it is necessary to adjust the regulations and provide incentives to foster and regulate sustainable productivity on plantation land/private land.

7. MONITORING OF HARVEST

7.1. Method to monitor harvest

The monitoring of harvest is carried out using both quantitative and qualitative parameters (indices). The method to monitor harvest in the Perhutani (state-owned forestry company) uses estimation and extrapolation of the extent of the areas of harvest and potential standing stock of the tree stands. In community-owned land, harvest monitoring uses qualitative measurement through traceability measures.

State-owned forestry company (Perhutani)

The harvest monitoring in the Perhutani area is carried out by inferring the value of exports, production, and potential standing stock on the existing land. In this regard, Perhutani operates on concession lands and all harvests are subject to government approval based on the submission of the long-term (ten years) and annual management plans. Both the plans consist of harvest areas, an estimated number of trees and their log volume that could be harvested for a given period, and post-harvest replanting activities. The stand census is carried out at the stage of preparation for logging in the area/block that will be harvested in the current year. *D. latifolia* is not included in the felling target because it is not the main crop. However, every logging activity for the main crop as well as other crops will be included in the census and reported.

Total Indonesia's export from 2017 to 2021 was as high as 422,468 m³. The estimated annual allowable cut (AAC) of Perhutani areas was inferred from export data of *D. latifolia*. Currently, Perhutani manages forest areas on Java Island covering an area of 2,433,024.72 ha of which 73.61% are production forest areas²⁵. Perhutani also manages 6,545.04 ha of *D. latifolia* (Perhutani, unpublished data). The data from the field survey on the island of Java showed that the volume of *D. latifolia* was estimated to be 128.59 m³/ha, this value was used as multiplying factor to calculate the potential standing stock. The potential standing stock of *D. latifolia* in the Perhutani area is estimated at 841,629.12 m³ and the AAC for a 20-year harvesting cycle is 42,081.46 m³. Meanwhile, the total export of *D. latifolia* wood from Indonesia in 2021 was 88,100.04 m³. The estimated percentage of export from Perhutani is 20% (Per. Communication during a meeting with PESONA, 2022) of the total export, and hence, the estimated export from Perhutani was 17,620.01 m³. The remaining 70,480.03 m³ was estimated from community-owned lands. As such, it is considered that the export of *D. latifolia* wood from Indonesia is non-detrimental to the species in the wild. (Figure 11)

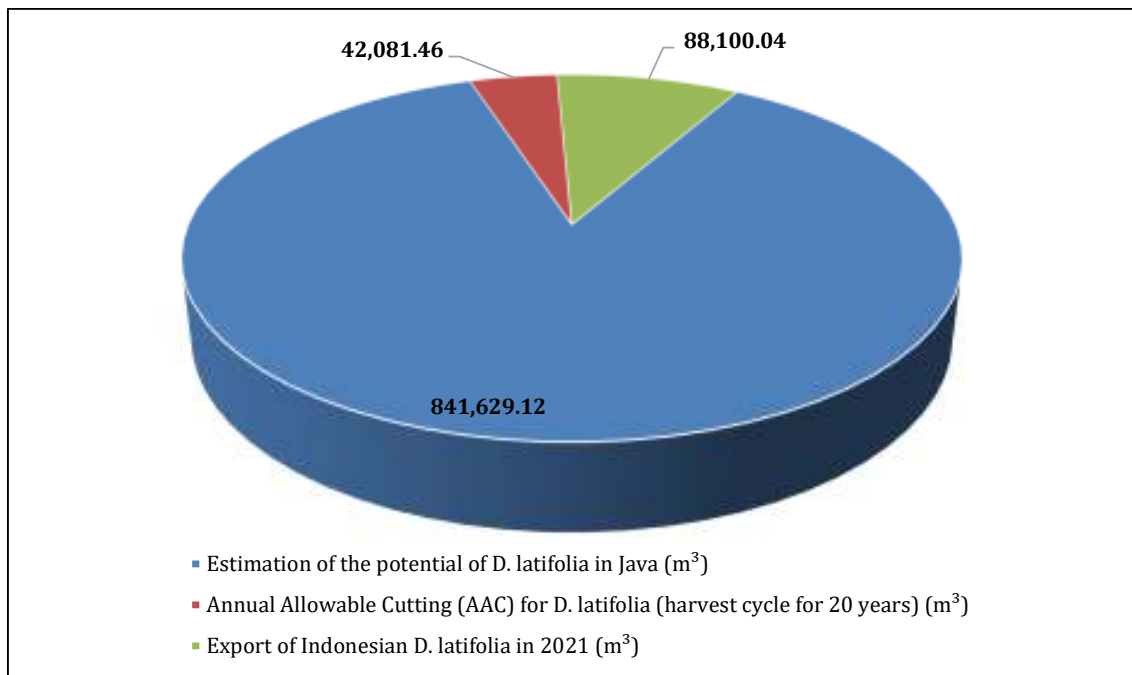


Figure 11. Pie chart of the estimated value of the potential stocking and annual allowable cut from Java and export of *D. latifolia* in Indonesia

Community-owned land

In community-owned land, harvest control is carried out through existing circulation documents. At several locations in West Nusa Tenggara and Java, a census was conducted before harvest. Most harvest from private lands in Java is carried out without a formally recorded census, except for registered farmers' land with non-governmental cooperatives, such as in Kebumen and Yogyakarta. Such cooperatives apply the registration of *D. latifolia*'s

²⁵ <https://www.perhutani.co.id/hutan-di-jawa-dan-tranformasi-perhutani/>

standing stock before harvesting and assist in preparing transportation documentation required to sell the *D. latifolia* logs. Thus, monitoring of timber originating from this area is carried out at the transportation stage, which must be accompanied by verified documents.

The timber originating from community-owned land uses the People's Timber Transport Letter (SAKR) as a transportation document. This independent declaration certifies the validity of logs being transported accompanied by proof of ownership and verification from the village officer. Afterwards, logs are transported to processing locations using the new SAKR that was based on the previous SAKR. The new SAKR is accompanied by a Company Memorandum (see **Figure 10**). These documents must be accompanied by a SATS-DN and other related documents required to obtain the S-Legality for export products that used wood from community-owned land as raw materials. The record of the volume of timber entering an industry which is derived from the transport documents can show the volume of harvest from an area that could be traced back to ensure its legality.

7.2. Confidence level in the harvest monitoring

The harvesting and transportation from state forest areas managed by business license holders such as Perhutani are well planned and monitored. Each stage is carried out with the approval of the competent authority, recorded, and reported for evaluation before the next harvesting permit is issued. Thus, the monitoring confidence level is quite high. Harvesting from private forest areas/community-owned land is not related to any licensing so logging can occur according to the owner's needs. However, the monitoring is carried out at the transportation stage. Each timber transferred must be accompanied by a transport document, namely, the SKAKR if it is from a proprietary area, or the SKSHHK if it is from a state forest area, as well as a SATS-DN specifically for species listed in the CITES Appendix II. As previously explained, the issuance of these letters is accompanied by proof of ownership and verification by officers. Thus, the level of monitoring is considered adequate (medium confidence).

8. Protection from harvest

8.1. Proportion of strictly protected area

The estimated percentage of protected forest areas is 18% of the total forest area in Java and West Nusa Tenggara. Meanwhile, only 20% of *D. latifolia* are found in the protected forests, and hence, the percentage of *D. latifolia* in the natural population is only about 5-15%.

8.2. Effectiveness of strict protection measures

There are available resources for forest protection, but the effectiveness of strict protection is not assessed although there are available resources and instruments for forest protection. As such, the effectiveness is assessed as medium because the resources were considered low compared to the size of areas that should be protected.

8.3. Regulation of harvesting effort

The Perhutani (state-owned forestry company) already has clear regulations to harvest trees with a diameter of at least 20 cm diameter at breast height (dbh). However, there is no restriction on the diameter limit for trees that could be harvested on community-owned lands. As the export/production from the latter source accounted for more than 80% of that from Perhutani, the regulation of harvest effort is considered less effective.

9. Non-detriment findings

9.1. Assessment

The assessment of the NDF followed the “Guidance for CITES Scientific Authorities: Checklist to assist in making non-detriment findings for Appendix II exports” by Rosser & Haywood, 2002. After conducting an in-depth review using Table 2 of Rosser & Haywood, several modifications were adjusted to meet the management of *D. latifolia* in Indonesia.

A total of six parameters, namely, (i) biological characteristics, (ii) distribution and population, (iii) threat status, (iv) harvest management, (v) harvest control and monitoring, and (vi) protection from harvest with 22 indicators were used in the NDF assessment.

The indicators were scored where each indicator comprised 5 criteria with scores of 1-5. In this context, a score of 1 is the lowest risk and 5 is the highest risk. A radar plot was then prepared to visualize the scoring. Details on the assessment of the NDF were elaborated in section 1.2: Non-detriment findings procedure.

9.2. Radar plot

A radar plot (**Figure 12**) that described factors affecting the management of *D. latifolia* in Java and West Nusa Tenggara was prepared based on the selected 22 indicators of the 6 parameters (**Annex 2**). The high score indicates the high severity of impacts associated with each indicator and vice versa. Of the 22 indicators, 4 indicators received negative impacts (score 3-5), and 18 indicators received positive impacts (score 1-2). The high scores of the four indicators reflect that the indicators have negative impacts on the management of *D. latifolia* in Java and West Nusa Tenggara, Indonesia, if no further actions and regulations are taken on the indicators. The low scores of the 18 indicators showed positive impacts on the management of *D. latifolia* in Java and West Nusa Tenggara. These 18 indicators are needed to be maintained for the sustainable use of the *D. latifolia* harvest and trade.

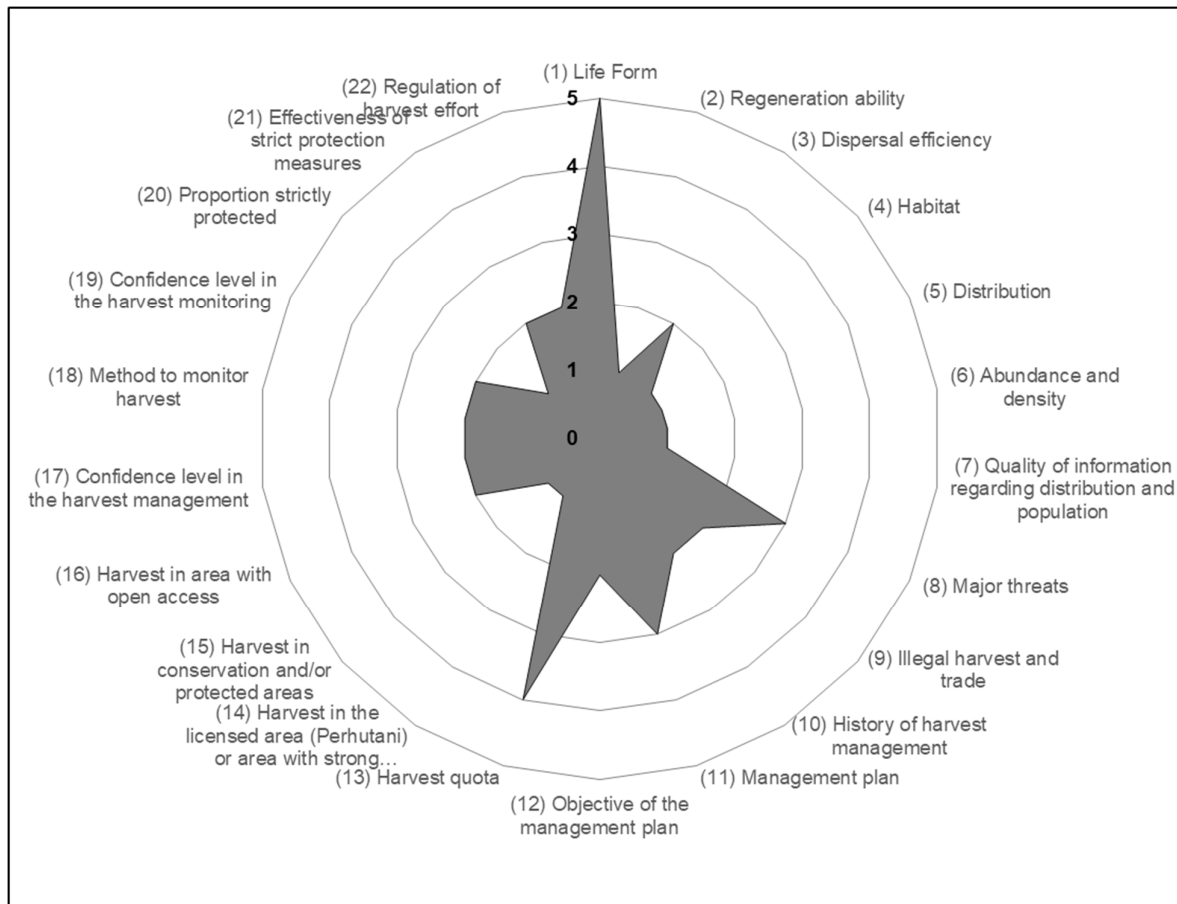


Figure 12. Radar plot of the factors affecting the management of *D. latifolia* in Java and West Nusa Tenggara, Indonesia

The highest risk of this species is due to its lifeform, i.e., tree form with a score of 5 in A.1 of **Annex 2**, as this is commonly found in timber species with slow growth. As the wood of *D. latifolia* is harvested not based on quota since the source of harvest from this species is from source codes A and Y, it has a high risk with a score of 4 in D.13 of **Annex 2**. The risk status for major threat and management plan is relatively high as the populations cannot fully recover due to *D. latifolia* being a slow-growing species and it received a score of 3 in C.8 of **Annex 2**, while the indicator for management plan received a score of 3 in D.11 of **Annex 2**.

The other 18 indicators with low scores received positive impacts on *D. latifolia*. As *D. latifolia* is easy to be propagated vegetatively it received a score of 1 in A.2 of **Annex 2**, and because of its high coppicing ability, it received a score of 2 in A.3 of **Annex 2**. As the species also has efficient dispersal ability and is highly adaptable to various habitats across its range it received a score of 2 in A.3 and a score of 1 in A.4 of **Annex 2** respectively.

As the distribution is considered widespread and contiguous in Java and West Nusa Tenggara and with a high population density of 286 trees/ha, it received a score of 1 in B.5 as well as a score of 1 in B.6 of **Annex 2** respectively. The quality of information regarding the distribution

and population density was derived mostly from direct observation in a number of sampling locations, and hence, it received a score of 1 in B.7 of **Annex 2**.

Although illegal harvest and trade of *D. latifolia* were found, the level was relatively low compared to the timber produced and exported, and hence, it received a score of 2 in D.9 of **Annex 2**. After the listing of *D. latifolia* in CITES Appendix II, additional documentation was needed which for the business people would require additional time and costs for its management and as such, it received a score of 2 in D.10 of **Annex 2**. The objectives of the management plan are to develop and maximize the standing stock potential (economic yield), ensure the availability of seeds by managing parent stands, and maintain landscape functions and sustainable production, and as such, it received a score of 2 in D.12 of **Annex 2**.

The harvest control in the licensed area of Perhutani is highly controlled, while quantitative control of harvest cannot be carried out in the community-owned lands because they are proprietary lands. In addition, harvesting in Perhutani areas is well planned and organized where the traceability level is high. As such, this indicator was scored 1 in E.14 of **Annex 2**. The harvesting from community-owned lands is unpredictable and unplanned, except for those in West Nusa Tenggara and Java. Such conditions were considered to have a medium level of confidence and thus received a score of 2 in E.17 of **Annex 2**. As the monitoring of harvest is carried out using both quantitative and qualitative parameters (indices), it received a score of 2 in E.18 of **Annex 2**. The harvesting and transportation from state forest areas managed by business license holders are relatively well planned and monitored, while the harvest from community-owned land is based on the owner's needs. Thus, the level of monitoring is considered adequate (medium confidence) and received a score of 2 in E.19 of **Annex 2**.

As the estimated percentage of protected forest area is 18% of the total forest area in Java and West Nusa Tenggara, and only 20% of *D. latifolia* are present in the protected forests, this indicator received a score of 2 in F.20 of **Annex 2**. There are available resources and instruments for forest protection, but the effectiveness is considered medium because the resources are considered low compared to the size of areas that should be protected, and hence, it received a score of 2 in F.21 of **Annex 2**. The state-owned forestry company, Perhutani, has clear diameter cutting limits for harvestable trees, while there are no similar restrictions to harvest trees on community-owned lands. As such, the indicator received a score of 2 in F.22 of **Annex 2**.

10. Recommendations

The recommendations were mainly based on the results of the discussion from the “Workshop on Dissemination of Non-Detriment Findings Report (NDF) *Dalbergia latifolia* in

Java and West Nusa Tenggara, Indonesia” that was held in Bogor, Indonesia, on 31 May 2022. They are as follows:

- (i) It is essential to identify the potential sites of *D. latifolia* and to collect data on the potential standing stock at the national level, particularly on the community-owned land to ensure its long-term stock availability.
- (ii) It is imperative to conduct an inventory of rosewood stands and increase rosewood production areas, as well as intensify research and development for production efficiency.
- (iii) It is crucial to control the circulation of wood to ensure the traceability of the origin of the wood to the processing industry.
- (iv) It is important to simplify administration by implementing electronic-based administrative governance to issue permits.
- (v) It is indispensable to strengthen the regulations to support efforts to prevent illegal harvesting and trade, and improve the livelihood of communities.

11. Conclusions

D. latifolia in Indonesia is commonly found in the lowland non-native forests or (artificial) plantations, while a few are found in undisturbed forests. In the non-native forests, *D. latifolia* grows as monoculture stands. *D. latifolia* also grows on mixed plantations with minimal human intervention and is usually planted with other trees species, such as teak, mahogany and sengon (*Paraserianthes falcataria*), and in farmlands/agroforestry or gardens owned by local farmers. The trees from such plantations are categorized as plants obtained through assisted production with the source code Y and found in two harvest regimes, the state-owned forestry company and community-owned land. Hence, the NDF assessment was only carried out on the species with the source code Y. There were 6 parameters and 22 indicators used for preparing this NDF report for *D. latifolia* in Java and West Nusa Tenggara, Indonesia. Of the 22 indicators, 4 indicators received negative impacts (score 3-5), and 18 indicators received positive impacts (score 1-2).

The high scores of the four indicators reflect that the indicators have negative impacts on the management of *D. latifolia* in Java and West Nusa Tenggara, Indonesia if no further actions and regulations are taken on the indicators. The low scores of the 18 indicators showed positive impacts on the management of *D. latifolia* in Java and West Nusa Tenggara. These 18 indicators are needed to be maintained for the sustainable use of the *D. latifolia* harvest and trade.

The data from the field survey on the island of Java showed that the volume of *D. latifolia* is estimated to be 128.59 m³/ha. The potential standing stock of *D. latifolia* in the Perhutani area is estimated at 841,629.12 m³ and the AAC for a 20-year harvesting cycle is 42,081.46 m³. Meanwhile, the total export of *D. latifolia* wood from Indonesia in 2021 was 88,100.04

m³. The estimated percentage of export from Perhutani is 20% (Per. Communication during a meeting with PESONA, 2022) of the total export, and hence, the estimated export from Perhutani was 17,620.01 m³ with the remaining 70,480.03 m³ from community-owned lands. Therefore, *D. latifolia* export from Java is non-detriment. In addition, the production from Perhutani only accounted for 20% while the balance of 80% is from the community-owned lands planted by farmers. For the *D. latifolia* present in community-owned lands, there is a lack of data on the potential standing stock, and hence, the AAC could not be estimated from the harvest regime. Therefore, further surveys and studies need to be conducted on the community-owned lands, as well as a need for national-level data on the available standing stock of *D. latifolia*.

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Annex 1.

Table 1P - Plants. Summary of harvest regime for plant species

Species: *Dalbergia latifolia*

Country (if applicable)

state or province): Indonesia (Java and West Nusa Tenggara)

Date (of making non-detriment finding): 21 August 2022

Period to be covered by

finding: March 2020-May 2022

Name: KS Yulita, W Wardani, TD Atikah, BA Pratama

Position in Scientific

Authority: Researchers

Is the species endemic, found in a few countries only, or widespread? Widespread

Conservation status of the species (if known): IUCN Global status: VU

National status: LC

Other: Export of this species comes from 2 sources, artificial plantations owned by state-owned forestry companies (Perhutani) and tenure/ownership land in the forms of community-owned land with no human interference

Note for Table 1P:

Based on this initial review, we concluded:

- (i) The first source of export of *D. latifolia* from artificial plantation was positive with a medium confidence level in the sustainability of the harvest as most of the components in the table can be filled even though some used a simple thick (commercial destination and percentage) and estimated quantity of “Relative level of harvest (include a number of quantity if known)
- (ii) The second source of export of *D. latifolia* from Indonesia was from tenure/ownership land with minimal human interference does not fit into the definition of ‘artificial plantation’ and thus cannot be filled using this table.

Type of harvest	Main product	Degree of control	Demographic segment of population harvested			Relative level of harvest (include number or quantity if known)				Reason for harvest and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	Unknown	Subsistence	Commercial	Others	Local	National	International

1.1 Artificial propagation	log	a) Regulated		v							v		v (firewood)	v (craft from remaining assortment)	v (heartwood only)
		b) Illegal or unmanaged													
1.2 Non-lethal harvesting of fruits/flowers /seeds/leaves	NA	a) Regulated													
	NA	b) Illegal or unmanaged													
1.3 Non-lethal harvesting of bark/roots/wood	log	a) Regulated													
	Wood/log	b) Illegal or unmanaged													
1.4 Removal of whole plant	NA	a) Regulated													
	NA	b) Illegal or unmanaged													
1.5 Removal of whole bulb	NA	a) Regulated													
	NA	b) Illegal or unmanaged													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood		a) Regulated													
		b) Illegal or unmanaged													

Annex 2.

Category and criteria for NDF score

No.	Category	Criteria	Score				
			1	2	3	4	5
A. Biological characteristics							
1	Lifeform: What is the lifeform of the species?	Annual	1				
		Biennial	2				
		Perennials (herbs)	3				
		Shrub and small trees (max. 12m)	4				
		Trees	5				✓
2	Regeneration ability: How is the regeneration capacity of the species?	Fast regeneration through vegetative propagation	1	✓			
		Slow regeneration through vegetative propagation	2				
		Fast regeneration from seeds	3				
		Slow regeneration or irregular from seeds or spores	4				
		Uncertain	5				
3	Dispersal efficiency: How efficient is its seed dispersal mechanism of the species?	Very efficient: seed dispersed to a distant area	1				
		Efficient: seeds dispersed to surrounding fruiting trees	2		✓		
		Moderate: seeds dispersed under the fruiting tree	3				
		Poor: seeds undispersed due to natural barriers (i.e., water barrier, predation)	4				
		Uncertain	5				
4	Habitat (ecological adaptability) in Java and Bali: How is the adaptability of the species under study to the variety of habitat	Highly adaptable to various habitat types across its range	1	✓			
		moderately adaptable to various habitat types	2				
		Adapted to a few unthreatened habitat types	3				
		Specific to one habitat type or a few threatened habitat types	4				
		Uncertain	5				
B. Distribution and population							
5	Distribution: How is the species distributed in Java and West Nusa Tenggara?	Widespread, contiguous in Java and West Nusa Tenggara	1	✓			
		Widespread, fragmented in Java and West Nusa Tenggara	2				
		Restricted and fragmented in Java and West Nusa Tenggara	3				
		Localized in Java and West Nusa Tenggara	4				
		Uncertain	5				
6	Abundance and density: How is the species abundance in	High Density Population-- 277-300 ind/ha	1	✓			
		Dense Population -- 150-200 ind/ha	2				

	Java and West Nusa Tenggara?	Medium -- 100-150 ind/ha	3					
		Rare -- 20-100 ind/ha	4					
		Very rare -- <20 ind/ha	5					
7	Quality of information regarding distribution and population density: How is the quality of the information related to the distribution and population density in Java and West Nusa Tenggara?	Information on distribution and population density based on quantitative, recently updated	1	✓				
		Information limited to only certain locations, good quality	2					
		Information on distribution and population density based on quantitative data, data out of date	3					
		Limited information on distribution and population density, but the information unclear	4					
		No information available	5					
C.	Threat Status							
8	Major threats: What is the current threat to the species? (Primarily excessive logging, harvesting, habitat conversion, and on how intense is the threat)?	No existing threat to this species	1					
		Limited/Reversible: No existing threat to this species, population and habitat could be restored	2					
		Limited/Irreversible: Limited threat, but population and habitat could be eventually restored within the long-term period	3			✓		
		Severe/Irreversible: Serious threat, population and habitat could not be restored	4					
		Uncertain	5					
D.	Harvest Management							
9	Illegal harvest and trade: How is the current condition of illegal logging and trade?	No illegal harvest and illegal trade	1					
		Limited cases of illegal harvest and illegal trade	2		✓			
		Moderate illegal harvest and illegal trade	3					
		Serious illegal harvest and illegal trade	4					
		No information available	5					
10	History of harvest management: How is the harvest management in Java and West Nusa Tenggara?	Managed harvest: ongoing with an adaptive framework	1					
		Managed harvest: ongoing but informal	2		✓			
		Managed harvest: new	3					
		Unmanaged harvest: ongoing or new	4					
		Uncertain	5					
11	Management plan: Is there any management plan for <i>D. latifolia</i> in Java and West Nusa Tenggara?	Approved and co-ordinated local and national management plans	1					
		Approved national/state/provincial management plan(s)	2					
		The approved local management plan	3			✓		
		No approved plan: informal unplanned management	4					

		Uncertain	5					
12	Objective of the management plan: What is the objective of harvesting in Java and West Nusa Tenggara level?	Maximize economic yield for sustainable production and environmental services	1					
		Maximize economic yield and partly for sustainable production	2		✓			
		Maximize economic yield	3					
		Opportunistic, unselective harvest, or none	4					
		Uncertain	5					
13	Harvest quota: Is the amount of timber harvested based on the quota system?	Ongoing national quota: based on biologically derived local quotas	1					
		Ongoing quotas: "cautious" national or local	2					
		Untried quota: recent and based on biologically derived local quotas	3					
		Market-driven quota(s), arbitrary quota(s), or no quotas	4				✓	
		Uncertain	5					
E. Harvest control and monitoring								
14	Harvest in the licensed area (Perhutani) or area with secured tenure or ownership: How big is the percentage of harvesting in the licensed area (Perhutani) or area with secured tenure or ownership?	High	1	✓				
		Medium	2					
		Low	3					
		None	4					
		Uncertain	5					
15	Harvest in conservation areas and protected forests: How big is the percentage of harvesting in conservation areas and protected forests?	None	1	✓				
		Low	2					
		Medium	3					
		High	4					
		Uncertain	5					
16	Harvest in areas with open access: How big is the percentage of harvesting in areas with open access?	None	1					
		Low	2		✓			
		Medium	3					
		High	4					
		Uncertain	5					
17	Confidence level in the harvest management: How confident is the harvesting is appropriately conducted?	High confidence	1					
		Medium confidence	2		✓			
		Low confidence	3					
		No confidence	4					
		Uncertain	5					

18	Method to monitor harvest: What is the main method used to monitor the harvest?	Direct population estimates	1					
		Quantitative and Qualitative indices	2		✓			
		Either Quantitative and Qualitative indices	3					
		National monitoring of exports	4					
		No monitoring or uncertain	5					
19	Confidence level in the harvest monitoring: How confidence is the harvesting is appropriately monitored?	High confidence	1					
		Medium confidence	2		✓			
		Low confidence	3					
		No confidence	4					
		Uncertain	5					
F. Protection From Harvest								
20	Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from the harvest?	>15%	1					
		5-15%	2		✓			
		<5%	3					
		None	4					
		Uncertain	5					
21	Effectiveness of strict protection measures: How certain is the effectivity of protection effort	Highly confident: <i>D. latifolia</i> in Java and West Nusa Tenggara could be protected effectively based on the available resources (budgetary, personnel, No information available on the effectiveness of protection)	1					
		Moderately confidence: a large portion of <i>D. latifolia</i> in Java and West Nusa Tenggara could be protected effectively based on the available resources (budgetary, personnel, instrument regulations)	2		✓			
		Low confidence: a small portion of <i>D. latifolia</i> in Java and West Nusa Tenggara could be protected effectively based on the available resources (budgetary, personnel, law enforcement)	3					
		No confidence: protection against <i>D. latifolia</i> is ineffective	4					
		Uncertain: No information available on the effectiveness of protection	5					
22	Regulation of harvest effort: How effective is the existing regulation to control excessive harvesting?	Effective: the existing regulation is effective to control excessive harvesting	1					
		Less effective: the existing regulation is sufficient to prevent excessive harvesting	2		✓			
		Ineffective: regulations exist, but were not fully implemented	3					
		None: No regulation to control harvest	4					
		Uncertain: No information available	5					