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***Using natural forest and plantation grown trees;  
different but complementary.***

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# Outline

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- ✓ ***Introduction***
- ✓ ***Definitions***
- ✓ ***Trends, prospects and necessity***
- ✓ ***Wood properties***
- ✓ ***Plantation silviculture***
- ✓ ***Product solutions***
- ✓ ***Concluding comments***

# Introduction

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**The purpose of this presentation is to address using timber sourced from plantation grown trees.**

**It explores wood properties and differences between plantation grown and natural forest sourced fibre.**







**The growing fibre by smallholders provides resources while providing much needed income to change the life of a family.**



# Definitions: Natural forests and plantations

## FOREST:

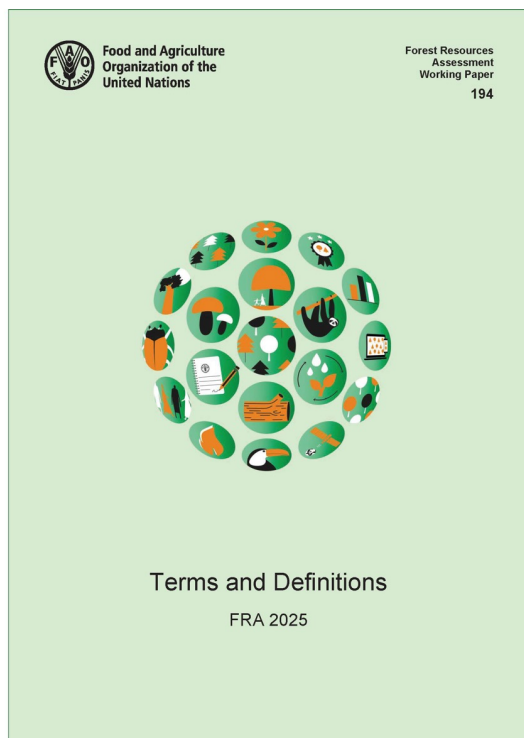
*‘Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.’*

## PRIMARY FOREST:

*‘Naturally regenerating forest of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.’*

## DEGRADED FOREST:

*To be defined by the country.*







17271  
KW

KW

16528

17271  
KW

15324  
KW

17271  
KW

18490

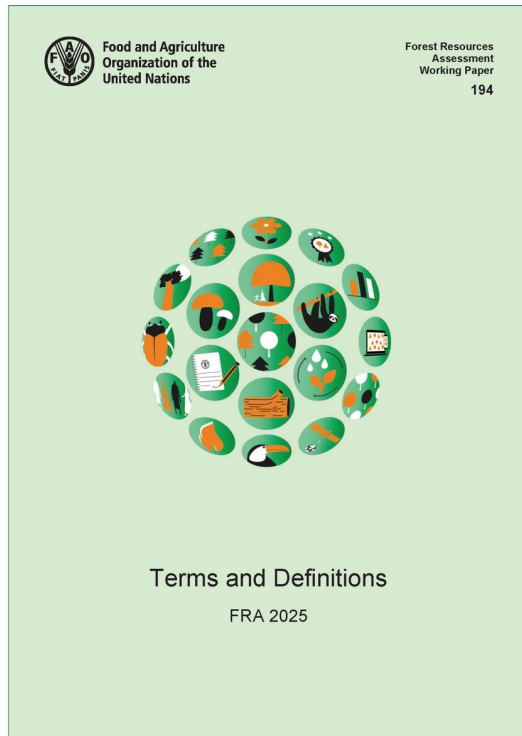
17271  
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# Definitions: Natural forests and plantations

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## ***PLANTED FOREST:***

***‘Forest predominantly composed of trees established through planting and/or deliberate seeding.’***

## ***PLANTATION FOREST:***

***‘Planted Forest that is intensively managed and meet ALL the following criteria at planting and stand maturity: one or two species, even age class, and regular spacing.’***

## ***PLANTATION FOREST OF INTRODUCED TREE SPECIES:***

***‘Plantation forest predominantly composed of introduced tree species.’***





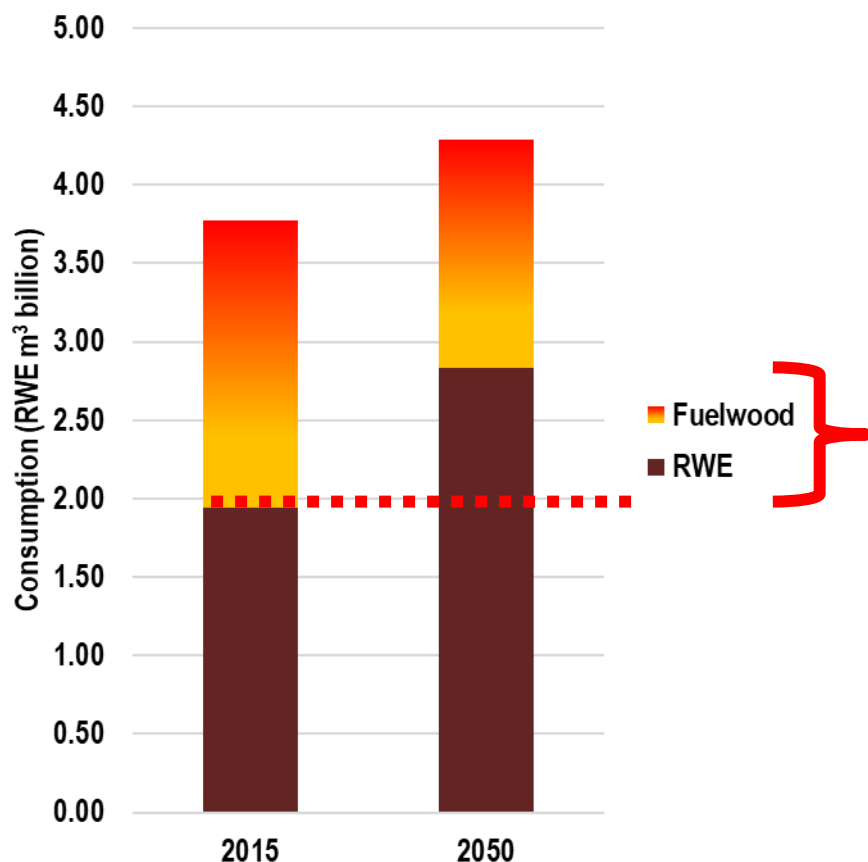
***‘RUBBER WOOD: Forest area with predominant rubber wood vegetation.’***

**As significant resource; e.g. Thailand’s production of 25 to 30 million GMT/y.**

Thieravarut, M. (2024). Thailand wood supply. Paper presented at the Global woodchip and biomass trade conference and networking event, Singapore, October, 2024.



# Trends, prospects and necessity



Demand for fibre is increasing; a 2021 projection out to 2050 is presented.

*‘Global industrial roundwood production is projected to grow by 45% by 2050, to 2.8 billion m<sup>3</sup>, but tropical production is projected to increase by only 24%, to 533 million m<sup>3</sup>.’\*\**

We have a fixed but reducing available area of natural forests for wood production.

*‘With limited expansion possibilities for large-scale plantations, smallholders and agroforestry systems will become important producers. Both need to further increase productivity and timber quality.’\*\**

Based on Held, C., Meier-Landsberg, E. and Verónica Alonso, V. (2021). Tropical timber 2050. ITTO Technical Series #49

\*\* Maplesden, F. (2024). Tropical timber trends. A review of tropical timber production, consumption and trade, 1990–2020. ITTO Technical Series #52.



# Trends, prospects and necessity



A traditional framed house,  
Western Province, 30/11/2008



A steel framed house,  
Western Province, 01/11/2012

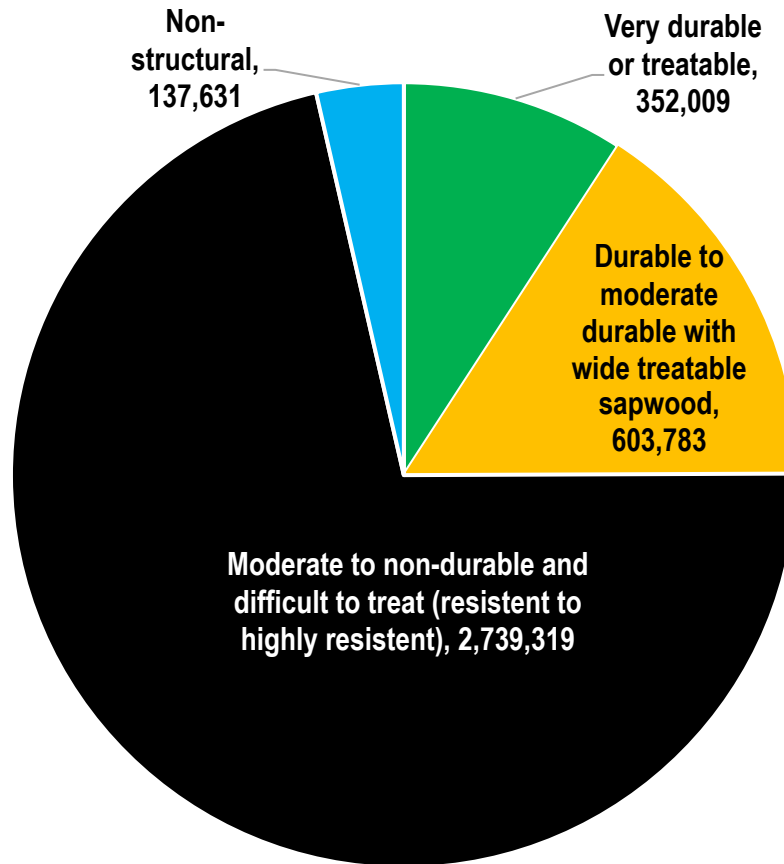
**If wood fibre is not available, alternatives will be used.**

**Who makes the purchasing decisions; it is unlikely to be the final consumers.**

**Decision makers will consider legality, third party certification, wood properties and price.**

# Wood properties: natural forest resources

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## PNG log exports in 2015.

- ✓ Natural forest resources are highly variable.
- ✓ 75.1% include wood with durability issues and/or non-structural.
- ✓ Variably provides opportunities and challenges to utilisation.



# Wood properties: natural forest resources



Western Province, 02/11/2012

**Dip-diffusion as a passive mechanism**



National Capital District, 21/04/2012

**Pressure treatment as an active mechanism**

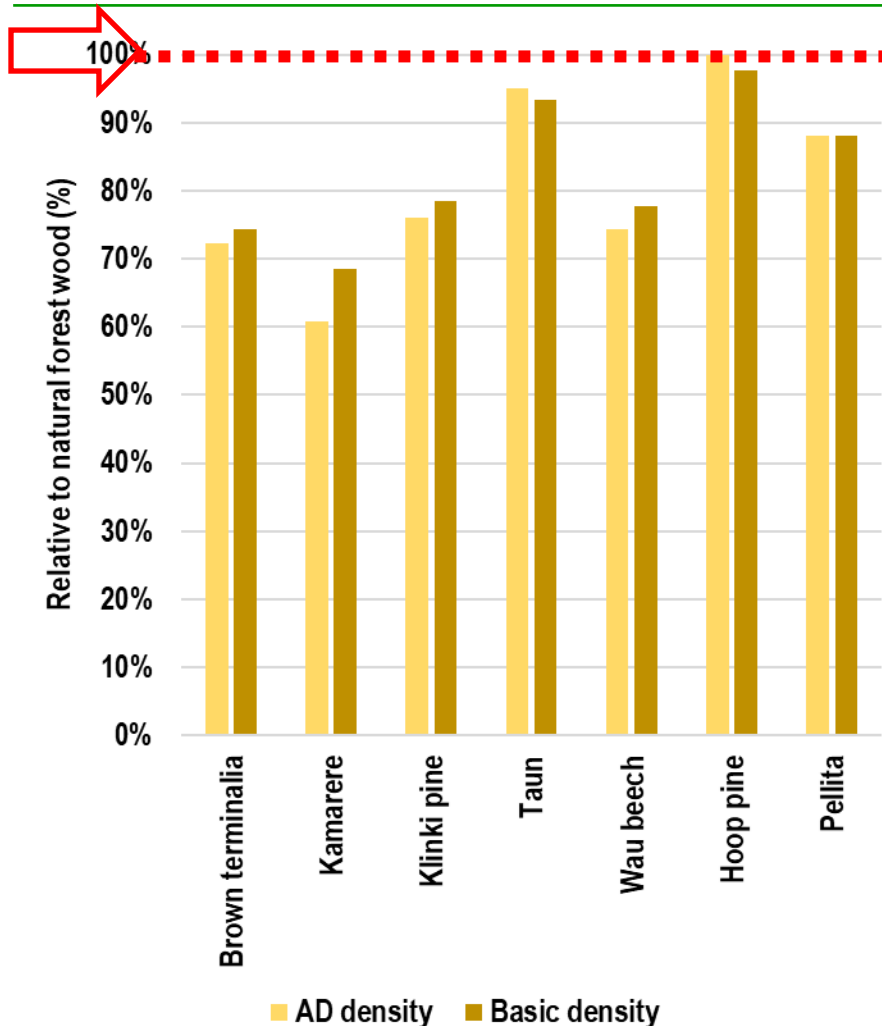
**Treatment of timber in PNG is regulated by Papua New Guinea Standard 1293: 2012.**



# Wood properties: differences

Property	Definition	Implication
Basic density	Weight of bone-dry wood per green volume.	Impacts wood weight and fibre yield.
Air dry density	Weight of wood per unit volume.	Impacts wood weight and strength.
MOE	Modulus of elasticity (MOE) measures a wood's stiffness, and is a good overall indicator of its strength.	Used in engineering design to specify wood sections required.  A basis of timber grading and price setting.
MOR	Modulus of Rupture (MOR) or bending strength, is a measure of wood strength before rupture.	Used to determine a wood species' overall strength; unlike MOE, which measures the wood's deflection, but not its ultimate strength.

# Wood properties: differences

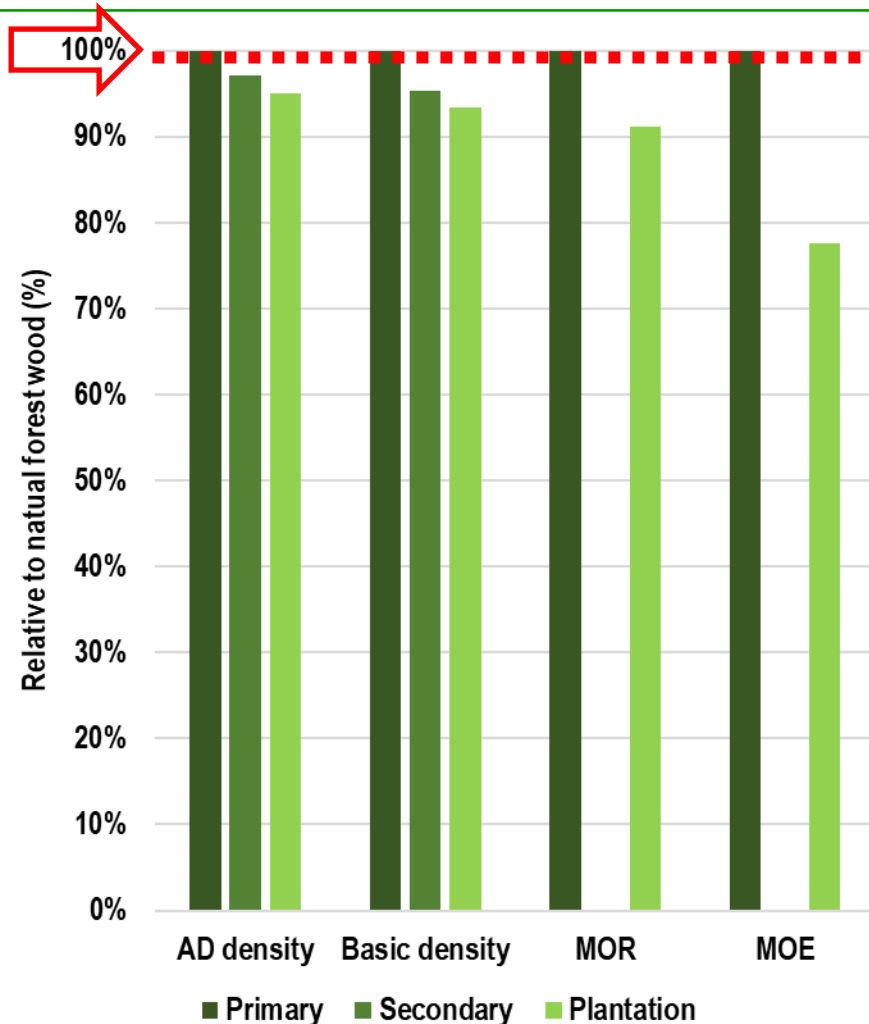


## Wood properties are important.

- Wood properties of plantation grown trees are different to natural forest trees of a species.
- Unlikely a simple substitution in a mill or product.
- With age, wood properties of a plantation tree will converge with those of natural forest trees.
- Product and market development must be based on knowledge of the expected resources.

*The wood is not 'bad', just different....*

# Wood properties: differences



## Taun (*Pometia pinnata*) in PNG

- A change in wood properties from *primary* to *secondary* forests.
- The trend continues with plantation grown wood.
- Product and market development must be based on knowledge of the expected resources.

*The wood is not 'bad', just different....*



# Wood properties: change



**Natural forest logs**

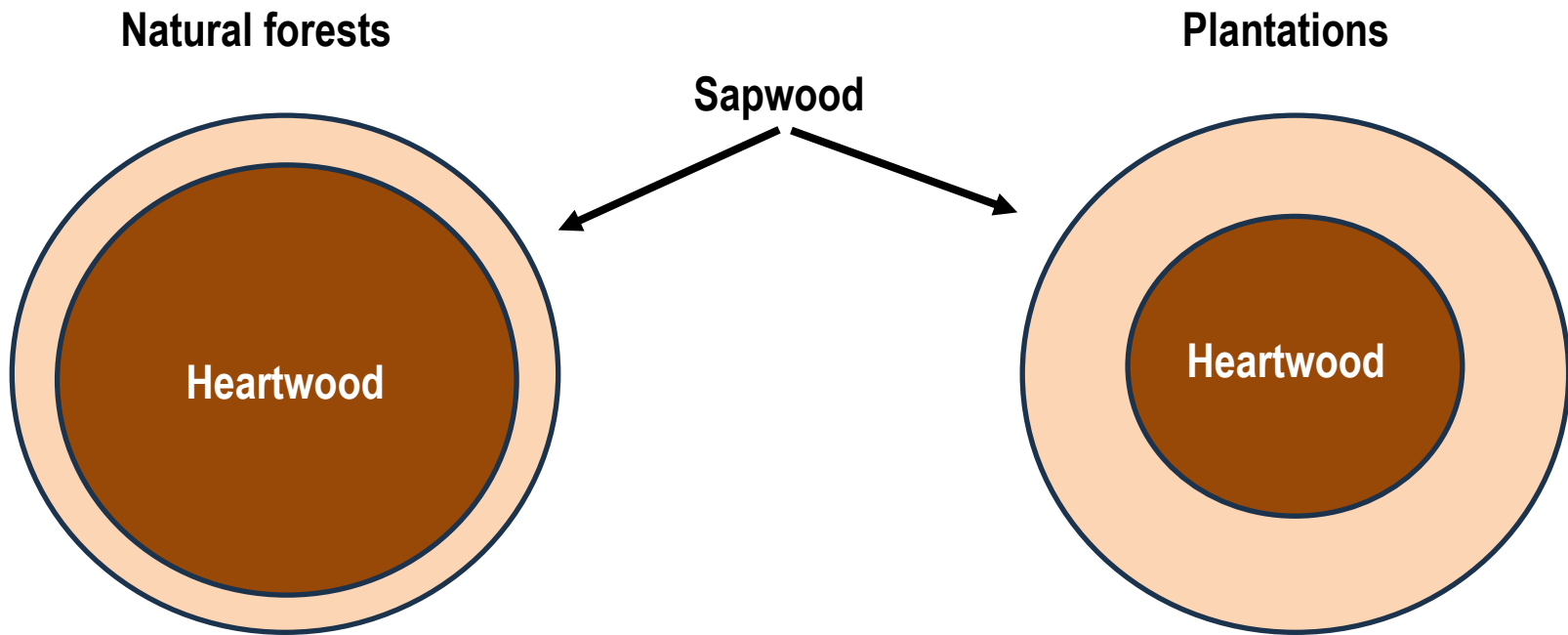


**A 10-year-old tree in balsa plantation**

- In natural forests, trees are slower growing taking longer to reach a merchantable size.
- A plantation tree achieves a merchantable size much faster.

# Wood properties: change

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- **Absolute change**: Some cell structures will differ with faster growth.
- **Relative change**: A greater percentage of wood with early-age wood properties.

# Wood properties: change



Mature planted teak logs



A 9-year-old teak log

- **Absolute change**: Some cell structures will differ with faster growth.
- **Relative change**: A greater percentage of wood with early-age wood properties.



# Wood properties: change

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- ✓ **Uniformity**: While plantation wood differs to natural forest trees of a same species, it is generally more uniform between trees with processing advantages.
- ✓ **Confidence**: Consumers must be confident to make use of this wood.
- ✓ **Testing**: Testing to document wood properties is required to appropriate standards.
- ✓ **Information**: Awareness, presentation of data and education is required.
- ✓ **Use**: Design and specification of timber components will follow.

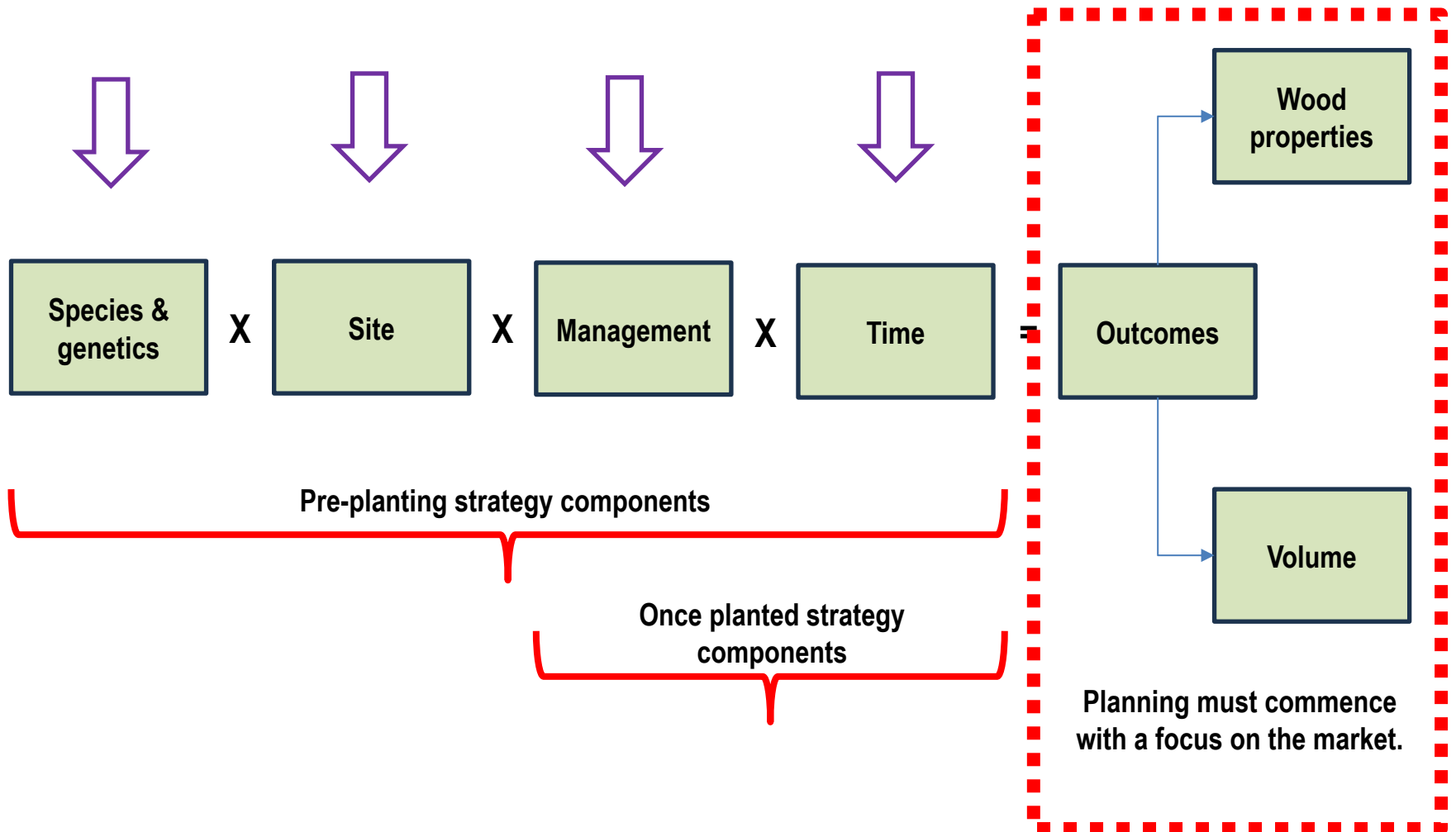


# Teak 'stumps' ready to plant

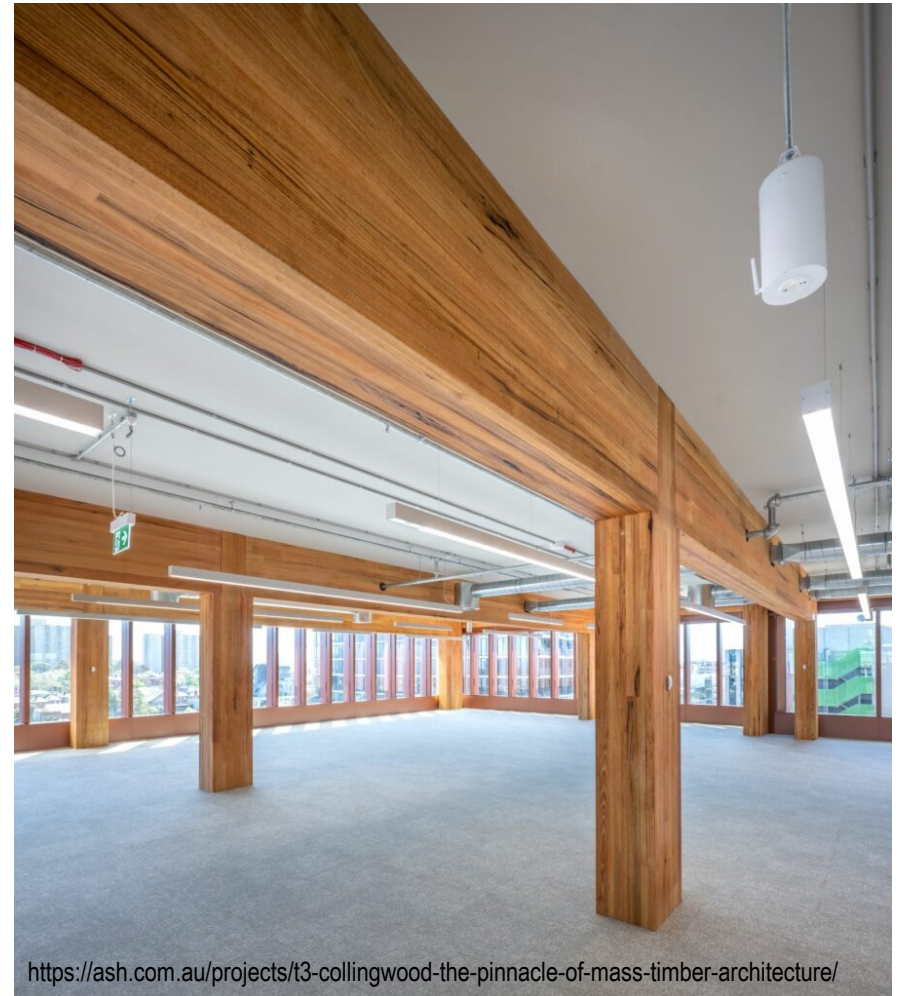
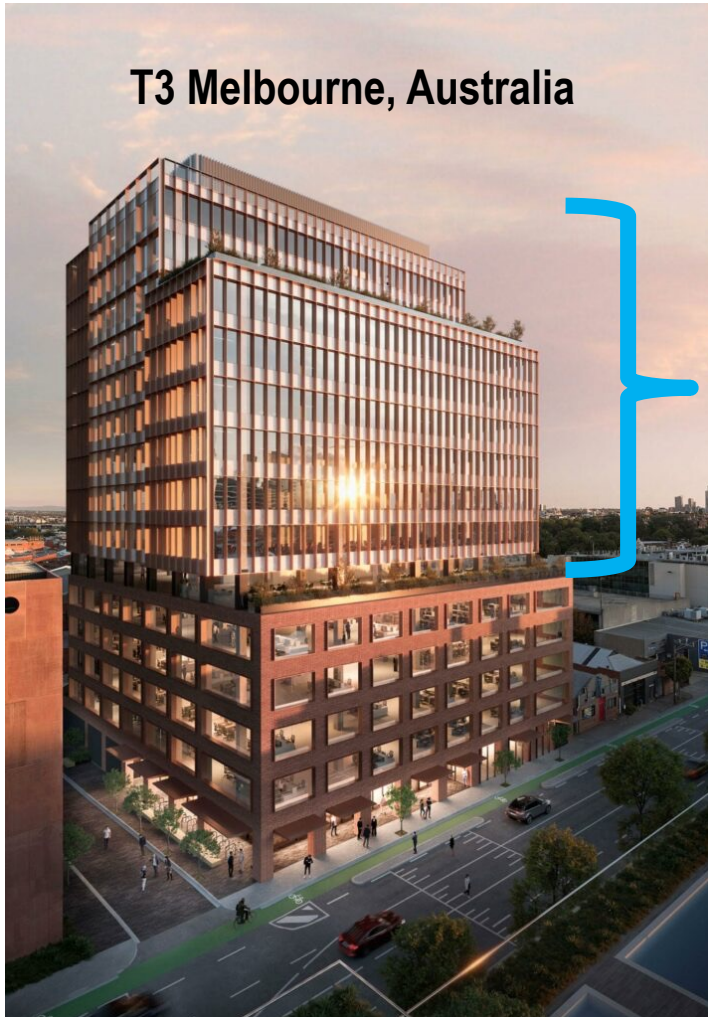




# Plantations silviculture



# Product solutions



<https://ash.com.au/projects/t3-collingwood-the-pinnacle-of-mass-timber-architecture/>



# Product solutions



Glue laminated timber manufactured from plantation grown eucalypts.



The individual boards finger jointed together.

- ✓ EWP including GLT, LVL, plywood.
- ✓ SCL including LSL, PSL, OSB, CLT, NLT
- ✓ Manufactured to 'any' length or size.

*A challenge to sawn timber*

*Are 'long logs' redundant?*

# Concluding comments

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- ✓ **Human's demand for wood is increasing, hence plantation timber use will expand, unless we acquiesce to non-timber substitutes.**
- ✓ **Natural forest resources are highly diverse, whereas plantations are highly uniform.**
- ✓ **Plantation grown fibre is different, but not 'bad'.**
- ✓ **Plantations offer an opportunity to produce new products in their own right and in combination with natural forest sourced wood.**
- ✓ **We must address the market-access gate keepers; legality, deforestation and third-party certification.**
- ✓ **ITTO can play an important role to inform plantation species selection and to guide the increased use of wood sourced from planted trees.**