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WOOD in CIRCLE

Forest resource management and sustainable forestry planning

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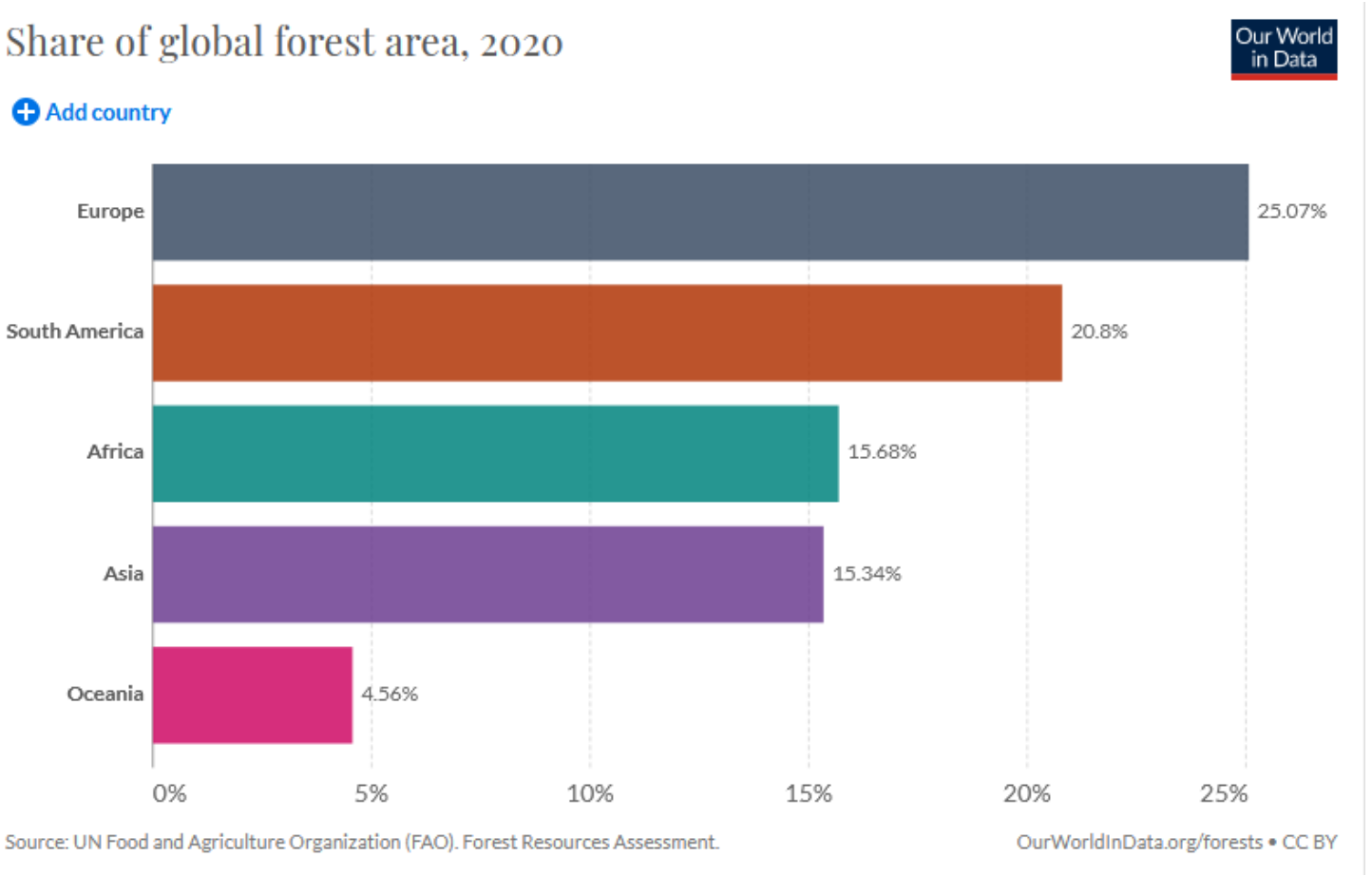
Forestry and the production of sawn timber

The world has 4.06 billion remaining hectares of forests, (Global Forest Resources Assessment 2020).

While the world is still losing its forests – an estimated 420 million hectares have been lost to deforestation since 1990.

Yet the report also found that the rate of net forest loss has significantly slowed, from an annual average of 7.8 million hectares during the decade of 1990 to 2000 to 4.7 million hectares annually from 2010 to 2020.



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Sustainable Forestry Management Policy

- Forest policy and management face environmental, economical and political challenges.
- Clarify the role of Sustainable Forestry Management .
  - How does it relate to other concepts?
  - What are its strengths and weaknesses?
- Can it serve as a balancing tool to moderate new claims on forests and its resources?

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Classification of Trees

- **Endogenous** (intertwined growth): e.g., palm trees
  - very strong and lightweight
  - not generally used for engineering applications in U.S.

- **Exogenous** (outward growth): e.g., most other trees
  - ➢ Fibers grow from the center outward by adding concentric layers (annual rings) which gives **more predictable engineering properties.**

Hardwoods

Beech

Oak

Ash

Teak

Comes from **deciduous** trees

This is a broad-leaved tree which looses its leaves in the winter.

Softwoods

Pine

Spruce

Cedar

Fir

Comes from **coniferous** trees

This tree is an evergreen (green all year), needle-leaved, cone-bearing tree.

Deciduous (broad leaf) = **hardwood** (ash, oak, maple, walnut, etc.) – expensive slow growing

Coniferous (cone bearing, evergreens) = **softwood** (Douglas fir, pine, spruce, cedar, etc.)

- There are known like 20,000 commercial species of hardwoods, There are around 650 species. In European codes and standards

Bamboo - belonging to the *Poaceae* or *Gramineae* family of monocotyledons, is it «good wooden material «

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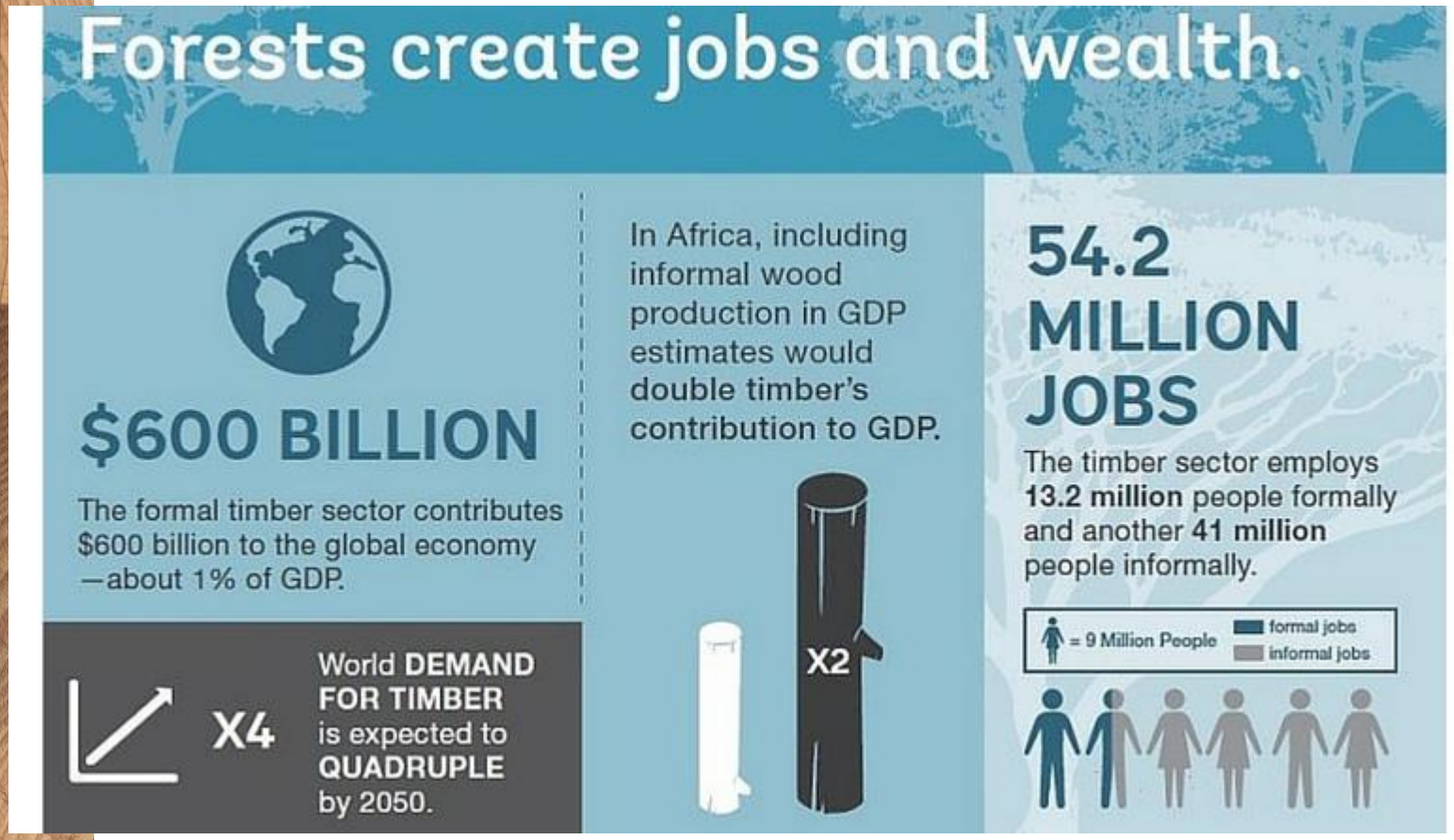
Economic aspect



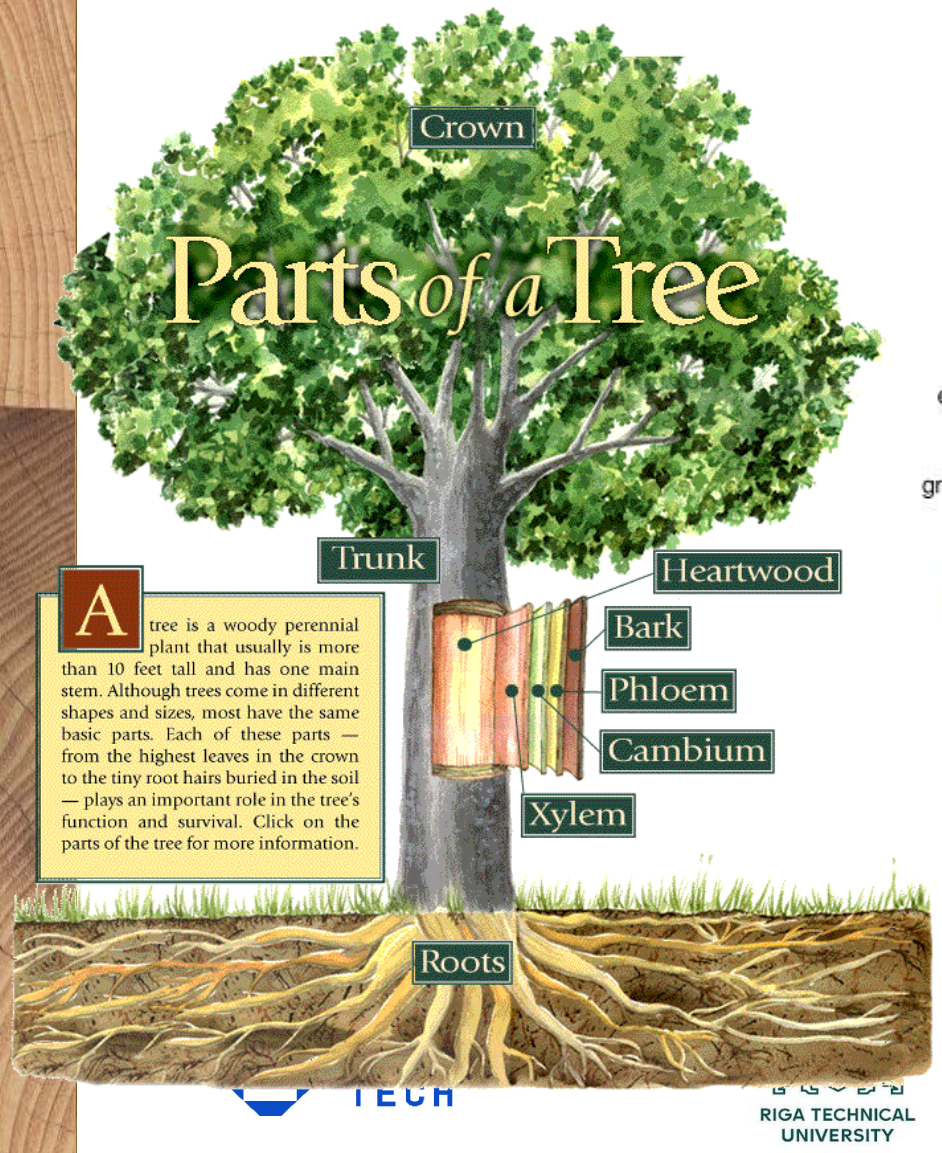
Forests generate wealth and millions of jobs. The formal timber sector employs more than 13.2 million people. It also produces more than 5,000 types of wood-based products and generates a gross value added of over $600 billion (≈EUR 493 billion) each year.

Including the informal sector in GDP calculations could double the contribution of the timber sector and quadruple the number of related full-time jobs.

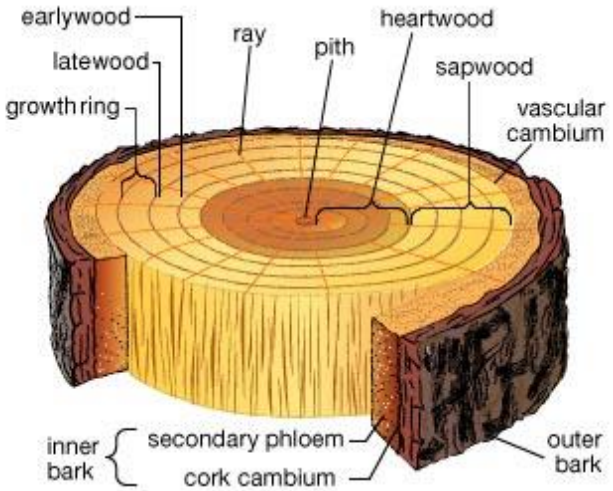
Inputs of timber sector to global economy (The World Bank, n.d.).

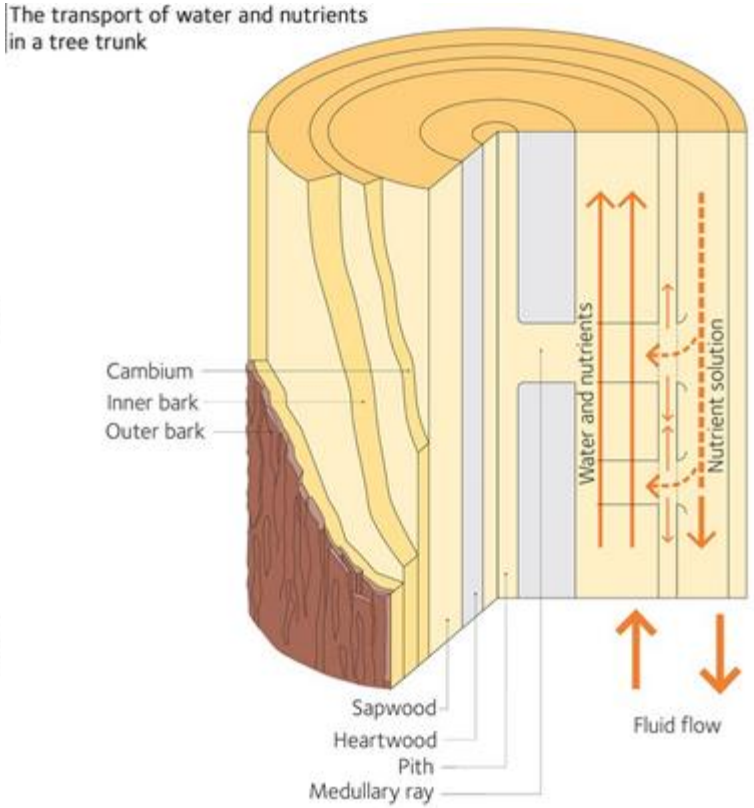
Structure of Timber

of the European Union



A tree can be divided into three parts – crown (branches and leaves), trunk and roots





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https://www.swedishwood.com

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Environmental aspect

Wood is the only renewable construction material that requires very little energy for its processing. By nature, wood is composed of **carbon** that is **captured** from the atmosphere **during** tree **growth**.

As a rule of thumb, the tree 'consumes' the 1.6–1.8 kg CO2 per 1 kg of wood it forms.

When wood is part of the construction, the building works as carbon sink.

Steel and concrete production is responsible for 9 % and 5 % of the world's total fossil energy consumption.

For the construction of Moholt 50 in Norway, approx. 5600 m3 or approx. 2240 tons of solid wood, if we assume a density of 400 kg/m3, was used. The construction resulted in a storage of well 3500 tons of CO2 – or equivalent to almost 2000 average cars annual CO2 emissions at a driving requirement of 15,000 km/year (InnoBYG, 2017).

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Harvesting Processes

There are several ways to harvest the trees.

Different logging methods have different effects on the structure of **a forest ecosystem**.

The three distinct methods are :

1. Clear-felling (or clear-cutting)
2. Shelterwood logging
3. Selective logging

Clear Cutting

This method, which is used in the vast majority of logging operations, is the fastest and cheapest.

Loggers remove every tree, leaving a barren landscape behind.

When the clear-cut area is replanted, the new forest grows up uniformly in species and size.

This makes it easier to log this forest in the future when the trees reach maturity.

If replanting does not take place, or if it is not successful, less desirable species may grow.

As well, the exposed soil may erode, and the land may be damaged. (erosian,...)

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Clear-Cutting Forests

Advantages

Higher timber yields

Maximum profits in shortest time

Can reforest with fast-growing trees

Good for tree species needing full or moderate sunlight

Industrial method

Disadvantages

Reduces biodiversity

Destroys and fragments wildlife habitats

Increases water pollution, flooding, and erosion on steep slopes

Eliminates most recreational value

Fig. 10-8, p. 223

Strip Cutting

- Strip cutting is a variation of clear cutting.
  - Trees are cut down in strips narrow enough for forest on either side to reclaim the cleared land.
  - After reclamation (3-5 years) the next strip is cut.
  - A strip will not be cut again for another 20 - 30 years.

Shelterwood logging

This method involves clear-cutting only part of a forest.

Groups of seed-bearing trees are left standing so that their seeds can regenerate the logged area.

This is used where tree species, such as white pine, regenerate naturally after major openings in the forest are created.

The shelterwood method is often used in forests with trees of uniform age and size.

Over time, this method will also regenerate a forest that has trees of varying ages and sizes.

Selective Logging

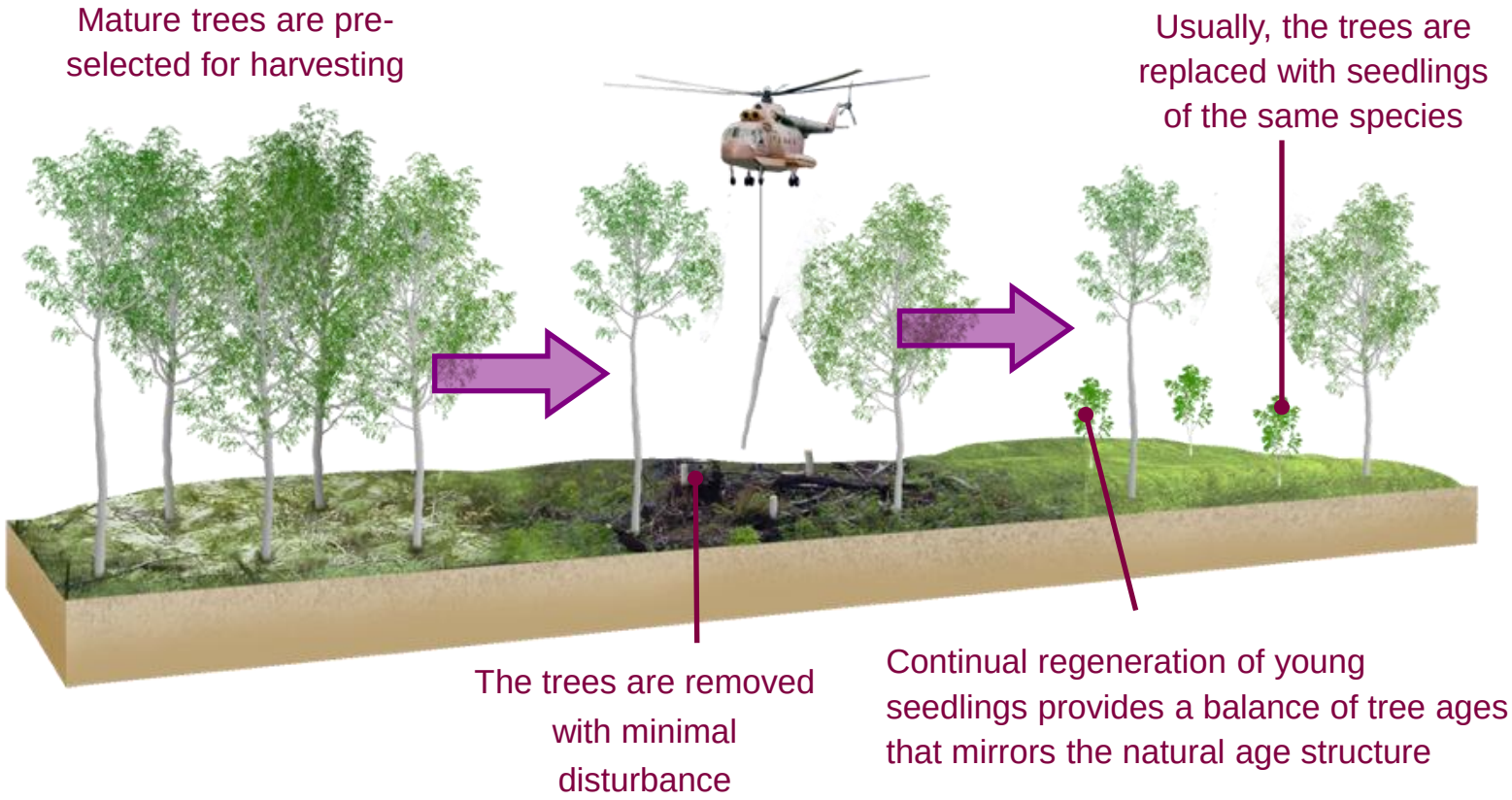
This method consists of harvesting only mature trees of the **desired size, type, or quality («Cherry picking»)**.

This method is much less disruptive to the forest environment. It is used in forests with **tree species that need shade** to become established.

Hardwoods, such as sugar maple, are cut in this manner.

Selective cutting tends to be a costly process because of the extra care and time taken to cut down the trees.

This method is also costly in the long run because it does not allow the replanting of a new, uniform forest.



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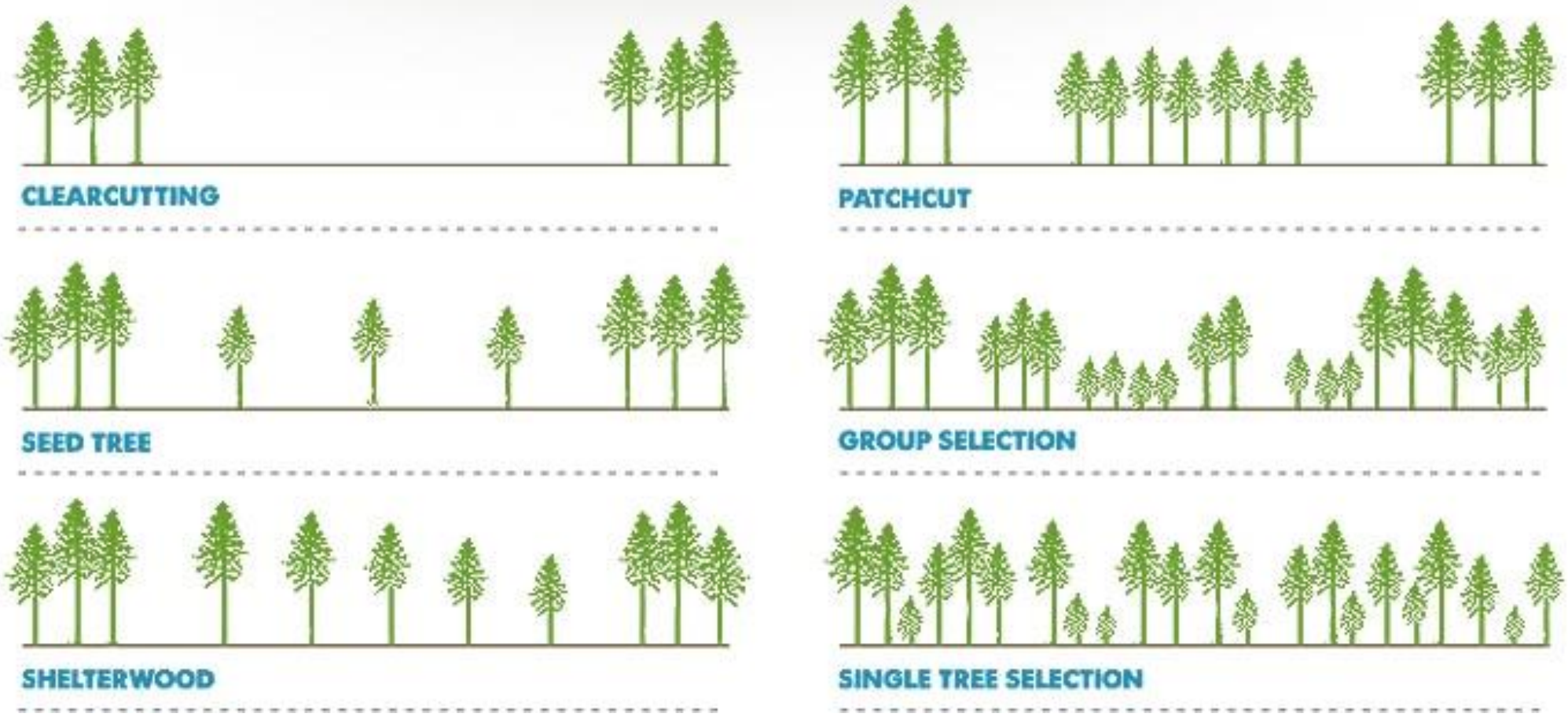
TYPES OF HARVEST



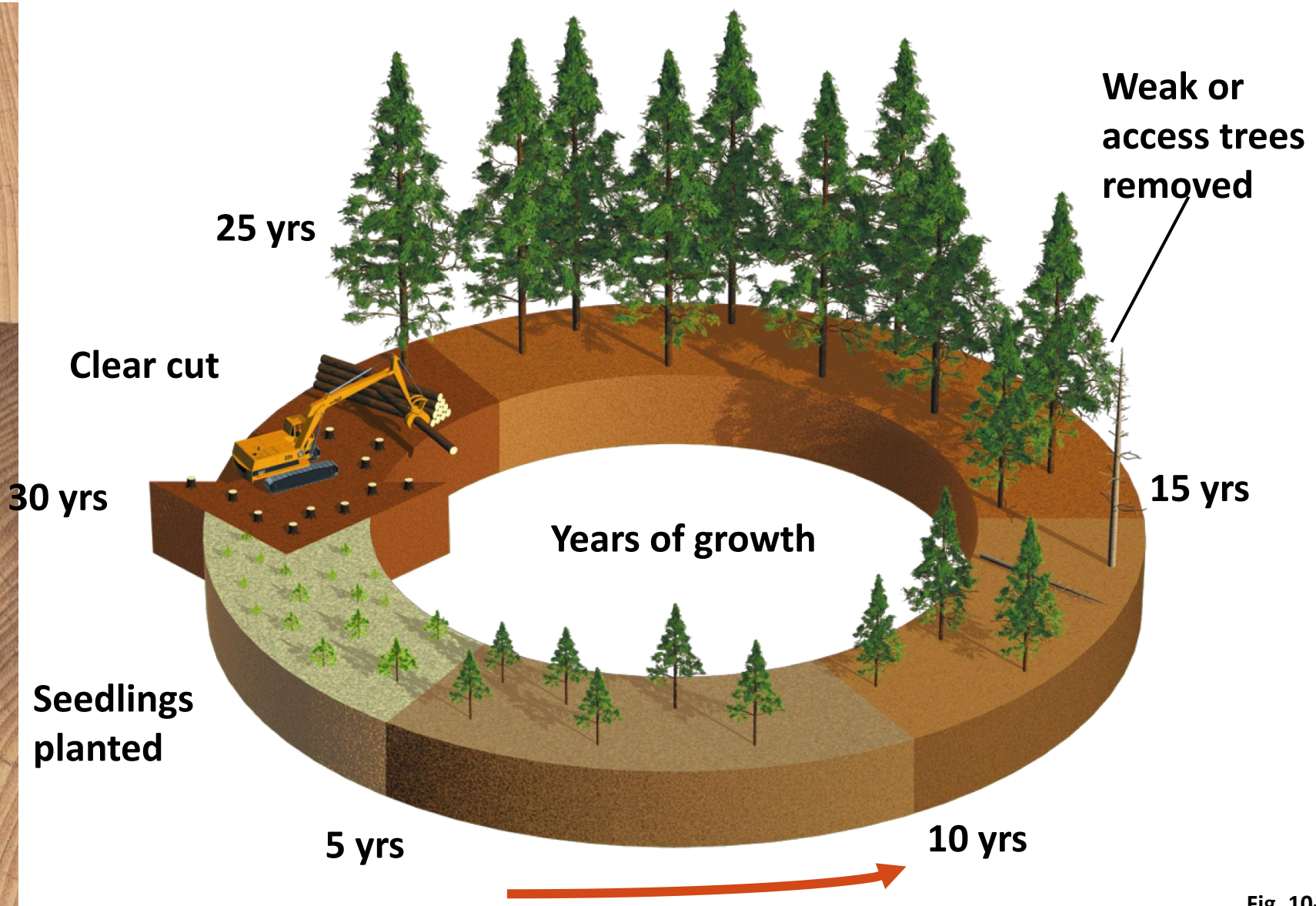
Dead tree processing ?

Commercial Plantations (Industrial Approach)

- Commercial plantations are specifically planted and grown for the **production** of timber and timber based **products**.
- They consist of a tree **monoculture** that is fast growing and produces straight, tall trunks ideal for logging and milling.
- *Pinus radiata* (monterey or radiata pine) is popular as **a commercial timber tree** as it is **fast growing, produces strong general purpose timber**, and is ready for logging **just twenty years** after **planting**.

Pinus radiata is the leading commercial timber tree in many countries. The Kaingaroa Forest in New Zealand is the Southern Hemisphere's largest planted forest, covering 2,900 km^2

Rotation cycle of cutting and re-growth of a monoculture tree plantation



Timing lenght – species specific and geography
- priority – fast groving spacies with acceptable properties

Samples – pine, berch, , + Cherry treess....

Condition – Soil , climate

Fig. 10-3a, p. 219

Heavy machinery used in Forestry

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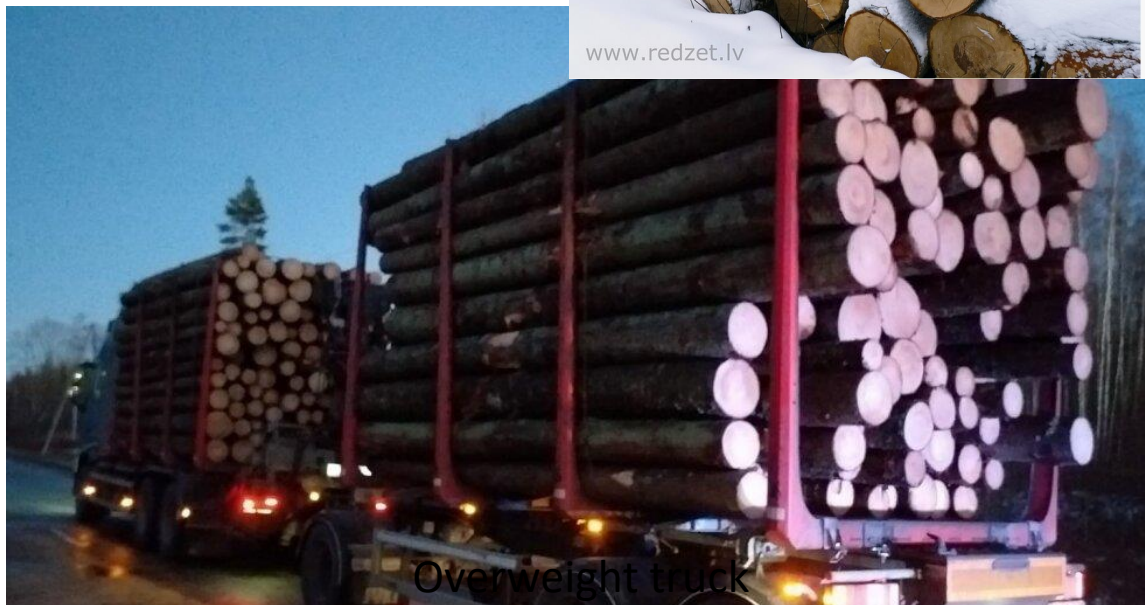
Harvester



Overweight truck

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Specialized equipemnt

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Tools and development

What next?

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What have been forgot ..... ?

Planting trees to save the planet

1. Planning a plantation
2. Preparing the planting site
3. Handling seedlings
4. Planting techniques
5. Adapting planting techniques to different site
6. Maintaining plantations
7. Planting trees outside woodlots and forests
8. Organizing the work
9. Working procedures

https://www.fao.org/sustainable-forest-management/toolbox/tools/tool-detail/en/c/218089/

Forest planting

Disc trenchers
Scarification with disc trenchers gives plants and seeds the best possible start for growth and survival whatever the terrain.

Forest mounders are used to create humus mounds with mineral soil cover, creating optimum planting beds.

Planters it is possible to conduct the full scope of regeneration work from scarification to planting.

https://www.brackeforest.com/

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Timber Logs in Forest (Linking to material lecture)

Forestry covers

- Planning and managing forest
- Cut trees
- Brought to transportation place

Forestry – have to considers not only plants but also animals of even water processes in area

Transforming wood into timber (Sawmill)

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Forestry activity grouping tasks (Sample)

Logging services

- Sawing services machinery
- Saw trees with chainsaws
- Tree sawing
- Forest management
- Inventory of trees
- Young stand care
- Cutting documentation

Forest management

- Forest development planning (management plan)
- Soil preparation
- Tree handing
- Care of young plants
- Timber transport services
- Tree removal
- Stock care (logging site)

Logging Technique services

- Sowing
- Transportation of special equipment
- Harvester services
- Forwarding services
- Transportation of forestry equipment

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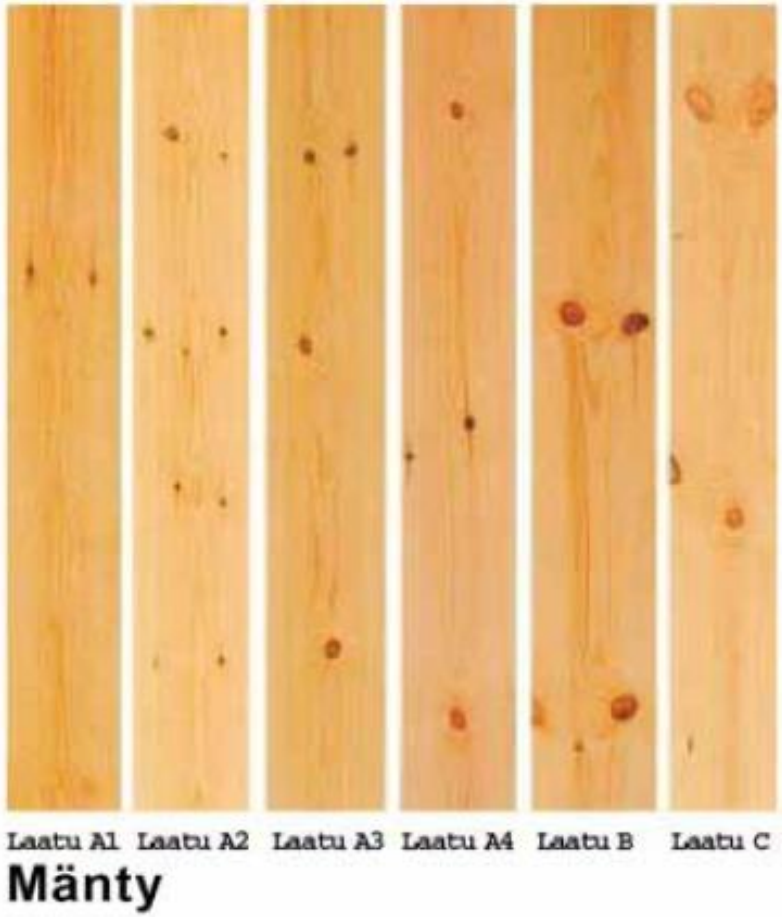
Logging area means that area on which timber operations are being conducted according the **Timber Harvesting Plan (possible Different namings (LV direct translateion – Forest management plan)),**

Transport to Sawmil

Visual grading

The permissible defects limits are set out EN 14081-1, and the various visual grade and species combinations are again attributed to strength classes in EN 1912)

Pine: A1, A2, A3, A4, B, C



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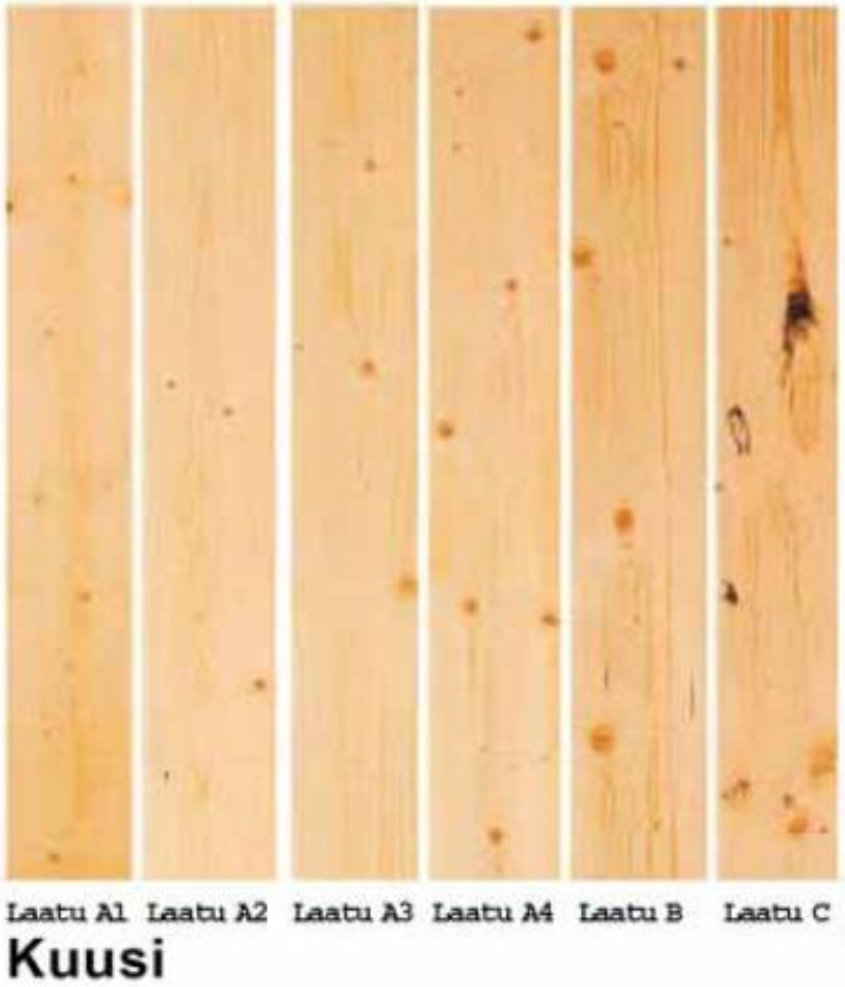
Examples of quality classes

- Spruce: A1, A2, A3, A4, B, C



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Machine grading

- Many of the disadvantages of visual grading can be removed by machine grading, a process in which the timber (up to about 75 mm thickness) is bent by a known force about the weaker axis, and the deflection measured.
- The timber strength is determined by known relationships between species strength and stiffness.
- The system allows timber to be graded directly to a strength class (with some visual overrides).
- Most machine grading of timber is now done with x-ray machines, which measure wood density in detail as well as the size and position of knots.
- But modern grading machines more commonly measure stiffness by the acoustic vibration method, allowing them to be much smaller and simpler.
- There are now many kinds of grading machine, including ones that work on other principles such as slope of grain.

https://brookhuis.com/

https://blogs.napier.ac.uk/cwst/grading-machines-speeds/

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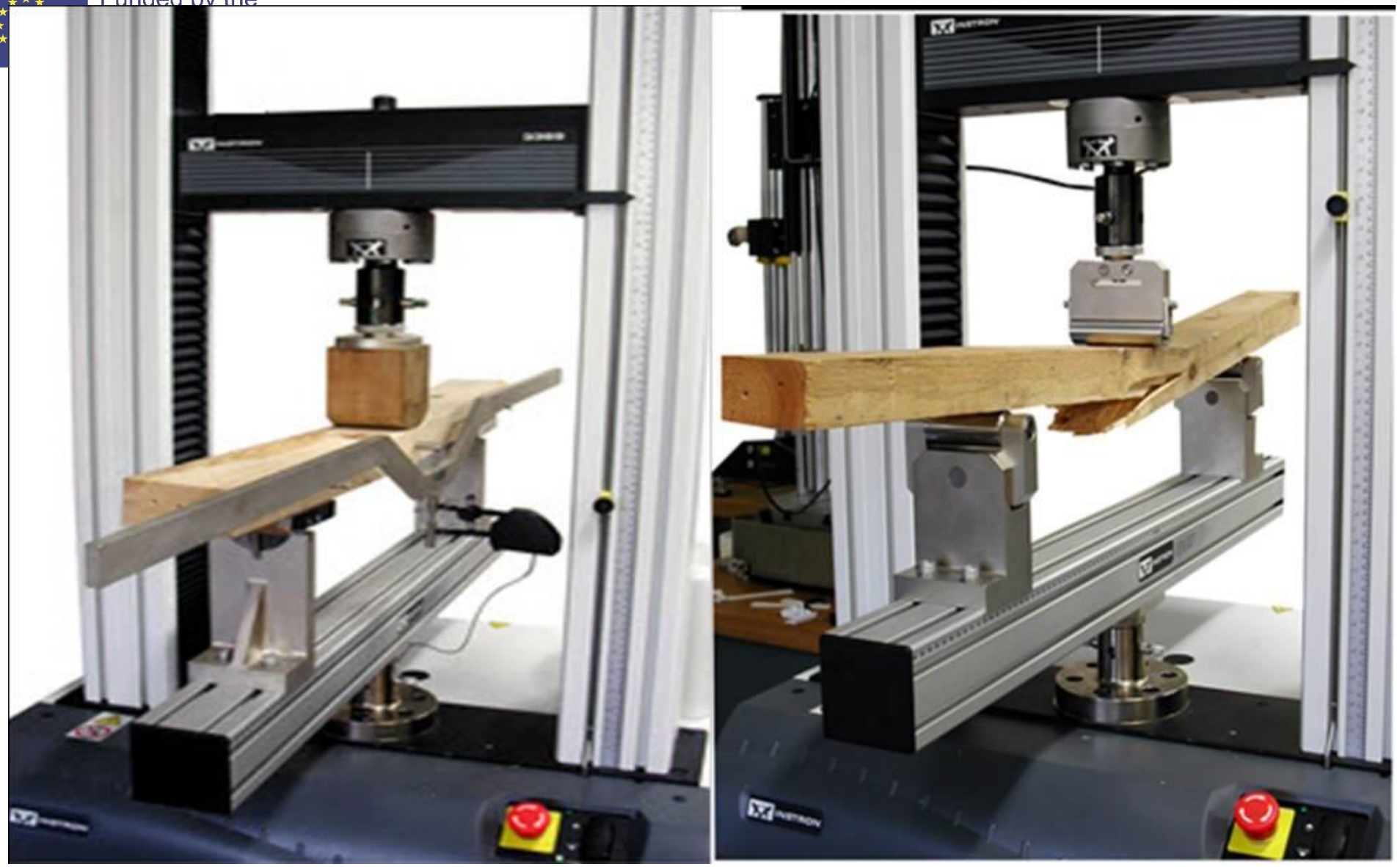

Bending test on a wood lumber

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Good processes can yield high conservation values

From endemic species to sacred sites, all natural habitats – especially forests – inherit conservation values. Those biological, ecological, social or cultural values of outstanding significance are known as 'high conservation values,' or HCVs.

- Guidance Documents
  - FSC-GUI-30-009 HCV Guidance to Managers
  - FSC-GUI-30-10 IFL Guidance
  - FSC-GUI-60-004 IFL Guidance for standard developers
  - FSC-GUI-60-009 Guidance for SDGs for developing HCV Frameworks
  - FSC-GUI-60-009a HCV Template

https://fsc.org/en/for-forests/high-conservation-values

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Forest Management Certification (FSR – Forest Steward Counsil)

- FSC Forest Management certification confirms that a specific area of forest is being managed in line with the FSC Principles and Criteria.

- To achieve FSC Forest Management certification, the forest manager or owner contracts with an FSC-accredited Certification Body or joins a Forest Management Group.
- As parto certification phase the forest is audited to FSC's Forest Management standards

https://fsc.org/en

Forests are our life support system.

- They help stabilize the climate, sustain a diversity of life, provide economic opportunity.
- Yet, forests and other critical ecosystems are hanging in the balance, being cut out and converted to croplands, pasture, and plantations, later even eroding totally.
- Forests - majority of the world's terrestrial biodiversity but provide crucial ecosystem services as they regulate water cycles, provide clean air and protect the soil from erosion.
- Existing laws are with flows, and the regulations in place are **poorly enforced**.

Samples

> From the Amazon to Canada to Indonesia, **half of our global forests have already been lost to unsustainable industrial practices**. The need to protect remaining forests is more urgent than ever. The loss of these vital ecosystems is displacing communities, threatening the habitats of rare and endangered species, and spewing greenhouse gases into the atmosphere.

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Industrial Forestry practice vs. «untouched forests»

- Industrial rforestry practices are privisioning demand to materials, still forest areas with natural ecosystem would be prefered to protect
- Untoucted forest are linign ecosystems for already rare or endancerous species
  - Migration is under risk for local protection of forest areas as natural migration of animal species is broken
    - Roads /walls/ cities
    - High voltage lines in forests (Step voltage)

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Thank you!
Questions?

Material for this presentation is prepared with Christina Tirteu material

Are the bomboo materials a wooden material?