Forest types:

Plantation vs natural, and softwood vs hardwood

Geography

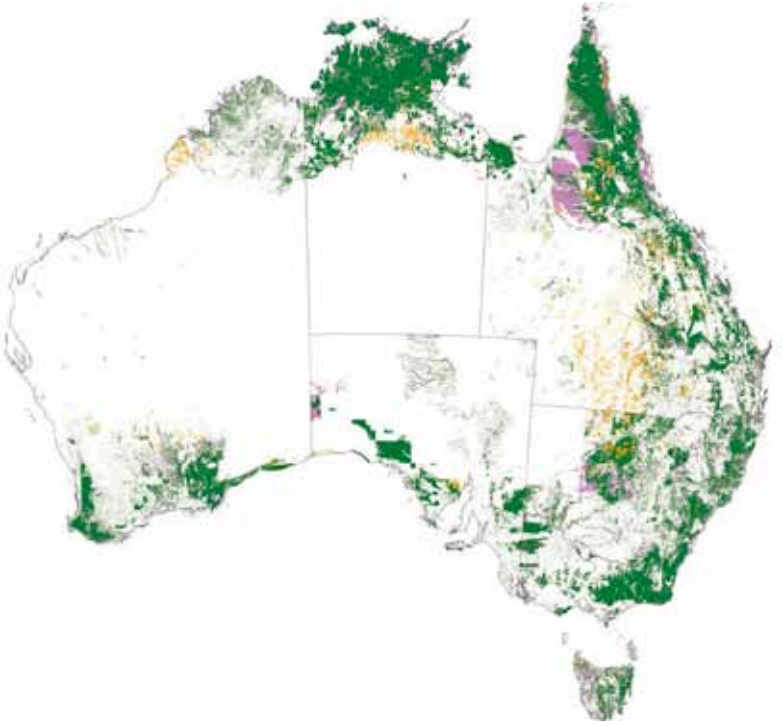
Practical Lesson

Activity information

Level:	Junior secondary school Years 7 – 10
Duration:	Approximately 3 lessons: • video • design forest plan • make 3D forest model
Preparation:	• Watch Going Bush online video's to assist students identify the difference between softwood pine plantations and native hardwood forests at: **www.forestlearning.edu.au/Resources/Going-Bush-SA-Plantations** and **www.forestlearning.edu.au/Resources/Going-Bush-cradle-product**
Materials:	• class set of tree template cut outs • scissors • brown plasticine • paint and brushes or Textas • toothpicks or wooden skewers • sticky tape • cardboard, plywood or Masonite for model base (30cm x 30cm)
Summary:	Students will examine and compare different forest types. They will learn how to identify major tree types and understand how they are used, what ecosystem services they provide, and the professional role of Foresters in managing forests. Using this information, students will design a landscape model of an area of a plantation or native forest in class groups to represent a forest type.

Background

Australia has over 4% of the world's forest area, covering 149.4 million hectares or 19% of Australia's land area (DAFF 2012). Forest types are grouped into either native or plantation forests to distinguish trees in their natural state from those that have been planted by man. Forests are further classified depending on the wood properties of the dominant tree species, being either hardwood or softwood.



Source: DAFF 2012

Native forests

Native forests account for 99% of our forests, covering 147.4 million hectares and are mainly Eucalypt, Acacia, Melaleuca and Callitris species. Native forest species originate from Australia, as opposed to exotic species that come from overseas. Around 6% (or 9.4 million hectares) of public native forest is under multiple use tenure where a small proportion is harvested yearly for sustainable wood supply. In comparison, 15% (or 22.4 million hectares) is in formal conservation reserves where trees cannot be harvested and the main aim is to preserve native vegetation and wildlife habitat.

Native Eucalyptus – Red Gum forest

Native Melaleuca – Tea Tree forest

Plantations

Plantations are intensively managed stands of trees that have been artificially planted with native or exotic species, laid out in rows. Plantation species are described as either hardwood (mostly eucalypts) or softwood (e.g. pines) depending on the density and hardness of the wood. In general, hardwoods have harder denser wood, and include the angiosperms that reproduce by producing seeds with a covering. Softwoods have softer, less dense wood that tends to be easier to cut, and include the conifers such as pines and spruces that have naked seeds that are easily dispersed in the wind.

There are currently 2 million hectares of plantations in Australia, with 1 million hectares of each type, supplying just over two-thirds of the logs harvested for wood products each year from just over 1% of the total forest estate; the balance from native forests. Plantations have been planted mainly on land previously cleared for agriculture and play an increasingly important role in wood supply as the area of native forest available for harvest continues to decline.

Pinus radiata plantation (softwood)

Eucalyptus acmenoides plantation (hardwood)

Foresters

Foresters engage in a broad range of activities to manage forests including timber harvesting, ecological restoration and the management of protected areas. The management of forests varies according to forest type (dominant tree species), forest structure (crown cover and height), forest age, climate, soil type, fire history, and planned use of the forest. Foresters manage forests to provide a variety of objectives including direct extraction of raw material (wood), recreation, biodiversity conservation, feral animal hunting and aesthetics. Emerging, socially responsible management practices include managing forests for air and water quality, carbon sequestration and biodiversity.

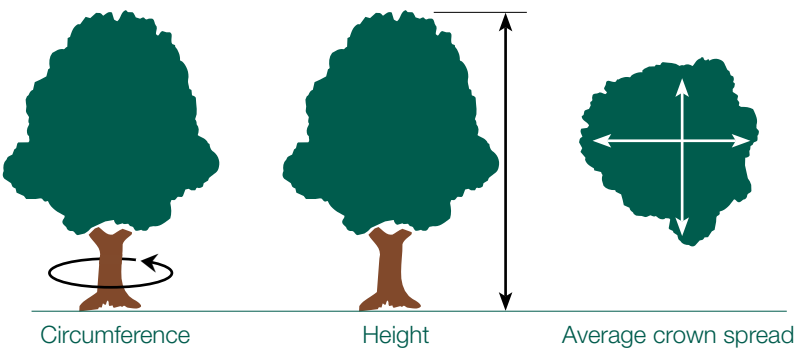
Forest structure:

Crown cover

Crown cover is the percentage of area covered by the canopy of trees in a forest (see following diagram illustrating crown spread). Woodland forest has a crown cover of 20-50%, Open forest is 51-80% crown cover, and Closed forest 81-100% crown cover. Woodland is the dominant forest type in Australia covering 99,007 hectares or 67% of total native forest.

Forest height

Forest height at maturity is also used to classify forests, with the majority (71%) being medium height of 10-30 metres tall (see diagram below illustrating tree height). Low forests are considered to mature between 2-10 metres tall, while tall forests grow to over 30 metres. Rainforests tend to be tall forests, while drier more arid climates have low forests.



Parameters of trees used to classify forests

Ecosystem services

Ecosystem services are benefits people obtain from the environment. Forests provide many ecosystem services in addition to wood production. These include air and water quality improvement, dryland salinity mitigation, biomass for biofuel production, carbon sequestration, seed dispersal, nutrient cycling, medicinal plants, recreation, and habitat for native plants, animals and microbes.

CASE STUDY

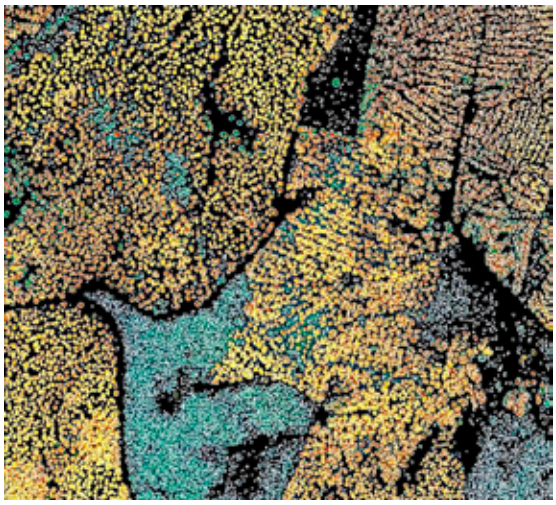
A native softwood forest managed for production: *Callitris glauca* (white cypress)

Callitris glauca (white cypress) forests grow in the drier, sandy soils in western NSW and Qld. Specified areas provide wood for a variety of softwood products including floorboards, palings, internal lining boards, structural poles and posts. The wood has an attractive finish due to colour variations along its grain and dresses smooth and shiny; examples below from Gunnedah Timbers, NSW. It is popular for its termite resistance due to the presence of natural substances including resin, guajol and callitrol. Resins can be extracted for use in paint varnish.The air dried density averages 680kg/m3, which is quite hard for a softwood. The most limiting factor in this industry is the lack of supply of mature cypress trees for harvest.

Native Callitris glauca (white cypress) forest, mature (left) and juvenile (right).

Forest landscape models

Models are regularly used by foresters and policy makers for improving planning and decision making, like helping to decide which trees to harvest and which ones to leave or protect. There are many software programs now available to accept geographical data, and produce computerised models and maps e.g. SLIM. Models show tree types, density and heights, and can also include the location of other natural and man-made features such as waterways, slopes, roads, dams, hills and rocky outcrops. Forests are often selectively harvested to maximise the growth of remaining trees and to leave remnant of forest for native animal habitat.



Crown mapping

Categorical tree crown mapping

Activity: Designing and building a forest landscape model

(a) In class groups, design on an A4 page a forest landscape model of either a native or plantation forest. Include any waterways, wildlife or other natural features you would like. Name the forest type (i.e. dominant tree species), and provide details of crown cover and forest height.

(b) Make model trees out of paper or cardboard (you may like to use the basic templates provided). Trees can be secured to wooden toothpicks or skewers with the aid of sticky tape. Note: Cypress and pine trees have a cone shape, while eucalypt trees have a canopy top.

(c) Prepare base of model by drawing or painting any additional features in such as waterways or roads. For an undulating (sloping) landscape, you can build up with paper mache and paint it, although you would require a further lesson to do this.

(d) Use plasticine to make bases for trees. Then place trees into position on the base according to your plan.

Questions

1. Explain the difference between native and plantation forests.

2. What the purpose of selective breeding for plantation trees as discussed in the Going Bush video?

3. Explain the difference between softwood and hardwood trees.

4. What is the role of a Forester?

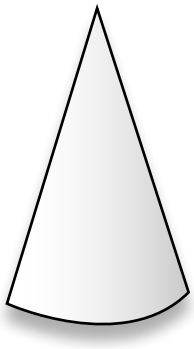
5. What does a measure of crown cover tell you?

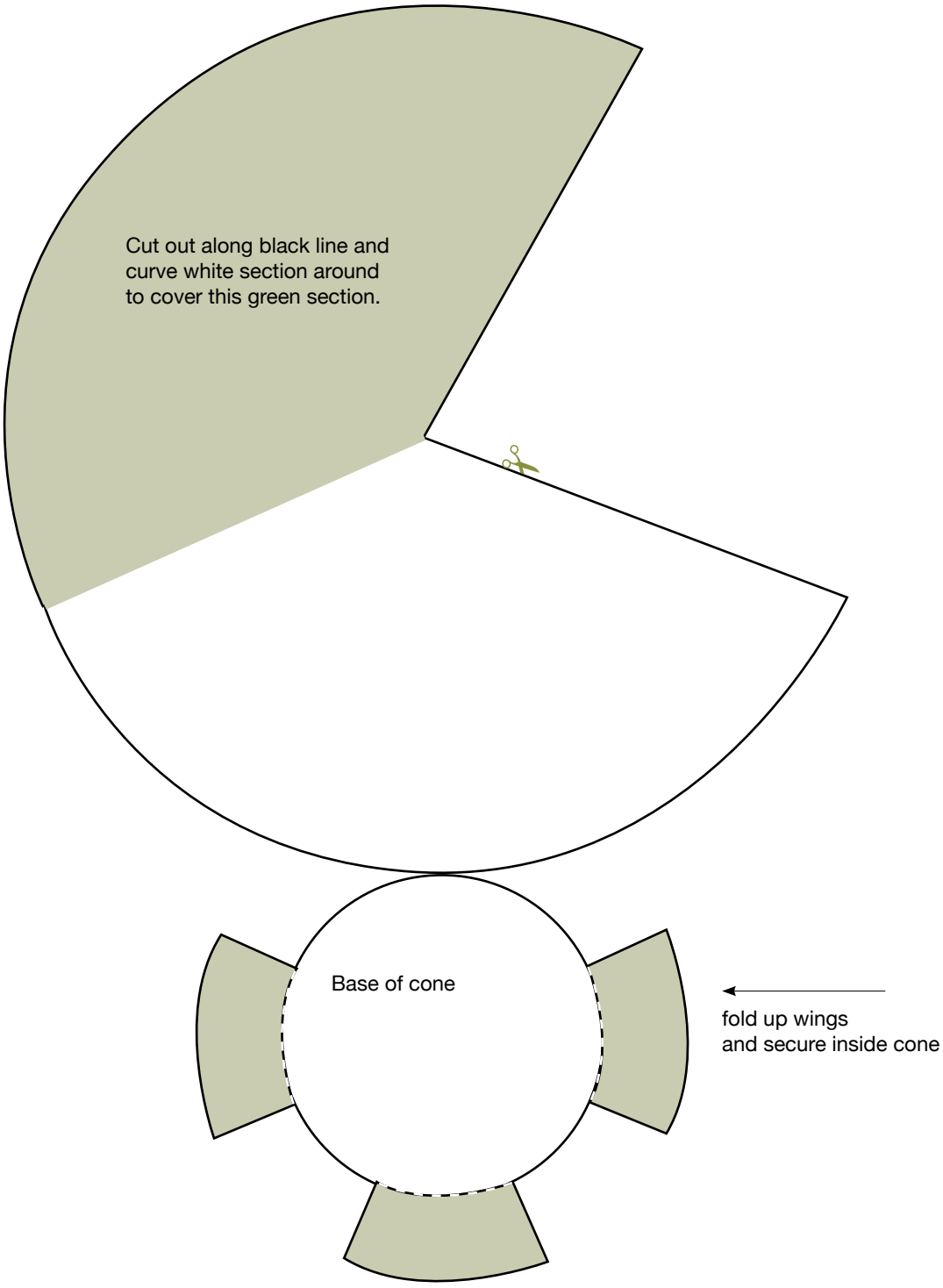
6. Using the case study of *Callitris glauca* (white cypress), what are some of the products made from wood and wood residues sourced from these native softwood forests?

7. Provide an example of how a landscape model could assist a Forester in planning management.

3D Templates

Cone



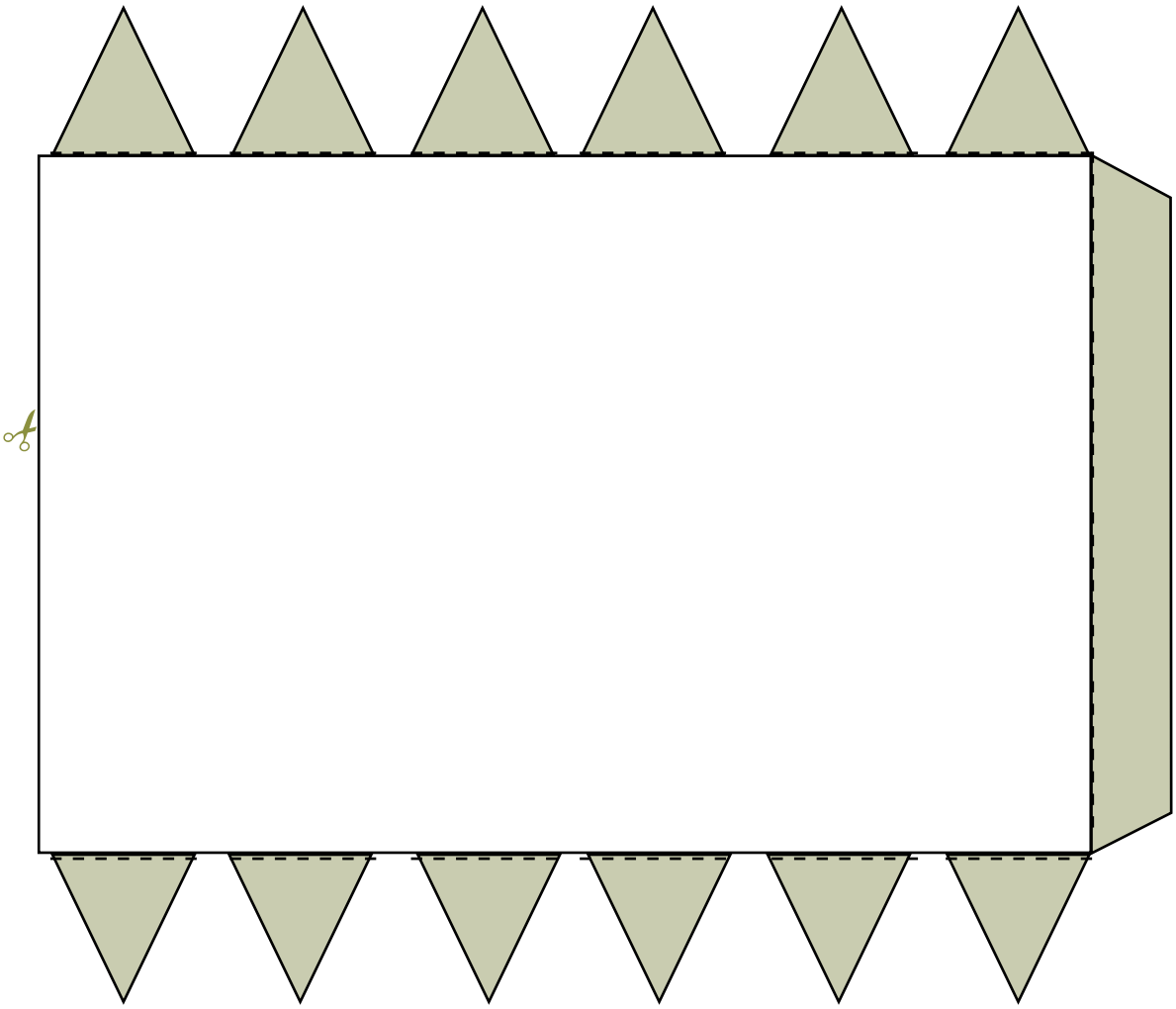


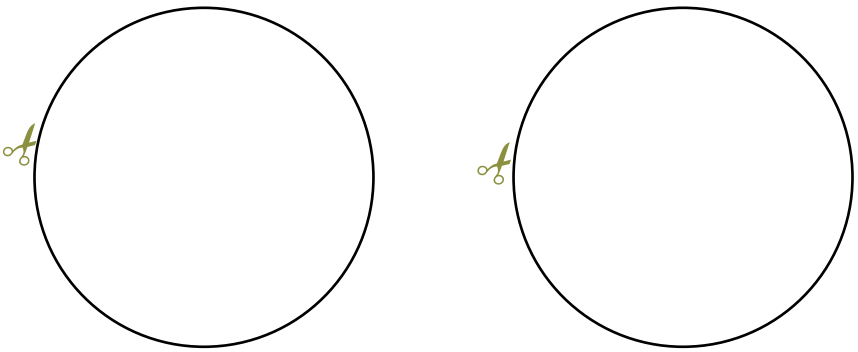
Cylinder

Cut out along black line, curl around to form cylinder and glue green edge.

Fold green triangles in to form top and bottom of cylinder.

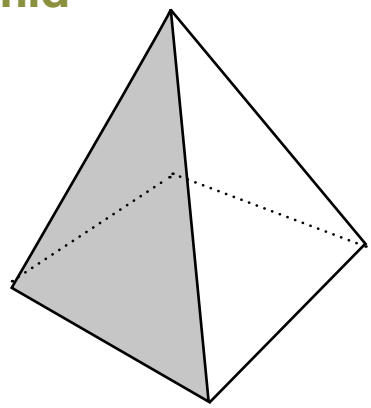
Glue on cylinder top and bottom.





Cylinder top and bottom

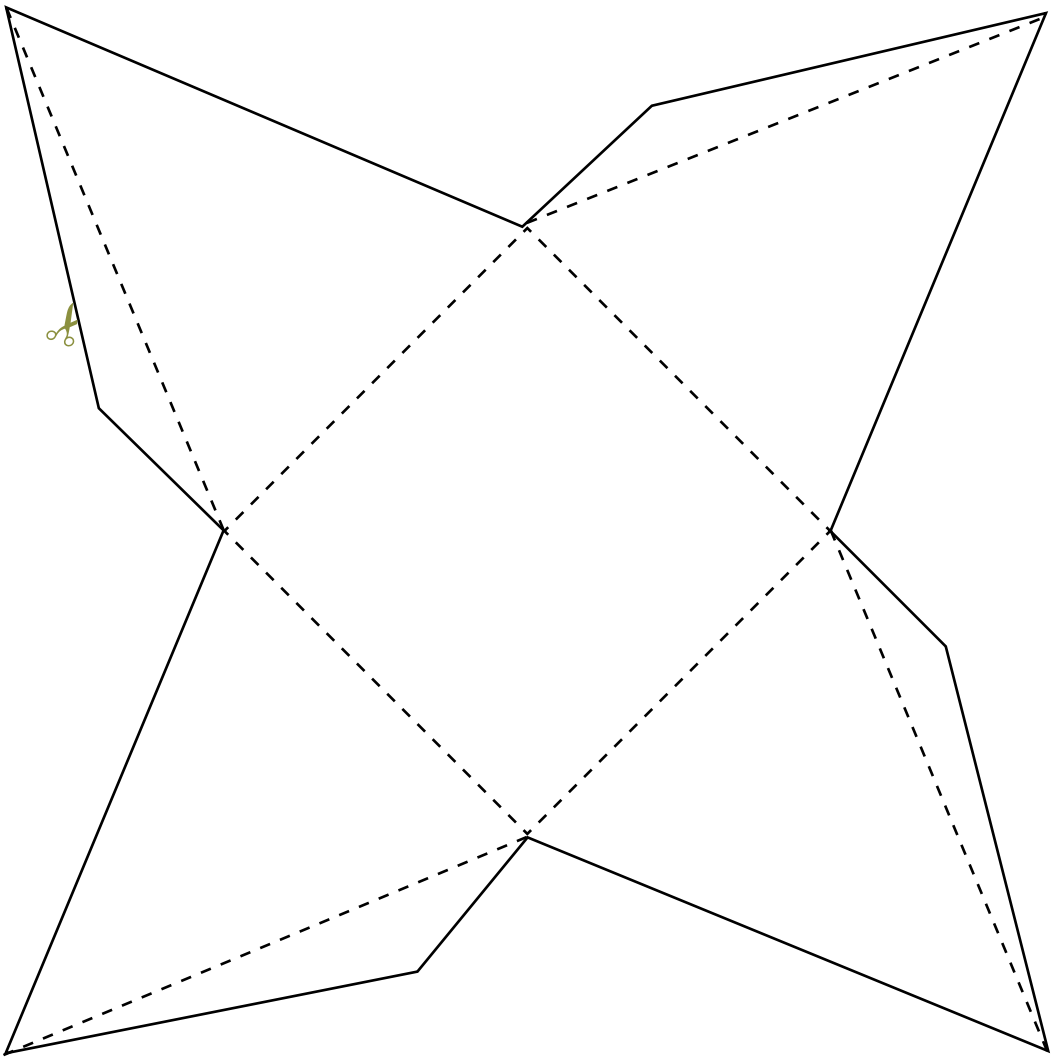
Pyramid



Cut out along solid black line,

Fold along dotted lines, fold tabs inward, and fold four sides up to create 4-sided pyramid.

Glue folded tabs inside edges.



ANSWERS

1. Native forests comprise of Australian tree species that naturally regenerate. Plantation forests are planted by man, usually in rows for the purpose of wood production.
2. Selective breeding is a program where ‘superior’ trees are identified in the field for traits such as straighter, stronger stems with less limbs, fast growing and high yielding. They are reproduced in nurseries and planted out in plantations to maximize potential wood production.
3. Softwood tree species generally have softer, less dense wood than hardwoods and tend to be easier to cut, and include the conifers such as pines and spruces that have naked seeds that are easily dispersed in the wind.
4. Foresters have the role of managing forests using scientific techniques. Foresters engage in a broad range of activities including timber harvesting, ecological restoration and management of protected areas. Foresters manage forests to provide a variety of objectives including direct extraction of raw material, outdoor recreation, conservation, hunting and aesthetics. Emerging management practices include managing forestlands for air and water quality, carbon sequestration and biodiversity.
5. Crown cover tells us the percentage of area covered by the canopy of trees in a forest, for example Woodland forest has a crown cover of 20–50%.
6. Wood products include floorboards, palings, internal lining boards, structural poles and posts. Also resins for use in varnishes.
7. Forest models can show tree density, and help plan which trees to harvest for wood through selective thinning and which ones to leave for further growth or remnants for native animal habitat.

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