VicForests

Climate Change

The Role of Trees and Forest

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Trees and forests are important in the battle against climate change because they sequester and store atmospheric carbon.

This helps counter the build-up of carbon in the atmosphere caused by emissions of 'greenhouse' gases through the use of fossil fuels such as oil and brown coal.

Forests have the potential to absorb about 10 to 20 per cent of total global carbon emissions projected for the first half of this century.

Carbon sequestration of trees:

This refers to the normal process of growth by which actively growing trees take up carbon dioxide (CO^2) and convert it into carbon which is stored in wood.

Carbon storage in wood:

This refers to the accumulation of carbon in wood in the stems, roots, and branches of forest trees, and in wood products derived from harvesting trees.

Carbon content of wood:

The carbon content of wood is approximately equal to 50 per cent of its oven dry density. For example, red gum has an oven dry density of 700 kg per m^3. Carbon content of red gum = 350 kg/m^3.

Carbon storage in tree biomass:

Carbon is stored in the stem, branches, roots, foliage, and bark of trees. Stem wood comprises around 75 per cent of above-ground tree biomass. Roots comprise around 25 per cent of total tree biomass.

Converting carbon into CO^2 equivalent:
1 tonne of carbon = 3.67 tonnes CO^2.

Useful 'greenhouse' facts:

Australia's net annual greenhouse gas emissions = 564 million tonnes (in 2004).

Australia's native forests store 10.4 billion tonnes of carbon – equivalent to 38 billion tonnes of CO^2 emissions.

Wood is 'greenhouse' friendly

Using wood products is one of the best things that we can do to combat climate change.

Wood is a renewable resource that involves low carbon emissions in its harvesting, processing and manufacture. Using more wood translates into lower demand for substitute products such as steel, aluminium, and concrete that embody far greater carbon emissions in their production and use.

Compared with the same productive unit of solid wood, steel emits 350 times more carbon, aluminium emits over 1400 times more carbon, and concrete 6–8 times more carbon in its manufacture and use.

Even burning firewood has 'greenhouse' benefits if it is derived from a sustainably managed forest in which harvested trees are immediately replaced by regrowth. Home heating with firewood reduces the use of electricity obtained from burning non-renewable fossil fuels.

Sustainable timber harvesting & carbon flows

About 7 per cent of Australia's public land native forests are available for timber production. Sustainable harvesting of this area is planned over an 80–100 year cycle.

Currently, about 9 million m3 of logs are harvested each year from Australia's available native forests. These contain an estimated three million tonnes of carbon.

Timber harvesting results in carbon emissions from soils and the burning of logging debris and undergrowth during the post-logging regeneration process. There are also emissions associated with the use of harvesting machinery and trucks carting logs to processors.

After taking account of emissions generated during harvesting, processing, manufacture and use, an estimated 70 per cent of the carbon in harvested logs remains in storage. This includes storage in wood products and land fills, as well as the re-use of some residues as an alternative power source that avoids fossil fuel use.

In sustainably managed forests that are immediately regenerated after harvesting, young regrowth sequesters carbon from the atmosphere at faster rates than the mature forest it has replaced.

It may take 150 years for regenerating trees on each coupe to recapture carbon removed during timber harvesting. However, when considered at the whole-of-forest scale, sustainable timber harvesting is 'greenhouse' neutral because released carbon is being continually recaptured by new growth across the whole forest.

Sustainable wood production entails the annual timber harvest being equal to the annual rate of growth over the whole forest. This allows a pre-determined level of timber to be removed in perpetuity with no net loss from the system. Assuming that carbon is replenished in soils and in the understorey as the trees regenerate there is no net loss of carbon from the forest as a whole.

Timber production and climate change

Environmental activists opposed to any native forest harvesting are increasingly referring to the carbon storage capacity of trees to justify their position. However, the combined carbon storage in wood products / landfill and post-harvest regrowth over time clearly exceeds that involved in simply preserving all forests in parks and reserves.

About nine per cent of Victoria's forests are designated for timber production. A sustainable annual timber volume is produced from harvesting around one per cent of this area each year. To be sustainable, annual timber production equals annual growth across the whole forest. Similarly, carbon storage over time in Victoria's sustainably managed wood production forests is constant because carbon stored is equal or greater than carbon removed.

Old growth forests are important carbon storehouses but do not capture new carbon and eventually become net carbon emitters as they slowly die.

Old growth forests generally contain large, very old trees that are important carbon storehouses. However, as trees age they grow ever more slowly. The 'old growth' stage corresponds to a time when trees have stopped growing and are starting to senesce (or decay and die). A balance is generally reached between carbon sequestered in new growth and carbon emitted in decaying wood. As trees decline further, they become net carbon emitters that contribute slightly to CO^2 levels.

Saving 'old growth' forests by preserving them in parks and reserves will not stop their eventual decay and death.

If killed by fire, 'old growth' forest can be replaced by vigorous young regrowth. If it dies in the absence of fire it is often replaced by understorey climax species that grow either as scrub or small trees that generally sequester and store far less carbon.

Reserving examples of 'old growth' forest is important for conserving biodiversity, but vigorously growing younger regrowth and mature forests is far better for combating climate change.

In 2004/05, Australians used 7.1 million m^3 of sawn wood and panel products and 4.2 million tonnes of paper products produced from plantations and native forests.

Depending on the type of product and how it is disposed of at the end of its service life, carbon will remain locked within it for many decades. Native forest hardwood is generally more durable than softwood produced from pine plantations, and so generally stores carbon for much longer.

A report commissioned by the Australian Greenhouse Office in 1999 allocated hardwood products into five pools with assumed service lives as follows:

Very short-term (over 3 years) – paper products

Short-term (over 10 years) – hardwood pallets, particleboard, MDF and hardboard

Medium-term (over 30 years) – panel products used in kitchen furniture, rail sleepers, plywood

Long-term (over 50 years) – poles, piles, and girders

Very long-term (over 90 years) – timbers used in house construction.

There are many examples of timber products lasting for hundreds of years in the right circumstances. In addition, while most paper may only be used for up to three years, there is a substantial quantity of paper stored for far longer in books and archives. In addition, around 48 per cent of paper products are recycled thereby ensuring longer in-service carbon storage.

The Australian Greenhouse Office estimates that wood products (produced since 1944) currently in service in Australia are storing 95.6 million tonnes of carbon.

At the end of their service life, wood and paper products follow several paths – recycled, burnt for energy, or disposed of into dumps (landfills).

Recycling will extend in-service carbon storage – around 48 per cent of Australian paper is recycled. Burning woody waste for energy or heating can reduce the use of finite fossil fuels and disposal into landfills can also significantly extend the period of carbon storage.

In 2004, Australian landfills contained an estimated 136 million tonnes of carbon – 45 per cent more than the estimated carbon storage in wood and paper products in service.

About 4.3 million tonnes of wood and paper products go to Australian landfills each year. This adds 1.6 million tonnes to landfill carbon storage.

A recent study shows that paper and wood products decay only very slowly in landfills. Three landfill sites where wood and paper products had been buried for 19,29 and 46 years were excavated. Chemical analysis of uncovered wood products revealed very low rates of carbon loss through decay. Even paper products were in some cases found to be largely intact after 20 years.

As it is now appreciated that carbon will be stored for many decades in landfill, the environmental footprint of wood products is even lower than previously expected.

It could be further lowered if landfill emissions were tapped and utilised for bioenergy to offset the use of energy derived from fossil fuels. Currently, an estimated 70,000 tonnes of gas is emitted from decaying wood and paper products in Australian landfills each year.

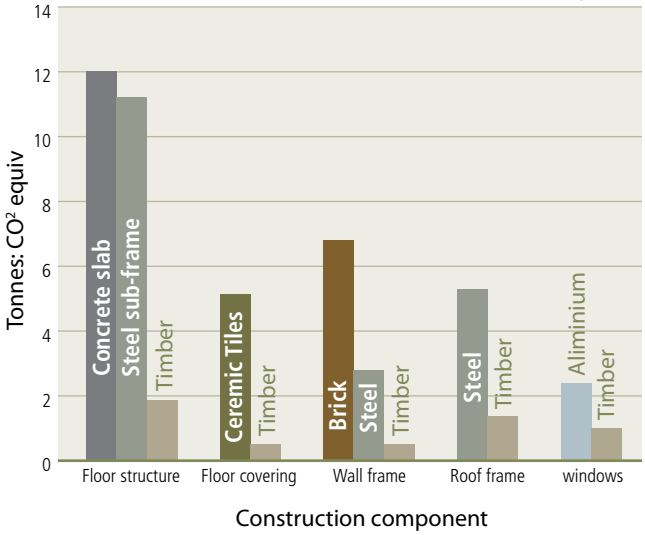
Wood products residing in Australian landfills represent an important long-term carbon store.

By using wood products wherever possible during Australian house construction, greenhouse gas emissions equivalent to up to 25 tonnes of CO^2 could be saved per house.

Similarly in New Zealand, the use of wood in new buildings has been shown to reduce greenhouse gas emissions by 30–85 per cent through savings made by not having to manufacture alternate materials. The environmental credentials of wood far outstrips those of all other building materials.

Comparison of greenhouse gas emissions in the manufacture of various building materials

Source: Modified from InWood International Magazine



The environmental movement, forests & climate change

Despite the environmental advantages of using a renewable raw resource that generates wood products requiring less energy to make than competing materials, environmental activists continue to oppose Australia's hardwood timber industry.

In using climate change as a lever to achieve this aim, they are generally misrepresenting Australian timber production by deliberately ignoring the regrowth of forests after harvesting. This enables them to:

- Wrongly infer that Australian timber production is the same as permanent deforestation in developing countries which is acknowledged to be responsible for 18 per cent of annual global emissions
- Incorrectly refer to all carbon removed from the forest by timber harvesting as greenhouse emissions despite the reality that most carbon in harvested logs is ultimately stored in wood products.

The growing store of carbon in wood products (both in-service and in landfill) combined with carbon sequestration in both commercial native forests and plantations is currently reducing Australia's annual net greenhouse emissions by about 10 per cent. Ceasing to produce wood from Australia's native forests would substantially counteract initiatives to reduce carbon emissions.

Although timber represents around 50 per cent of the industrial raw materials used globally, it requires only 4 per cent of the energy employed to convert raw materials into usable products.

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