

NSW FOREST CARBON:

An Effective
Climate Change
Solution



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An Effective Climate Change Solution

WE NEED TO ACT NOW ON CLIMATE CHANGE



Protecting native forests is a low-cost, effective and immediate way to take real action on climate change. Protecting native forests reduces emissions and allows forests to draw down considerable amounts of carbon from the atmosphere.



HIGH LEVELS OF EMISSIONS

Native forest logging in New South Wales emits around 3.6 million tonnes of carbon each year.



EQUIVALENT TO 840,000 CARS

Emissions from native forest logging are equivalent to the annual emissions of 840,000 cars.



76 MILLION TONNES OF CARBON BY 2050

can be prevented from entering the atmosphere if forests are protected rather than logged.

\$2.7 BILLION

BENEFIT IN CLIMATE MITIGATION

Protecting native forests could provide \$2.7 billion worth of climate benefit to the community.

Authored by Dr Jennifer Sanger, The Tree Projects. © The Tree Projects. Contact: thetreeprojects@gmail.com. Cover photo: Learnscope Creative Commons

This document has been adapted from the reports: J. Sanger (2022) Tasmania's Forest Carbon and J. Sanger (2022) Victoria's Forest Carbon, The Tree Projects.

The Tree Projects recognise that the forests of New South Wales exist on the unceded land of several different Sovereign Aboriginal Nations. We acknowledge the Traditional Owners and their long and ongoing custodianship of Country and pay our respects to Elders past and present.

REPORT SUMMARY

We need to take immediate action on climate change. Protecting New South Wales' forests is a low-cost and effective way to reduce emissions. By ending native forest logging immediately, forests can continue to grow and draw down a significant amount of carbon dioxide from the atmosphere and store it long-term. Protecting New South Wales' native forests is real action on climate change.

The logging of native forests in New South Wales releases vast amounts of carbon dioxide into the atmosphere. Due to the way that emissions are reported, the emissions from native forest logging are not separated from the carbon dioxide absorbed by our forests. Only a net figure is reported. This net figure makes it impossible to tell how many greenhouse gas emissions are coming from native forest logging.

Research conducted for this report found that greenhouse gas emissions from native forest logging in New South Wales is approximately 3.6 million tonnes of carbon (CO₂e) per year. This shows that native forest logging in New South Wales is a significant source of emissions. It has the same annual emissions as 840,000 medium sized cars or is close to four and a half times the annual emissions of New South Wales' domestic aviation.

This figure is based on 'short-term' and 'long-term' emissions. Around 64% of a forest's carbon is released within a few years of logging. Most of the wood removed from New South Wales' forests goes into single-use products such as paper, which have a short lifespan. As much as 40% of the forest's biomass is incinerated, which immediately emits carbon dioxide, methane and nitrous oxides into the atmosphere.

Long-lasting wood products such as sawn timber only represent about 4-8% of the forest's carbon. Around 30% of the forest's biomass, mainly consisting of woody debris and stumps, gets left behind on-site after burning. This can take up to 50 years to break down and emit the stored carbon.

Currently in New South Wales, forests containing 2.2 million tonnes of carbon (CO₂e) are logged each year. However, annual emissions are estimated to be higher due to the lag effects of waste breaking down on-site from decades-old logging when the rate of harvest was twice as high.

When forests are logged, two-thirds of the carbon is released within two years. Some of these carbon dioxide emissions will be recovered as some native forests regrow after logging. However, it takes many decades to centuries for forests to capture lost carbon. We cannot wait decades to centuries. We need to reduce emissions now to prevent catastrophic climate change.

Protecting New South Wales' native forests is a real climate solution. If native forests currently managed for logging were protected, we could prevent 76 million tonnes of carbon (CO₂e) from entering the atmosphere by 2050. This could provide close to \$2.7 billion in benefit to help mitigate climate change.

Our smartest choice would be to protect New South Wales' native forests - this will prevent significant emissions and allow forests to continue to draw carbon down from the atmosphere.

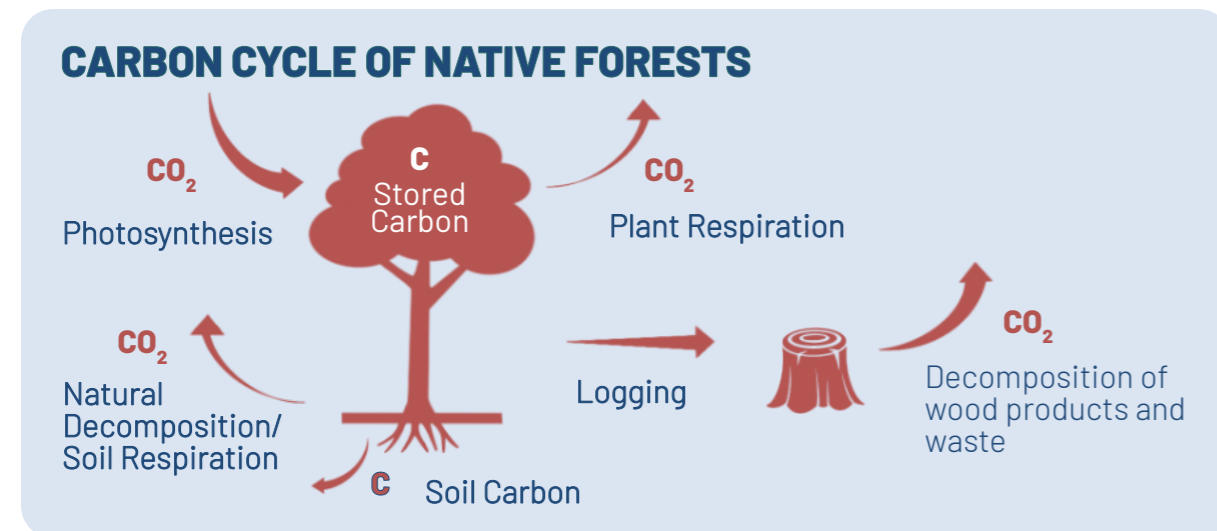
FORESTS ARE IMPORTANT FOR THE CLIMATE

Forests capture carbon from the atmosphere and store it long-term. This carbon is released back into the atmosphere when a forest is logged.

Trees absorb carbon dioxide from the atmosphere and store it long term. If the forest is left undisturbed it will continue to store carbon indefinitely. The world's remaining forests contain 861 billion tonnes of carbon (carbon dioxide equivalent: CO₂e) – that's equivalent to nearly a century's worth of the world's annual fossil fuel emissions at current rates.¹

When forests are logged or cleared, most of the stored carbon is released into the atmosphere. Around 12% of global greenhouse emissions are caused by deforestation and logging. This makes deforestation the third largest contributor to emissions after the energy and agricultural sectors.² Protecting native forests is a simple way to prevent emissions.

Native forests are especially good at absorbing carbon dioxide from the atmosphere. By allowing forests to remain intact and allowing degraded forests to regrow, a significant amount of carbon can be drawn down from the atmosphere and stored long-term. If forest protection and restoration happened at a global scale, it would contribute one-third of the total climate change mitigation that we need by 2030.²



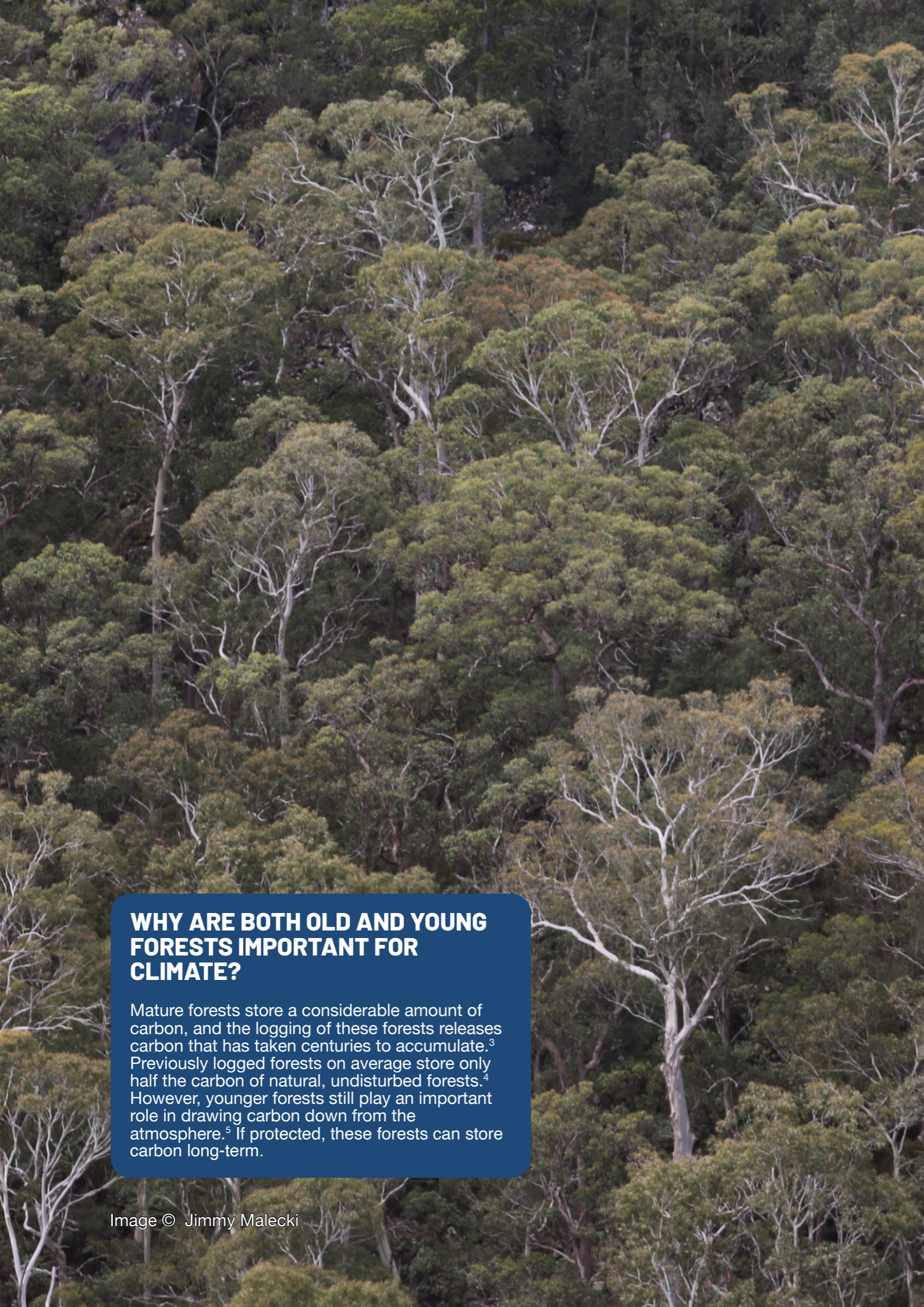
✓ FORESTS STORE CARBON
Forests store carbon in living trees, dead wood, leaf litter and in the soil.

✓ FORESTS ABSORB CARBON
Forests draw down carbon dioxide from the atmosphere.

✗ FORESTS ARE A SOURCE OF CARBON
Logging forests releases stored carbon back into the atmosphere.



Image © Dailan Pugh



WHAT HAPPENS TO THE CARBON WHEN FORESTS ARE LOGGED?

When a forest is logged in New South Wales only 4-8% of the carbon gets stored in long-term timber products.

Many people incorrectly assume that when a native forest is logged, most of the carbon gets stored in timber products. This is not the case.

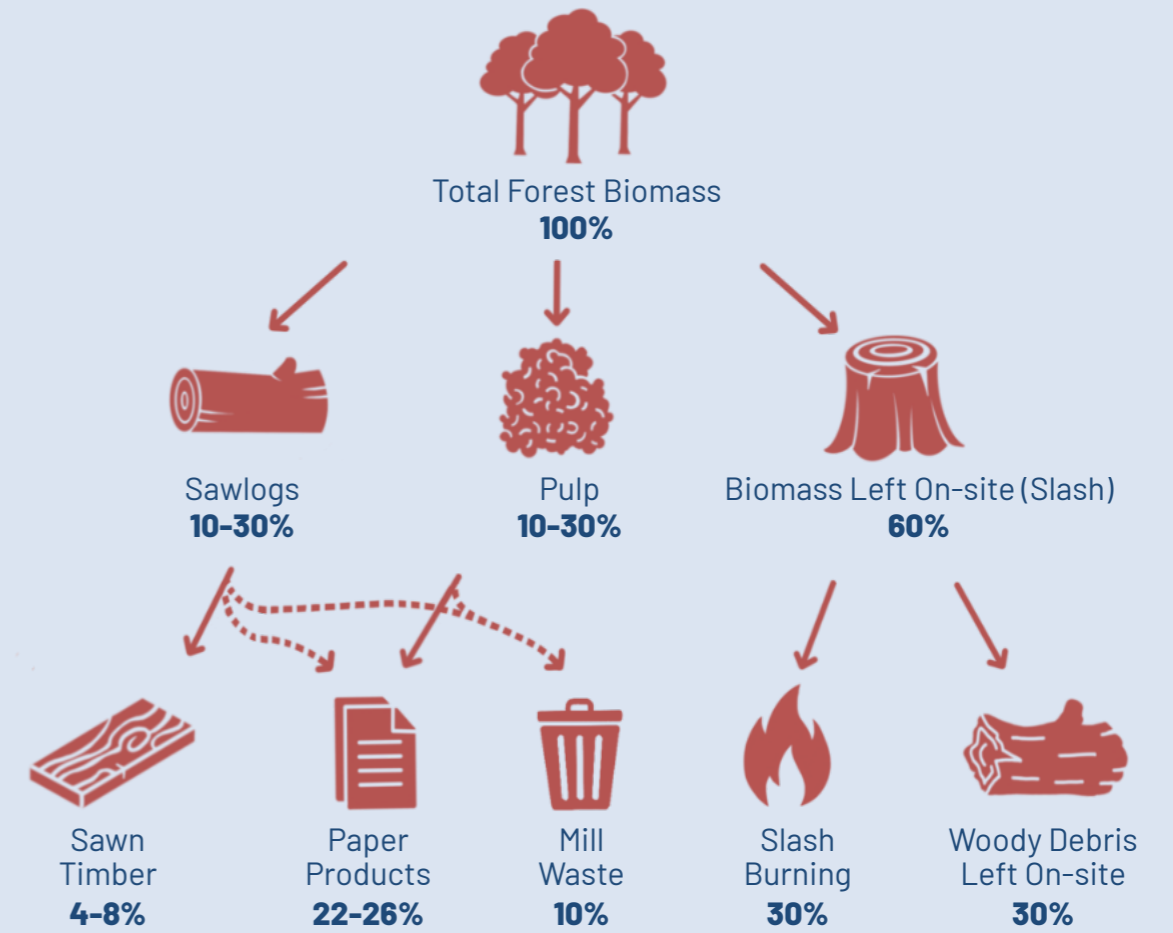
A forest is made up of biomass which includes all the trunks, branches, leaves and roots. This is where the carbon is stored. When a forest is logged, 60% of the above-ground biomass gets left on-site.⁴ This waste is either burned or left to rot, releasing carbon into the atmosphere.

Only 4-8% of the forest's biomass gets turned into sawn timber which is used for building houses and furniture (4% from forests from southern NSW and 8% in northern NSW). The rest goes into short-lived products such as paper and cardboard.

WHY ARE BOTH OLD AND YOUNG FORESTS IMPORTANT FOR CLIMATE?

Mature forests store a considerable amount of carbon, and the logging of these forests releases carbon that has taken centuries to accumulate.³ Previously logged forests on average store only half the carbon of natural, undisturbed forests.⁴ However, younger forests still play an important role in drawing carbon down from the atmosphere.⁵ If protected, these forests can store carbon long-term.

WHERE DOES THE CARBON GO WHEN A FOREST IS LOGGED?*



The reality of native forest logging in New South Wales is that most of the forest ends up as woodchips and waste. Native forests mainly get turned into temporary, disposable products like paper and cardboard.

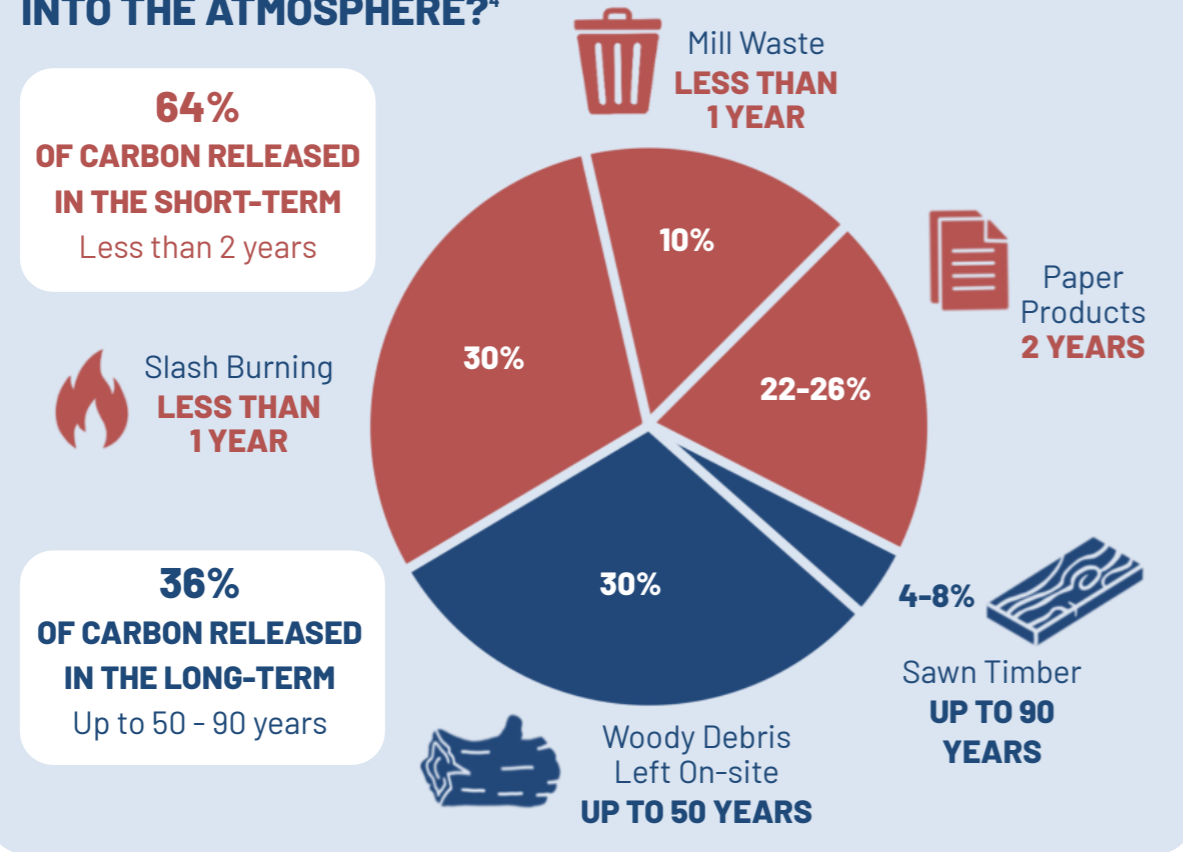
NOT ALL CARBON IS RELEASED IMMEDIATELY

Two-thirds of the forest's carbon is released within a few years, while the remainder can take up to 50 years to be emitted.

When a native forest is logged, two-thirds of the carbon is released within two years.⁴ This is because most wood removed from the forest is woodchipped and turned into short-lived products like paper and cardboard. The burning of waste left on-site and mill waste also releases greenhouse gases immediately.

Sawn timber has the longest lifespan of up to 90 years, however this only makes up 4-8% of the forest's carbon.⁶ Most of the long-term stored carbon of a forest is in the woody debris which is left on site as waste after logging – this can take up to 50 years to break down.

HOW LONG DOES IT TAKE FOR CARBON TO BE RELEASED INTO THE ATMOSPHERE?*



WHY DO THESE DIFFERENT TIMESCALES MATTER?

Around 64% of emissions from forestry are considered short-term, that is, they are released within two years. The remaining 36% is considered long-term and are mainly from rotting wood left on-site that can take decades to decompose.

If we were to stop native forest logging today, we would be able to stop the short-term emissions immediately. This would reduce emissions by two-thirds. However, we would still be experiencing long term emissions caused by previous decades of logging.



Image © Jimmy Malecki

HOW ARE EMISSIONS FROM FORESTRY REPORTED?

Forestry emissions are reported in a category called Land Use, Land Use Change and Forestry (LULUCF), which has been set by the United Nations Framework Convention on Climate Change. This includes all the emissions and carbon removals that occur on land.

Emissions from native forest logging and the carbon dioxide drawn down by forests are both included in this category and are reported as a net figure. This net figure makes it impossible to tell how many greenhouse gas emissions are coming from logging and how much carbon dioxide all of the forests are drawing down from the atmosphere.

We need more detailed reporting that separates logging emissions from the carbon removed by forests, so policy makers can make better decisions when it comes to managing our forests.⁷

NATIVE FOREST LOGGING IN NSW RELEASES A HIGH AMOUNT OF EMISSIONS

Native forest logging in New South Wales emits approximately 3.6 million tonnes of carbon (CO₂e) each year.

Research conducted for this report estimates that the logging of New South Wales' native forests emits 3.6 million tonnes of carbon (CO₂e) per year (averaged over five years).*

The amount of logging has varied significantly over the last five years. Due to fires and floods in 2020 and 2021, the amount of forest that was logged was significantly lower than previous years.

This has meant that emissions over recent years have varied dramatically. For instance, emissions in 2018 were 4.2 million tonnes of carbon (CO₂e), while they were only 2.8 million tonnes of carbon (CO₂e) in 2021. The total amount of logging in state forests has risen by 175% from 2021 to 2022, and could potentially rise further in the future.⁸

Each year, forests containing 2.2 million tonnes of carbon (CO₂e) are logged in New South Wales.* Two-thirds of this carbon will be emitted within two years. However, New South Wales is still experiencing long-term emissions from decaying waste from the past few decades when the rate of logging was twice as high. This increases the estimates of current emissions. Furthermore, additional greenhouse gas emissions are caused from the burning of waste, which produces methane and nitrous oxide emissions.⁹

The 3.6 million tonnes of carbon (CO₂e) emitted by native forest logging in New South Wales is equivalent to the emissions of 840,000 medium sized cars, or is four and a half times the emissions of the New South Wales domestic aviation sector.

Ending native forest logging would significantly reduce New South Wales' greenhouse gas emissions.

THE 3 MILLION TONNES OF CARBON EMITTED BY FORESTRY IS EQUIVALENT TO:



The annual emissions of 840,000 cars



Four and a half times the New South Wales domestic aviation industry



The annual emissions of 265,000 Australian homes



390,000 return flights to London

WHAT ABOUT SOIL CARBON?

Soil carbon is carbon that is stored underground as organic matter. It can make up to 27% of the overall carbon in a forest.¹⁰ Logging forests gradually releases a substantial proportion of the soil carbon.

When a forest is logged, soil carbon can take longer to be released into the atmosphere than the above ground carbon. More research is needed on this topic, and due to lack of data we have not added this to our calculations. However, it still makes up a significant part of the emissions of native forest logging.

*See appendix for methodology on how these figures were calculated

NATIVE FOREST LOGGING IS NOT CARBON NEUTRAL

Forests are regrown after logging, however it can take centuries to re-capture the emitted carbon.

After native forests are logged, the sites are often burned by high intensity fires, eucalypt seedlings germinate and a forest slowly starts to re-grow. However, it would take centuries for the original amount of stored carbon to be absorbed by the re-growing forest.

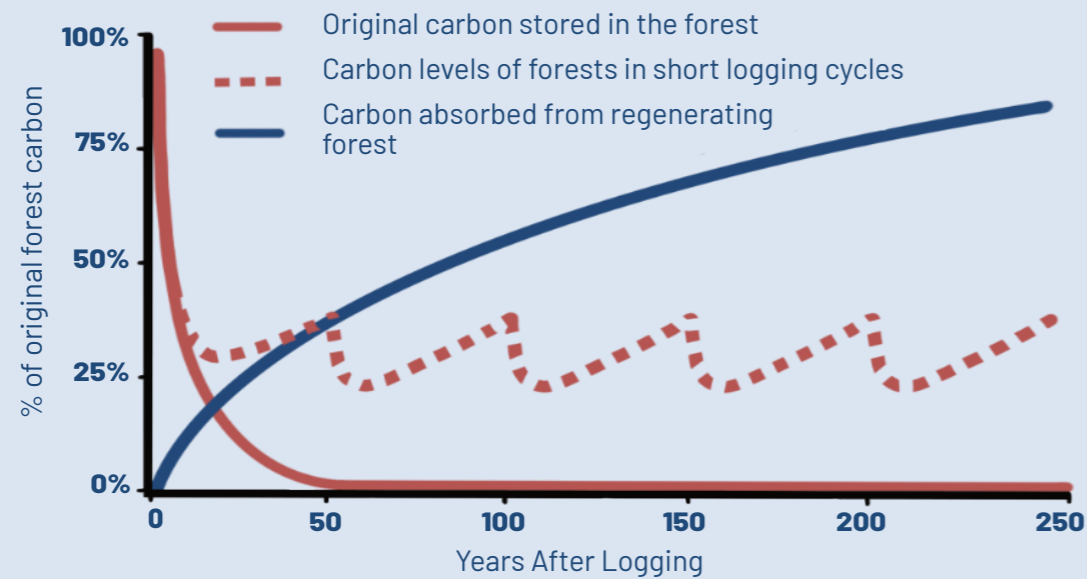
What matters most are the short-term emissions from native forest logging. Around 64% of the forest's carbon is released within a few years. At current logging rates, this is around 1.8 million tonnes of carbon (CO₂e) per year. Over these few years, when the short-term emissions have been released, the regrowing forests have not been able to draw down much carbon. This creates a huge carbon deficit.¹¹

Furthermore, once logged, forests are often put into logging cycles of 40-80 years and the original amount of carbon is never recovered. These forests will only ever store a fraction of their potential carbon if they are continually logged.⁴

Native forest logging is not carbon neutral. The best use for our native forests is to protect them and to allow young forests to keep growing. This will allow significant amounts of carbon to be drawn down from the atmosphere which can be stored long term if forests are protected.

We cannot wait centuries for regrowing forests to re-capture carbon lost during logging. We need to stop emissions now. We can prevent significant emissions by protecting our native forests.

HOW DOES LOGGING AFFECT THE AMOUNT OF CARBON STORED IN A FOREST OVER TIME?⁶



Once a forest is logged, it can take decades to centuries for the carbon to be re-captured. We cannot wait that long - we need short-term solutions to the climate crisis.



Image © Jimmy Malecki



FORESTS: THE BEST CARBON CAPTURE TECHNOLOGY

The impacts of climate change are increasing, and the world is searching for ways to draw carbon dioxide down from the atmosphere. While carbon capture technologies exist, they use huge amounts of energy and there is no secure way to store the carbon. Trees are currently the most efficient and cheapest form of carbon capture.

Forests are the best solution to the problem: they draw significant quantities of carbon from the atmosphere and store it long-term.

Protecting our forests is a cost-effective and practical solution to absorbing the large amount of carbon that we need to mitigate climate change.

Image © Jimmy Malecki

CARBON POTENTIAL OF NSW FORESTS

New South Wales' forests store lots of carbon. If protected, they can make a real impact on climate change.

New South Wales has a vast forest estate. If protected, these forests could help fight climate change by storing significant amounts of carbon that would otherwise be released if they were logged.

Over the long-term, we could prevent around 76 million tonnes of carbon (CO₂e) from entering the atmosphere by 2050 if we protected New South Wales native forests instead of logging them. What's more, if protected, native forests have the potential of drawing down significant amounts of carbon from the atmosphere and storing it long term.

Protecting New South Wales' forests is a low-cost, effective and immediate way to reduce emissions and draw carbon down from the atmosphere.

IF NSW FORESTS WERE PROTECTED, 76 MILLION TONNES OF CARBON COULD BE PREVENTED FROM ENTERING THE ATMOSPHERE BY 2050. WHAT'S THAT EQUIVALENT TO?



Taking every single car off the road in Australia for an entire year



Converting 240,000 Australian homes to solar



Shutting down Australia's dirtiest power plant, eight years early



Shutting down an average Hunter Valley mine four and a half years early

PROTECTING FORESTS HELPS AUSTRALIA MEET ITS NET ZERO TARGET

If native forests were protected in New South Wales, our forests could provide carbon sequestration services equivalent to \$2.7 billion from now until 2050 (assuming a carbon price of \$35 a tonne).

The Emissions Reduction Fund received criticism in early 2022 when it was revealed that the scheme had failed to reduce greenhouse gas emissions. This is because 80% of the carbon credits approved under the scheme do not represent real or new cuts in greenhouse gas emissions.¹²

If native forests were protected in New South Wales, we would see real cuts to emissions and a considerable amount of carbon could be drawn down from the atmosphere and stored long-term. This would be a significant step in helping Australia meet its emissions reduction commitments. In comparison to the Emissions Reduction Fund, protecting New South Wales' forests is a cost-effective alternative which would mean real cuts to emissions.

\$2.7 BILLION

Protecting New South Wales' native forests could provide carbon mitigation services that are worth \$2.7 billion to the community.

PLANTATIONS CAN MEET OUR TIMBER NEEDS

Plantations are a more climate friendly choice than native forest logging.

Plantations are a logical solution to native forest logging. Not only do plantations produce 14 times more usable wood per hectare than native forests,¹³ they also produce less emissions when logged. The harvesting of plantations produces 60% less carbon dioxide emissions than the logging of native forests.¹⁴ This is due to the large amount of waste biomass that is discarded on-site when a native forest is logged.

Close to 90% of Australia's wood now comes from plantations and with the proper investment plantations could meet all of Australia's wood needs.¹⁵ It is therefore possible to quickly transition out of native forest logging.

PLANTATIONS ARE A CLIMATE FRIENDLY ALTERNATIVE TO NATIVE FOREST LOGGING:



NATIVE FOREST TIMBER IS NOT A CLIMATE-FRIENDLY SOLUTION FOR CONSTRUCTION

The majority of wood from native forests goes into woodchips, with very little going into sawn timber used for housing.⁴ Native forest logging is not essential for the construction industry. Proper investment into plantations can provide climate friendly wood products.

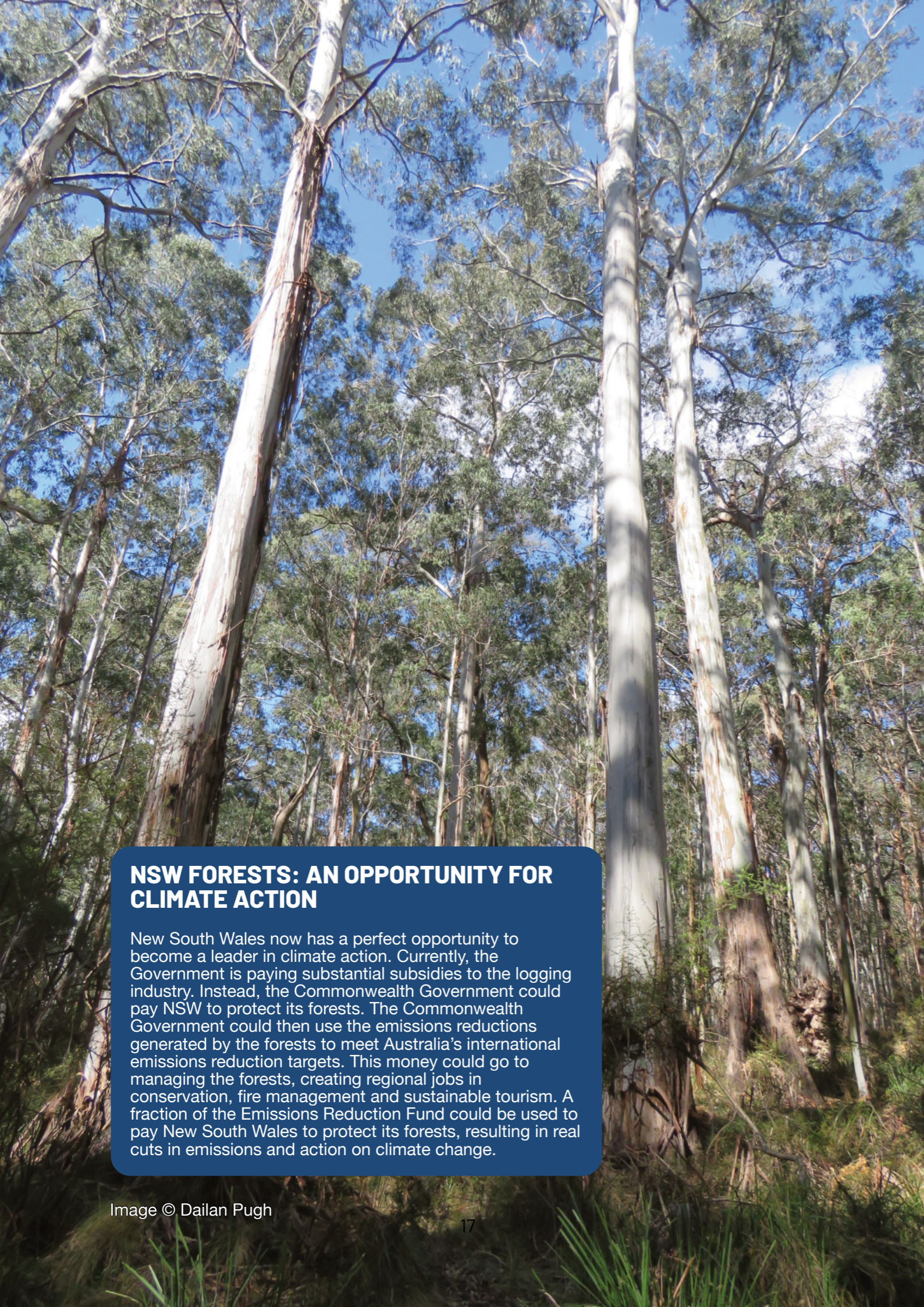
The construction industry has a huge climate impact, responsible for 36% of Australia's annual emissions.¹⁶ The production of concrete and steel requires huge amounts of energy. However, the alternative of using wood products from native forests is not a climate-friendly solution.

Research from Australia has shown mid-rise buildings made from concrete generate just 9% more greenhouse gas emissions than buildings made from plantation softwood.¹⁷ Considering that emissions from native forest logging are close to three times that of softwood plantations, using timber from native forests is not a good climate-friendly solution.

PLANTATIONS COULD PROVIDE ENOUGH HARDWOOD TIMBER

Around 85% of eucalypt plantations are used for paper and cardboard and are harvested on short 10 to 20-year rotations. If these plantations were grown for 25 years or longer and managed appropriately, they could produce sawn timber suitable for building. Allowing eucalypt plantations to grow longer would not only allow them to absorb more carbon, but would yield a more valuable product that would store carbon long-term.¹⁸





PROTECTING NATIVE FORESTS IS CLIMATE ACTION

We cannot wait for decades or centuries for forests to regrow after logging to reabsorb lost carbon. We need to make immediate cuts to emissions now.

Climate change is upon us and we must do everything that we can to reduce our emissions. In New South Wales, native forest logging is a high-emitting industry, with emissions of 3.6 million tonnes of carbon (CO₂e) per year. Ending native forest logging immediately would prevent short-term emissions of 1.8 million tonnes of carbon (CO₂e) per year. It will also prevent long-term emissions in decades to come.

If we end native forest logging now, we could prevent 78 tonnes of carbon (CO₂e) from entering the atmosphere between now and 2050. This is worth \$2.7 billion in carbon sequestration services to the community. What's more, by protecting our forests, we can allow regrowing forests to draw significant amount of carbon down from the atmosphere and store it long-term.

The reality of native forest logging in New South Wales is that most of the forest ends up as woodchips and waste. A better use of our forests is to protect and value them for the climate mitigation services they provide. Protecting native forests is also important for many other reasons, including biodiversity and our own well-being. Forests also hold spiritual significance and are fundamental to the living culture of First Nations peoples.

We have an easy opportunity to make a difference to New South Wales' emissions. Let's not miss out on our chance to make a real contribution to addressing the most pressing issue of this century. By ending native forest logging immediately, New South Wales can make a significant contribution to taking strong action on climate change.

NSW FORESTS: AN OPPORTUNITY FOR CLIMATE ACTION

New South Wales now has a perfect opportunity to become a leader in climate action. Currently, the Government is paying substantial subsidies to the logging industry. Instead, the Commonwealth Government could pay NSW to protect its forests. The Commonwealth Government could then use the emissions reductions generated by the forests to meet Australia's international emissions reduction targets. This money could go to managing the forests, creating regional jobs in conservation, fire management and sustainable tourism. A fraction of the Emissions Reduction Fund could be used to pay New South Wales to protect its forests, resulting in real cuts in emissions and action on climate change.

BY PROTECTING NATIVE FORESTS, WE CAN:



Immediately stop
**1.8 MILLION
TONNES OF CO₂**
Emissions each year



Prevent
**76 MILLION
TONNES OF CO₂**
By 2050

**\$2.7
BILLION**

Provide
**\$2.7B IN CARBON
MITIGATION**
By 2050

We need to take immediate action on climate change. Not only do we need to reduce emissions but we need to draw down carbon from the atmosphere. Protecting forests is a low-cost, effective and immediate way to achieve both emissions reduction and to absorb carbon from the atmosphere.

ENDING NATIVE FOREST LOGGING IS REAL ACTION ON CLIMATE CHANGE.

APPENDIX:

Methodology For Calculating Annual Emissions From Native Forest Logging

Calculations for emissions from native forest logging in New South Wales: 3,603,876 tonnes of CO₂e per year (averaged over the last 5 years; 2019-2022)

Estimated emissions from native forest logging over the last five years: 2018: 4.27Mt CO₂e; 2019: 4.19Mt CO₂e; 2020: 3.38Mt CO₂e; 2021: 2.80Mt CO₂e and 2022: 3.37Mt CO₂e.

Emissions from native forest logging in New South Wales were estimated using reported wood volume removed from native forests. This method was selected as wood volume is used by the Australian Department of Industry, Science, Energy and Resources in the compilation of the National Inventory Report 2019.²² The methods used to calculate emissions from native forests are aligned with the 2006 Guidelines for National Greenhouse Inventories and subsequent amendments.

The volume of native forest timber logged each year in New South Wales from 1970 to 2022 was recorded from Forestry Corporation of NSW reports,⁸ ABARES,¹⁹ State of the Forest Reports²⁰ and the Forest and Timber Inquiry Report 1991²¹. The volume of all logs (saw log, peeler log, pulp etc.) was recorded then converted to dry weight using 620-710kg/m³ density.^{22,23}

For each year from 1970 to 2022, the amount of carbon in the total above ground ecosystem biomass was calculated by halving the total tonnes of dry weight of timber products to represent the amount of carbon. Since the amount of wood removed from the forest represents on average 40% of the total above ground ecosystem biomass,⁴ the value was multiplied by 2.5 to account for the remaining 60% biomass left on-site after logging.

When a forest is logged, not all the carbon from the forest is emitted straight away. Different wood products and types of waste have different lifespans which impact how quickly carbon is emitted. Annual emissions for 2018-2022 were calculated by adding short-term emissions and long-term emissions.

Short-term emissions were 64% of the total forest carbon of logged forests over the two previous years. This includes additional emissions from methane and nitrous oxides when 40% of biomass (slash and mill waste) which is burned. A value of 2,560kg CO₂e per tonne of dry weight biomass was assumed to account for additional biomass.^{9,24}

Long-term emissions include unburnt biomass left on-site (30%) and sawn timber (4-8% depending if timber is from northern or southern NSW). Emissions from these sources were calculated by assuming that the biomass left on-site has a linear decomposition rate which was calculated over the last 50 years. The 4-8% of carbon from sawn-timber was estimated to have a lifespan of 90 years. Long-term storage in landfill is considered to be less than 3% and therefore has not been included in this analysis⁴.

Soil carbon has not been considered, and often contributes a significant part of a forest's carbon. It has not been considered in this report as there is insufficient data to accurately account for soil carbon. Therefore the value of 3.7 million tonnes CO₂e is considered an underestimate.

These calculations are for the emissions from native forest logging of the above ground biomass, and do not account for the carbon that may be absorbed as the forest regrows. This carbon can take decades or centuries to be recovered.

The annual emissions from native forest logging given in this report are an estimate. Some assumptions have been made given the lack of data, or data not being available. For instance, additional emissions from biomass burning have been estimated from overseas studies and wood-fire heating.

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