

I have attaching these documents as promised. These documents are as follows:

1. My reports to the Scientific Advisory Panel for modernizing RFAs in Victoria – these documents contain a lot of information about how plantations can be better used to promote employment in Victoria as well as opportunities in the carbon market
2. A report that was prepared by a private company on the carbon and employment opportunities that was sent to me around carbon in a national park
3. A paper (in the journal Nature Ecology and Evolution) and an associated Fact Sheet about the relative values of water and carbon and tourism to the regional economy in Victoria compared with the low value for native forest timber

Appendices

A NATURAL ASSET AS AN
ECONOMIC POWERHOUSE
FOR VICTORIA

CARBON
DISCUSSION
PAPER

A. PLANTATION SUPPLY

A transition to a plantation-only industry will result in a move toward managing natural assets for the best and highest value. That is, plantations for timber production, and native forests for water, carbon and tourism. The Victorian government has committed \$110 million to new plantations in Gippsland, there is an option to use some of this fund to facilitate the short term supply from alternative plantation feedstock to support a transition for (Nippon) Australian Paper.

A transition to a plantation-only industry is especially important for providing long-term resource security for the forest industry. Wood supply from native forests is highly uncertain and has limited social licence to be continue to be produced.

Plantations can produce up to 14 times the wood volume per ha relative to native forests (Department of Agriculture 2016). The large volumes of eucalypt plantation pulpwood could substitute for the native forest pulp-wood that clearly dominates the wood derived from the native forest sector (Poyry Management Consulting 2011). Accounts produced by the Australian Bureau of Statistics on native and plantation timber resources for the whole of Australia, reported a net value of \$11.6 billion in 2016–17. Of this, \$9.9 billion was for plantation timber and \$1.7 billion was native timber.

The economic value of the plantation sector in the Central Highlands is already 3 times that of the value of the native forest sector (Keith et al. 2017b, a) New Zealand has become Australia's largest source of sawn timber imports. Specific rainforest species imports into Victoria, such as Merbau, along with Meranti (commonly used in window frames), have declined significantly over the past 20 years.

B. PLANTATIONS AND JOBS

VicForests notes that there are now only 350 direct jobs (including 100 VicForest jobs) in the native forest industry. The plantation sector already dominates the forest industry in Victoria, in terms of volumes of sawn timber, eucalypt pulplogs, employment, and economic value and returns (Schirmer et al. 2018). There are 12 600 jobs in the plantation sector (Schirmer et al. 2018).

There are more jobs generated in plantations than native logging;

- 1.51 workers are employed per 100 hectares of softwood plantation (Schirmer et al. 2013)

- 0.51 workers are employed per 100 hectares of native forest management for commercial timber harvest. (Schirmer et al. 2013)

There are more jobs associated with sawlog production than there are in pulp log utilisation by a ratio of 3 to 1 per cubic metre of sawlog produced (Schirmer et al. 2013).

3.9 m tonnes of hardwood eucalypt pulp logs produced in Victoria – but 2.9 m shipped out of state (ABARES 2018).

A Schirmer et al. 2018 industry report states that this export leads to a major loss of processing job.

Australian Paper's preferred feedstock is plantation wood, it's younger, cleaner and requires less energy to process.

A transition to 100% FSC certified plantation feedstock for the Maryvale mills would require around 600,000 m³ of native forest pulplogs to be replaced by hardwood plantation pulplogs to maintain current production capacity;

The expansion of the Victorian hardwood plantation estate has resulted in significant growth in hardwood pulplog production, increasing from 76,500m³ in 2001 to 3.9 million m³ in 2017 (ABARES, 2018). Most of this is exported as low value unprocessed product;

Given the rapid expansion of Victoria's hardwood plantation estate, this transition has been deemed technically feasible for nearly a decade (Poyry, 2011);

Much of the replacement hardwood plantation pulplog supply would be sourced from the Green Triangle region, where a comparatively small fraction of the pulplogs destined for export markets could be redirected to the Maryvale mills for domestic processing;

Potential options for redirection of feedstock may reside with the Nippon Paper Group itself, where it already imports woodchips sourced from hardwood plantations across Victoria and more widely across Australia. In 2016, the Nippon Paper Group imported 581,280 tonnes of woodchips from Australia, much of it sourced from plantations;

As the majority of hardwood plantation tree species to replace the native forest input to the Maryvale Mills would consist of Tasmanian Bluegum, there are increased processing benefits for a transition to hardwood plantations;

Tasmanian Bluegum has a higher basic density (kg dry fibre/m³) compared with the native forest Ash species, which gives the pulplogs more 'dry tonnes' of weight (kg) per cubic metre of wood (Poyry, 2011);

The previous owner of Maryvale Mill - in 2008, PaperlinX Ltd - publicly announced that it would phase out its procurement of native forest pulp logs by 2017. This transition never happened.

C. CARBON

Plantations can produce large amounts of timber from a relatively small area, with that timber generating less Greenhouse Gas emissions than timber cut from logging native forests. This has the additional benefit of conserving native forests for other key values such as long-term carbon storage and long-term water production (Keith et al. 2014b, Taylor et al. 2019). Indeed, with rapid changes in climate, the importance of secure long-term stores of carbon in native forests will likely increase significantly and hence sourcing wood products from plantations will be increasingly important (Keith et al. 2014b).

Global analyses indicates that native forests are six times better than agroforestry and 40 times better than plantations at storing carbon (Lewis et al. 2019).

There are important opportunities for increased employment in the plantation sector if steps are taken to process more plantation wood within Victoria (Schirmer et al. 2018).

In-State processing meets with the aims of value-adding in the plantation sector.

The large volumes of eucalypt plantation pulpwood could substitute for the native forest pulpwood that clearly dominates the wood derived from the native forest sector (Poyry Management Consulting 2011). At a national level, despite plantations providing over 85% of net value of the overall forest industry in Australia, they use only 14% of the area currently managed for forestry in the nation.

Australian Paper has recycled paper and plantation mills – it will take little retooling to repurpose the native forest mills to allow them to take alternative (native forest) feedstock.

D. IMPORTS AND EXPORTS

Australia is a net exporter of forest products by volume, but it suffers a trade deficit imports of around \$2 billion. This is the result of Australia being a net exporter of unprocessed and low value commodities, but a net importer of value added wood products. In some cases, Australian grown wood is exported and processed in other countries and imported back into Australia.

For paper-based products, Australia is also a net exporter by volume, where it exported 8.2 million tonnes more of product than it imported in 2017 (Figure 3), also suffering a trade deficit, exceeding \$1 billion up to 2010. The deficit has narrowed since, decreasing to \$350 million in 2017. On average, Australia suffers from a \$2 billion trade deficit in timber trade.

Sawn timber imports into Australia have declined since 1992, from 1.25 million m³ to 814,312m³ in 2016, a decline of 35%. Of these imports, New Zealand has contributed on average 42%. Imports from Asia have declined by nearly 50%, from 157,844m³ in 1992 to 79,399m³ in 2016. Imports from North America have also declined from 552,932m³ in 1992 to 81,200m³ in 2016. In contrast, imports from Europe have significantly increased, from 9,286m³ in 1992 to 365,669m³ in 2016,

E. WATER

Water security is critical for Melbourne and communities north of the Divide (Viggers et al. 2013).

It has long been recognised that native forest logging has significant negative effects on water yield. This directly affects the security of the water supply for Melbourne (Langford et al. 1982, Vertessy et al. 2001, Viggers et al. 2013).

Removing logging from key catchments will boost water yields for at least 600 000 people (Taylor et al. 2019)
Removing logging from key catchments will reduce the cost burden on ratepayers significantly because of reduced water costs from less reliance on desal water at \$1650 per ML (Vardon et al. 2019)

Removing logging from key catchments reduces GHG emissions because of the many kilotonnes of emissions generated from producing Desalinated water.

Melbourne will have serious water issues by 2030 (Coad et al. 2019).

Significant logging is planned in catchments – especially in the Thomson catchment – and primarily in ash forests that comprise 1/3rd of the catchment but generate 2/3rd of the water (Taylor et al. 2018).

F. FIRE

Logging makes native forests more prone to high-severity, crown-scorching fires (Taylor et al. 2014) (Zylstra 2018).

Ongoing native forest logging in native forests will increase the fire proneness of forests, thereby adding significantly to the fire burden in these areas (and for adjacent human communities) for many decades to come (Taylor et al. 2014, Zylstra 2018). Fire has only limited short-term effects on carbon stocks (Keith et al. 2014a).

There are significant regional employment opportunities in seasonal summer fire-fighting crews and a targeted first strike team.

An opportunity to re-purpose existing capital equipment used for logging as part of fire-fighting efforts.

Recent work has modelled relationships between climate change-driven increases in fire frequency and rotation times in wood production ash-type forests. The results of the modelling suggest a low likelihood of trees being able to reach an age where they can produce sawlogs (Cary et al., unpublished data). This is due to a contraction in fire return intervals (Cary et al., unpublished data). Plantation tree crops, harvested with shorter rotation lengths, have greater likelihood of successfully meeting timber demands than native forests.

G. NATIVE FOREST ACTIVITY

Industry players and estimated contract volumes

Of the 1,639 jobs generated by the native forest industry (up to and including primary processing), the majority – between 1,060 and 1,170 – rely on logs harvest from native forests located in the Central Highlands Regional Forest Agreement (RFA) region. (Forest Wood Products Australia 2018).

There are approximately 8 mills dependent on the Ash and Mixed Species (MS) for wood - Nippon Paper - Australian Paper - Maryvale Mill - MS 260,000 m³ pa Ash. 145,000 m³ pa and a 3rd contract that we are not aware of.

Dormit (e-grade Ash) - 175,0000 m³ pa
Heyfield B and C grade Ash - 80,0000 m³ pa
Noojee/ Drouin West - B,C,D -10,000 m³ pa Ash and 10,000 m³ pa MS
Ryan and McNulty B,C,D - 38,0000 m³ Ash pa and (MS?)
Fennings Bairnsdale 30,000 m³ pa Ash
Poweltown - B,C,D - 20,000 m³ pa Ash
Gladysdale - 4,000 m³ pa Ash

Harvest crews

Native forest harvesting crews can readily be transitioned to fire, roading and land management due to their specific skills in performing these tasks in native forests. There are 10 - 26 contractors, some of these are both harvest and haul contracts - fulfilling both contracting and haulage. DELWP have agreed to absorb these jobs.

Haulage - drivers

There are six independent haulers (truck drivers) fully reliant on native forest logging. Most drivers are over 60 years old. Given the shortage of truck drivers nationally, these jobs can readily be transitioned to haul plantation timber, for example from the Otways, or hauling other freight. The forest tourism plan will also require heavy vehicle operators.

The native forest harvesting sector: (a) is largely producing low value product, (b) suffering from low levels of investment, (c) characterized by shrinking levels of employment, (d) subject to high levels of resource conflict (e.g. between water and wood), and (e) characterized low levels of community support.

There is only limited social licence to continue widespread native forest logging (Schirmer et al. 2018). Recent surveys by the Victorian Government indicate a strong desire on the part of the general public to protect native forests from timber harvesting (DELWP 2019).

There are rapidly declining sawlog resources in native forests. This is a result of past overcutting due to efforts to maximise sustained yields, with levels being set at unsustainably high levels due to Woodstock and Stanley resource modelling failing to account for the effects of disturbances (such as recurrent wildfires) in sustained yield calculations (Lindenmayer 2017).

The native forest sector is overwhelmingly dominated by the production of pulpwood and wood-chips. More than 87% of the native forest harvested in Victoria is used for woodchips, pulp and paper.

The Victorian Government should embrace a policy of best and highest value for natural assets.

Environmental and economic accounting work has shown that the best and highest value for plantations is timber production. Plantations can produce up to 14 times the wood volume per ha relative to native forests (Department of Agriculture 2016). The best and highest value for Victoria's native forests for is water production, tourism, and carbon (Keith et al. 2017b, a).

There are high levels of resource conflict between water production and logging in water catchments and these conflicts will only be further magnified under climate change (Taylor et al. 2019).

Conservation advice from the Australian Government's Threatened Species Scientific Committee recommended the cessation of logging of montane ash forests to increase the chance of persistence of Leadbeater's Possum. The Mountain Ash forest ecosystem is the most widespread and is currently subject to extensive clearfell logging. This ecosystem is classified as Critically Endangered under the IUCN Red Listed Ecosystems criteria, and further logging may lead to ecosystem collapse (Burns et al. 2015).

Recent work based on species distribution models for 70 threatened forest-dependent species in Victoria suggests that the current reserve network does not meet Comprehensive Adequate and Representative (CAR) criteria (Taylor and Lindenmayer 2019). The CAR reserve system therefore needs to be expanded, particularly to meet the Adequacy criterion (Taylor and Lindenmayer 2019). This underscores the need to meet timber demands from plantations.

H. TRADITIONAL OWNERS IN THE REGION

Traditional owners are part of the economy and have had their traditional country handed over for logging without consent. An initial overview of Country designated under the Registered Aboriginal Parties arrangement, the VicForests allocation takes in 622,783 ha of Gunaikurnai Country, 255,330 ha of Taungurung Country, 40,675 ha of Wurundjeri Country and 895,774 ha of Country not assigned to a Registered Aboriginal Party.

The VicForests allocation comprises 25% of Gunaikurnai Country, 18% of Taungurung Country and 7% of Wurundjeri Country.

Treaty may provide an opportunity to negotiate important carbon trade opportunities.

I. METHODS FOR DEVELOPING A GREAT FOREST (CARBON) PARK

Option 1: **Standard state reserve creation**

Victorian Government creates the Great Forest National Park in stages over parts of the Central Highlands Forest Management Area (FMA). The Victorian Government funds the necessary transitional arrangements for the native forest industry, including in relation to the Heyfield and Maryvale mills. Funding from the Australian Government and private parties is confined to discrete aspects of the initiative (e.g. for particular park infrastructure or job training programs).

Positives:

simplicity and familiarity.

Negatives:

Victorian Government bares the financial and political costs of the Initiative.

Option 2:

Emissions Reduction Fund (ERF)

The Australian Government develops an improved forest management method under the ERF. The Victorian Government develops a project under the method involving the cessation of native forest harvesting in all or parts of the Central Highlands FMA. The Victorian Government enters into a minimum 10 year ERF contract with the Australian Government for the supply of Australian carbon credit units (ACCUs).

The cessation of harvesting could be conducted in stages to allow a managed transition for the industry. The creation of the project is likely to require compliance with the procedures prescribed in Part 5 of the Climate Change Act 2010 (Vic).

The Victorian Government finances the upfront costs of the initiative (e.g. log contract buyouts and worker retraining) from consolidated revenue or debt.

The revenues from the ERF project (i.e. from the sale of the ACCUs) are used to recover these costs and repay any debts, with any profit going to the Victorian Government.

After the ERF project has commenced, the Victorian Government declares the Great Forest National Park over those parts of the project area where harvesting has ceased.

The Victorian Government remains the owner and manager of the project area, meaning it also has ongoing ERF responsibilities, including to report on project compliance for the duration of the crediting period (minimum of 25 years) and maintain the carbon stocks for 100 years (known as the 'permanence obligation').

The design and implementation of the ERF project could be contracted to a third party provider, who would receive a fixed fee or a proportion of the revenues from the sale of the ACCUs.

Positives:

Australian Government bares some or all of the financial costs and some of the political costs associated with the initiative, Victorian Government potentially earns a profit from the ERF project, the climate benefits of the initiative are robustly and transparently accounted for, and structure of the ERF project would be relatively uncomplicated.

Negatives:

Victorian Government bares a significant proportion of the political costs of the Initiative, Victorian Government bares the upfront fiscal costs, difficulty in getting the Australian Government to create an improved forest management method, and the risks associated with any improved forest management project (e.g. uncertainty about ACCU prices and sources of demand after the 10 year ERF contract expires).

Option 3:

ERF with private entity

Same as option 2, only a private entity is used to finance the upfront costs of the ERF project and the entity is legally entitled to receive some or all of the ACCUs from the project. This arrangement could be structured so the private entity becomes the owner and manager of the ERF project area. Given the ecological and social significance of the region, and the legal impediments to the transfer of Crown land, the more likely arrangement would involve the private entity becoming the holder of carbon sequestration rights under Carbon Sequestration Agreement(s) entered into under Part 5 of the Climate Change Act 2010 (Vic). Alternatively, the private entity's rights to ACCUs could be purely contractual and potentially bypass the Climate Change Act 2010 (Vic) processes.

Positives:

The main benefits are the reduced fiscal impact of the initiative due to the involvement of the private entity and the capacity to partially privatise some of the political costs. Other than that, the positives are largely the same as option 2, only the scope for the Victorian Government to make a profit from the initiative is reduced.

Negatives:

Same as option 2, except for the fiscal impacts.

Option 4: Commonwealth-Victoria environmental impact bond

The Victorian Government enters into an environmental impact bond with the Australian Government, under which it agrees to deliver specified environmental and social outcomes associated with the management of the native forests of the Central Highlands FMA. The outcomes would include the delivery of climate benefits associated with the reduction or cessation of harvesting in the FMA (e.g. reduced emissions and increased carbon sequestration). They could also include the protection of nationally listed threatened species like the Leadbeater's possum, the expansion of the National Reserve System through the creation of the Great Forest National Park, pest and weed management outcomes, and social outcomes (e.g. worker retraining and transitioning workers out of the native forest industry).

The climate benefits could be accounted for via the ERF (i.e. under an ERF improved forest management method) or a separate approach (i.e. a bespoke monitoring, reporting and verification process). Appropriate monitoring, reporting and verification processes would need to be created for the other specified environmental and social outcomes.

Positives:

Australian Government bares some or all of the financial costs and some of the political costs associated with the initiative, Victorian Government potentially earns a profit from the initiative, the climate, environmental and social benefits of the initiative are robustly and transparently accounted for, the Australian and Victorian Governments obtain political benefits by being seen to be innovators (i.e. by creating one of the first environmental impact bonds in Australia and the first between governments).

Negatives:

Victorian Government bares a significant proportion of the political costs of the Initiative, Victorian Government bares the upfront fiscal costs, Victorian Government bares the financial risks associated with non-delivery of the specified climate, environmental and social outcomes, difficulty in getting the Australian Government to agree to create a relevant environmental impact bond, difficulty in getting Australian Government to agree to a long-term contract (>10 years), and the technical difficulties in designing appropriate monitoring, reporting and verification processes for the specified outcomes.

Option 5: Commonwealth-private entity environmental impact bond

Same as option 4, only the Australian Government enters into the environmental impact bond with a private entity rather than the Victorian Government. The terms of the environmental impact bond would be similar as in option 4, covering the delivery of specified environmental and social outcomes. The mechanics of the arrangement between the Victorian Government and the private entity would be managed through the Climate Change Act 2010 (Vic) and/or contracts. As with option 3, the private entity would finance the upfront costs associated with the initiative. It would also be responsible for the delivery of the specified outcomes.

An alternative arrangement would involve the private entity and Victorian Government jointly entering into the environmental impact bond with the Australian Government.

This would ensure the state government's direct involvement in the delivery of the outcomes and recognition of its ongoing responsibilities in relation to the management of the forests.

Regardless of whether the Victorian Government is a party to the bond, the defining aspect of this option is that the private entity (or entities) finance the upfront costs of the initiative and carry some or all of the risks associated with the non-delivery of the outcomes.

Positives:

The main benefits are the reduced fiscal impact of the initiative due to the involvement of the private entity and the capacity to partially privatise some of the political costs. Other than that, the positives are largely the same as option 4, only the scope for the Victorian Government to make a profit from the initiative is reduced.

Negatives:

Same as option 4, except for the fiscal impacts.

J. REFERENCES

Burns, E. L., D. B. Lindenmayer, J. Stein, W. Blanchard, L. McBurney, D. Blair, and S. C. Banks. 2015. Ecosystem assessment of mountain ash forest in the Central Highlands of Victoria, south-eastern Australia. *Austral Ecology* 40:386-399.

Coad, L., J. E. Watson, J. Geldman, N. D. Burgess, F. Leverington, M. Hockings, K. Knights, and M. Di Marco. 2019. Widespread shortfalls in protected area resourcing undermine efforts to conserve biodiversity. *Frontiers in Ecology and Environment* 17:259-264.

DELWP. 2019. Future of our Forests. Feedback Report - Phase 1 Engagement, December 2018-March 2019. Victorian Government Department of Environment, Land, Water and Planning, Melbourne. Available at https://www2.delwp.vic.gov.au/__data/assets/pdf_file/0032/426947/FutureOfOurForests_FeedbackReport.pdf.
Department of Agriculture. 2016. Plantations and farm forestry. Department of Agriculture, Canberra.

Keith, H., D. B. Lindenmayer, B. G. Mackey, D. Blair, L. Carter, L. McBurney, S. Okada, and T. Kon-ishi-Nagano. 2014a. Accounting for biomass carbon stock change due to wildfire in temperate forest landscapes in Australia. *PLOS One* 9:e107126.

Keith, H., D. B. Lindenmayer, B. G. Mackey, D. Blair, L. Carter, L. McBurney, S. Okada, and T. Kon-ishi-Nagano. 2014b. Managing temperate forests for carbon storage: impacts of logging versus forest protection on carbon stocks. *Ecosphere* 5(6):Art. 75. [online] <http://dx.doi.org/10.1890/ES1814-00051.00051>.

Keith, H., M. Vardon, J. A. R. Stein, J. L. Stein, and D. B. Lindenmayer. 2017a. Ecosystem accounts define explicit and spatial trade-offs for managing natural resources. *Nature Ecology and Evolution* 1:1683-1692.

Keith, H., M. Vardon, J. A. R. Stein, J. L. Stein, and D. B. Lindenmayer. 2017b. Experimental Ecosystem Accounts for the Central Highlands of Victoria. Final Report. The Australian National University and the Threatened Species Recovery Hub, Canberra, Australia. Available at http://www.nespthreatenedspecies.edu.au/Ecosystem%20Complete%20Report_V5_highest%20quality.pdf.

Langford, K. J., R. J. Moran, and P. J. O'Shaughnessy. 1982. The Coranderrk Experiment - the effects of roading and timber harvesting in mature Mountain Ash forest on streamflow and quality. Pages 92-102 in E. M. O'Loughlin and L. J. Bren, editors. The First National Symposium on Forest Hydrology. Institution of Engineers, Canberra.

Lewis, S. L., C. E. Wheeler, E. T. Mitchard, and A. Koch. 2019. Restoring natural forests is the best way to remove atmospheric carbon. *Nature* 568:25-28.

Lindenmayer, D. B. 2017. Halting natural resource depletion: Engaging with economic and political power. *The Economic and Labour Relations Review* 28:41-56.

Poyry Management Consulting. 2011. VicForests and Australian Paper: Review of Issues Affecting the Transition of Victoria's Hardwood Processing Industry from Native Forests to Plantations. Poyry Management Consulting (Australia) Pty Ltd, Melbourne.

Schirmer, J., M. Mylek, A. Magnusson, B. Yabsley, and J. Morison. 2018. Socio-economic impacts of the forest industry. University of Canberra and Forests and Wood Products Australia, Canberra.

Taylor, C., D. Blair, H. Keith, and D. B. Lindenmayer. 2018. Resource conflict across Melbourne's largest domestic water supply catchment. Fenner School of Environment and Society, The Australian National University, Canberra.

Taylor, C., D. Blair, H. Keith, and D. B. Lindenmayer. 2019. Modelling water yields in response to logging and Representative Climate Futures. *Science of the Total Environment* 688:890-902.

Taylor, C., and D. B. Lindenmayer. 2019. The adequacy of Victoria's protected areas to conserve its forest-dependent fauna. *Austral Ecology* in press.

Taylor, C., M. A. McCarthy, and D. B. Lindenmayer. 2014. Non-linear effects of stand age on fire severity. *Conservation Letters* 7:355-370.

Vardon, M., S. May, H. Keith, and D. B. Lindenmayer. 2019. Accounting and valuing the ecosystem services related to water supply in the Central Highlands of Victoria, Australia. *Ecosystems Services* in press.

Vertessy, R. A., F. G. R. Watson, and S. K. O'Sullivan. 2001. Factors determining relations between stand age and catchment water balance in mountain ash forests. *Forest Ecology and Management* 143:13-26.

Viggers, J., H. Weaver, and D. B. Lindenmayer. 2013. *Melbourne's Water Catchments: Perspectives on a World-Class Water Supply*. CSIRO Publishing, Melbourne.

Zylstra, P. 2018. Flammability dynamics in the Australian Alps. *Austral Ecology* 43:578-591.



Great Forest Park

A NATURAL ASSET AS AN
ECONOMIC POWERHOUSE
FOR VICTORIA

CARBON
DISCUSSION
PAPER



1. THE OPPORTUNITY

**Victoria
has a proud
history of
identifying
& protecting
its natural
& cultural
values...**

Successive governments have led pioneering approaches to reimagining our extraordinary landscapes, resulting in the creation of a world class estate of conservation reserves which are deeply valued and revered by the public. These include the Grampians, Wilson's Promontory, the Alps, and the Otways.

However, in recent years protection of some of the state's most important forests has been left unaddressed. These include the critically endangered Mountain Ash forests of the Central Highlands on Melbourne's doorstep, yet are among the most carbon-dense of forests on earth.

Previously, political and community leadership conceived better futures for our key natural assets and exhibited bold decision making which enabled new management regimes that protected these assets for all time. Such bold and visionary changes have enabled Victoria to grow its economy whilst enhancing our livability. **This legacy must continue.**



The tall wet forests an hour east of Melbourne support rich and diverse animal and plant communities. Endangered wildlife includes the critically endangered Leadbeater's Possum, critically endangered Baw Baw Frog and the vulnerable Greater Glider. These same forests generate almost all of the water for the Greater City of Melbourne and many regional centres north of the Great Dividing Range. Current land management practices in these forests are incompatible with an environmentally sustainable future.

There is an exciting and important opportunity to protect these forests and to create and shape the last major piece of conservation estate in the very heart of Victoria. This opportunity is based on a rapid transition away from logging native forests and a focus on existing and new plantations for the production of sawn timber and pulpwood for paper manufacture. This would give security of wood supply for the forest industry and generate opportunities for significant growth in jobs and income from the sector through the processing of plantation timber.

A transition to plantation timbers would ensure that the best and highest values of native forests – for carbon storage, water production, water security, tourism and biodiversity conservation could be realized. Importantly, there would be significant opportunities for both new revenue streams and also employment and economic renewal in many parts of regional Victoria - including for Traditional Owners of forests.

The proposed transition is a win for the economy and job opportunities, for tackling dangerous climate change, for the plantation forestry sector, for the environment and a win for all Victorians.

**“Significant
growth
in jobs”**



2. EXTRAORDINARY CHALLENGES DUE TO CLIMATE CHANGE

Human-induced climate change is shaping our economies and future prosperity like no other issue in human history. Responses to climate change demand strong leadership and a willingness to abandon old paradigms regarding the factors that provide economic benefit. The view that nature can provide prosperity without regard to the impacts on natural capital is one such example.

Economists and scientists now know and understand that depleting natural capital to support our economy is unwise and an unviable economic model. We are now in a position to price and value our natural assets and manage them in ways to ensure their long term viability whilst providing society with essential goods and services and new employment opportunities.

The impact of climate change is evident in our changing weather patterns and the increasing severity and frequency of wildfire.

The Black Saturday wildfires were the most destructive in Australia's history. Every year, major bushfires are re-burning previously burnt areas.

Ongoing logging without regard to the impacts of bushfires is compounding ecosystem degradation to the point where these unique forest landscapes are being lost.

The Paris Agreement commits countries (including Australia) to take bold action in limiting dangerous climate change by decarbonising our economies and repurposing our natural assets in ways that make meaningful contributions to avoiding emissions.

Protecting forests is critical for sequestering and storing carbon and reducing emissions.



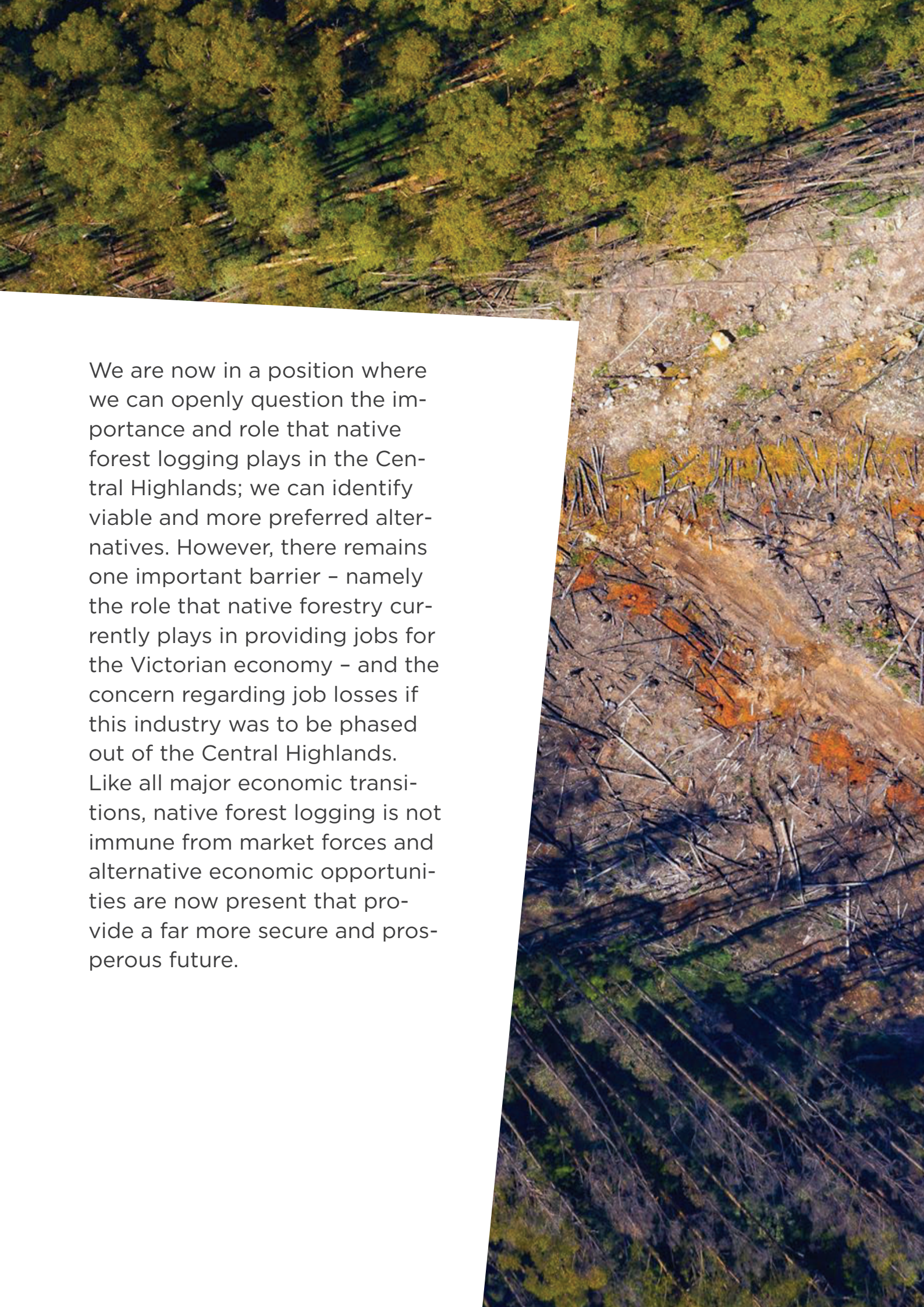
3. FORESTS AT THE CROSSROADS

The tall wet forests of the Central Highlands have been the backbone of the Victorian native logging industry for over a century. In a similar fashion, coal-fired power has provided the base load power that has enabled Victoria to evolve into an economic powerhouse. In the establishment of coal-fired base load power, it was never imagined that that source of energy would in turn significantly contribute to climate change and global warming.

With the benefit of science, the broader community now understands that our future depends upon low emission forms of energy. The role that coal-fired power plays in supporting our future is no longer necessary. Victoria is embracing this alternative energy future and has set ambitious renewable energy targets to drive our economic future and is well placed to realise these energy goals.

Similarly, native forestry has undergone massive transition due to the development of plantation forestry and technologies that underpin the development of wood products.

The bulk of wood products coming from native forests is used for pulp under contracts that could easily be substituted with plantation wood. Retaining and utilising even a small portion of the currently exported 2.9 million tonnes of plantation eucalypt hardwood for domestic pulp processing instead would release the pressure on the native forests estate and generate additional jobs in the timber and paper industries. Over the longer term, the State Government has committed to \$110 million in new funding to grow plantations in Gippsland that will immediately generate new jobs and new wood stocks. The Victorian Government could establish a transition authority with the appointment of a Commissioner for transforming the sector, providing an important public role and an apparatus for adjustments.

An aerial photograph showing a stark contrast between a lush, green forest on the left and a cleared, logged area on the right. The cleared area is covered in dry, brownish ground with scattered tree stumps and branches. The boundary between the two areas is a straight line, likely a logging road or a clear-cut edge. The text is overlaid on the white background of the left side of the image.

We are now in a position where we can openly question the importance and role that native forest logging plays in the Central Highlands; we can identify viable and more preferred alternatives. However, there remains one important barrier – namely the role that native forestry currently plays in providing jobs for the Victorian economy – and the concern regarding job losses if this industry was to be phased out of the Central Highlands. Like all major economic transitions, native forest logging is not immune from market forces and alternative economic opportunities are now present that provide a far more secure and prosperous future.



4. THE EMERGING CARBON ECONOMY

There is now a significant and enduring economic alternative for the Central Highlands of Victoria that resolves the competing land use interests and provides economic prosperity for the communities that depend upon these forests. That is, the role that the forests can play in combating climate change.

Since the 1980s, the global carbon economy has grown dramatically with over 57 carbon pricing initiatives across 46 countries. In 2018, Governments around the world received over US\$44 billion in carbon revenues at an average price of US\$10 per tonne. The growth of carbon pricing has spawned technological innovation and accelerated the transition to a low emissions future. In Australia, the best and most prominent example has been to the National and State Renewable Energy targets created principally to sponsor the shift from high emissions to zero emissions energy sources.

The Federal Government's \$2.55 billion Emission Reduction Fund has enabled the development of a suite of alternative land management practices that conserve and promote the role of native vegetation in sequestering carbon. Such approaches have been adopted across the northern regions of Australia, throughout the dry land agricultural regions and are expanding into coastal areas.

Carbon farming, as it is colloquially termed, is providing farmers with new forms of income which are invaluable in combination with traditional farming revenues and provide a positive incentive to nourish and promote the natural values of farming landscapes.

This commercial activity provides evidence of the role that ecosystem services can play in a modern economy and provide a positive stimulus to landholders in a way previously not possible.

The role that native forests play in combating climate change is universally understood and emphasised in contemporary climate policies. There are numerous examples of where a change in the management of native forest has provided a strong economic future and employment for regional communities. Ironically, the best examples of this transition exist in developing countries in South East Asia, the Pacific and Central and South America.

Australia is yet to embrace the emerging economic role that forest protection can play in combating climate change due solely to administrative and political reasons. Yet, there are well established scientific methods that are accepted by carbon schemes that enable carbon revenues to be realised from forest protection.

Importantly, as part of its National Carbon Accounts, the Australian Government models the emissions arising from native forestry and as such, changing this land use to the value carbon asset can readily contribute to combating climate change. All that is required is political will.





5. VOLUNTARY CARBON MARKETS

In parallel to compliance carbon markets, a global voluntary carbon market has developed.

This services the needs of society and business who source carbon offsets to match their associated emissions footprints – commonly known as carbon neutrality. Voluntary carbon markets have provided a financial stimulus for forest protection with major initiatives underway in the tropical and sub-tropical forests around the globe.

The best known program is REDD (Reduced Emissions from Deforestation and Forest Degradation) and REDD+ and up until recent times, they have been focused on developing countries to create an incentive to protect and sustainably manage forest areas. The most commonly used standard to guide the development of carbon projects is the Voluntary Carbon Standard (VCS) (see www.verra.org).

The VCS provides a range of peer reviewed methodologies by which project developers can create carbon offset projects. In 2017, the Global Voluntary Carbon Market purchased over 42 million tonnes of offsets with the first quarter figures in 2018 trending even higher.

Increasingly, corporations and other organisations across Australia are taking voluntary action to offset their emissions and associated customer footprint. High profile examples include Qantas, NAB, ANZ, QBE, Frasers Property Group, Intrepid, NextDC and many others. This is driving demand for domestic offset credits. At present, the majority of offsets are derived from countries other than Australia due to a lack of supply. It is predicted that domestic demand is set to escalate dramatically. For example, BHP recently announced a US\$400m commitment to invest in new technologies and strategies to substantially reduce its carbon footprint.



6. ECONOMIC VALUE

Re-imagining the Central Highlands in the carbon economy provides superior economic outcomes than the present forestry economy with better financial returns and employment outcomes.

Under a native forest logging regime, only sawlogs realise any financial gain and when the full government management costs are included, logging operations break even at best but with substantial opportunity costs for other forest values.

When protected from being a source of industrial wood production to becoming a standing carbon asset, the full impact of the carbon removal is monetised and valued. The value of the carbon protected is many magnitudes greater than the income from the removal of the sawlog and pulp logs.

A broad estimate of the potential income that carbon forestry could realise in the Central Highlands of Victoria is conservatively calculated at A\$30-60 million per annum based upon a business as usual annual harvesting regime of 2,000ha. This is in stark contrast to the reported statewide \$2.6 million net profit before income tax of VicForests for FY 2018.

This annual income from carbon management can be projected forward for the forecast logging cycle (> 50 years) and provides an enduring, increasing, margin-rich source of income that can fund a diverse array of forest management functions and sponsor new economic activities relating to indigenous engagement, tourism, recreation, local employment, training and risk management. Furthermore, the ecological integrity of the forests can be enhanced through greater investment in pest plant and animal control, enhanced fire management, and good neighbour programs.




7. IMPORTANT JOB CREATION

The exciting opportunity to embrace a landscape scale carbon offset project in the Central Highlands of Victoria will create substantial numbers of new jobs through the following activities:

- Landscape restoration
- Revegetation
- Fire management
- Pest plant and animal control
- Forest management and planning
- Water catchment management
- Carbon measurement, accounting and reporting
- Financial management
- Training and apprenticeships
- Nature-based tourism and recreation, including infrastructure development, guiding and transport

Importantly the ongoing management of the native forest estate for an array of non-timber values will provide meaningful transition for employees of the forestry sector. This is due, in part, to the substantial requirement for machinery, land management skills and forestry knowledge.

VicForests should be repositioned from being a manager of forest pulp and timber to managing more assets such as carbon. VicForests could be empowered, by way of a change to its order in government, to diversify away from outdated native forest activities towards forestry that will generate higher returns, such as plantation forestry and to take advantage of funding under the Emissions Reduction Fund, the state could generate a significant revenue. VicForests may become the transitional authority or manager of investments into forest-based eco-tourism to optimise economic outcomes.



VicForests' contractors can be absorbed by DELWP for fire management and other kinds of land management. They have important native forest knowledge and heavy-equipment skills in mountainous terrain, with an option to retrofit harvesting machinery exclusively for fire management, track and coupe rehabilitation and assisting with new tourism infrastructure.

The social license for these changes rates much more highly than continued native forest logging, as demonstrated by recent surveys by the Victorian Government and by industry groups.



8. SECURING NATURE'S FUTURE

Independent of the opportunities presented by the carbon economy, we have a duty of care to ensure that the natural features of the Central Highlands are safeguarded for present and future generations.

Transitioning away from native forest logging as the land use of the Central Highlands also positively responds to a raft of State and Federal Government Policies such as:

- Biodiversity 2037
- Water for Victoria
- Victorian Economic Strategy
- Victoria's 2020 Tourism Strategy
- Plantations for Australia: The 2020 Vision

Research by the Victorian Government has revealed Victorians want these forests; valued for their beauty and biodiversity, and it is important that the benefits people gain from forests are preserved for future generations.

The responses recognised the contribution of forests to providing clean water and mitigating the impacts of climate change. The surveys also demonstrated that Victorians want native forests protected for native flora and fauna to thrive. The role of Traditional Owners was recognised and respondents want the heritage and cultural values of forests protected.

Interactions with the forest are highly valued and respondents want this to continue into the future. People want to be able to access forests for recreation including bushwalking, camping, birdwatching, cycling, horse riding and four-wheel driving, among other pursuits. They want this access to have minimal impact on forests. A high value was placed on the experience of being in a forest and the benefits of this for mental health and wellbeing.

The background image is a photograph of a forest fire. The scene is dominated by a thick, orange-yellow smoke that fills the upper two-thirds of the frame. In the foreground, several dark, charred tree trunks stand as sentinels amidst a layer of brown, charred forest floor litter. A bright, circular sun or moon is visible in the upper right corner, partially obscured by the smoke. On the left side, a large, solid teal-colored shape, resembling a torn piece of paper or a graphic overlay, extends from the bottom left towards the center. Inside this teal area, white text is written in a clean, sans-serif font.

The largest number of responses in this report (52% of replies), supported ceasing timber harvesting and reducing the role of the native logging industry. Others wanted to see forests protected with agreements that stopped logging, especially in old-growth and mature native forests.

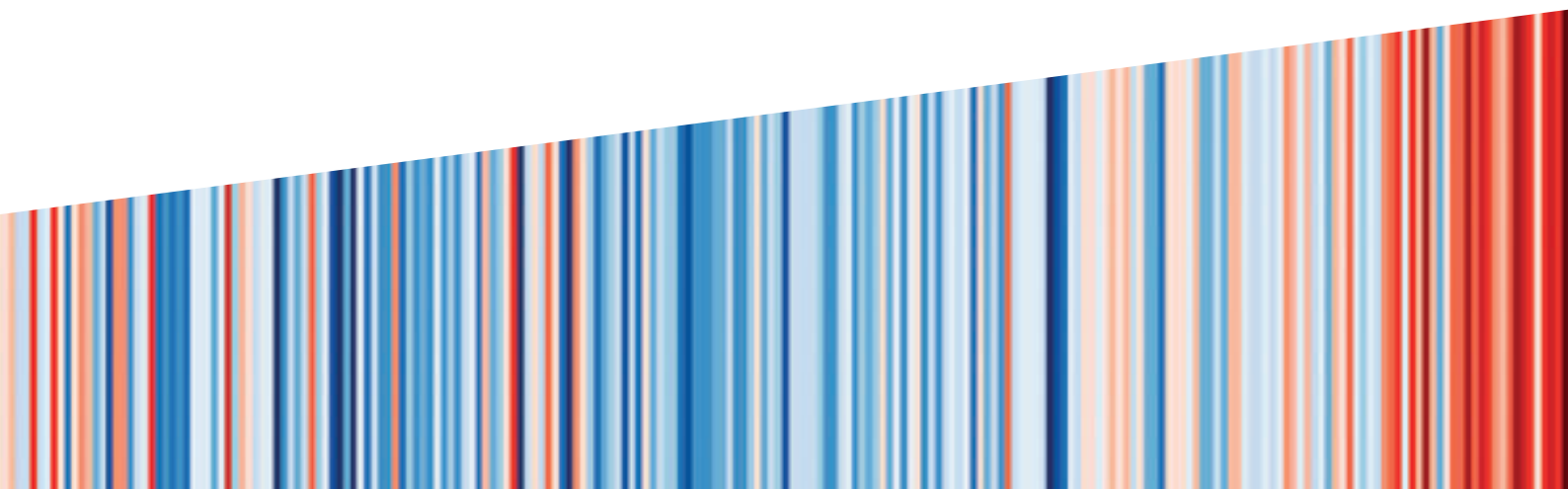
A photograph of three people in a meeting. A man with a red beard and glasses is in the foreground, looking down and resting his chin on his hand. Behind him, a woman and another man are looking at a laptop screen. The image is partially obscured by a white diagonal line.

9. WHY NOW?

The viability of our threatened species is at the precipice. Current land use activities are one of the primary causes of species decline and if left unchanged are likely to cause the extinction of several species.

Climate change further endangers these precious natural communities and the time available to reverse this change is frighteningly short. In fact, many scientific experts agree that the time to act is now. Countries and communities across the globe are responding to this existential crisis by declaring climate emergencies designed to trigger urgent and substantial action to avoid catastrophic climate change.

There exists no better natural landscape opportunity in Victoria than the evolution of forest management in the Central Highlands from traditional forest management to a carbon forest project for the present and future.



The value in Victoria's Central Highlands

Why is the research needed?

The Victorian Central Highlands is a diverse region with towns, agricultural land, forests and waterways. It contains the major catchment areas for water supply to Melbourne and surrounding regions. Other land use activities include agriculture, tourism and timber production.

The use of forest land for native timber production falls under the Central Highlands Regional Forest Agreement due for renegotiation in 2018. The Regional Forest Agreement is a 20 year agreement made

between the Victorian Government and Commonwealth Government that outlines their obligations and commitments for forest management.

There are strong and conflicting attitudes among stakeholders and the community towards the logging of native timber. Stakeholders in the native timber industry have called for an expansion and certainty of wood supply allocated for native timber harvesting. In contrast, the environmental and tourism sections

have called for an expansion of the national park network, proposed as the Great Forest Reserve System.

Managing the various land use activities within the region is complex due to conflicting land use activities. Not all land uses supported by the community are mutually compatible, and the Victorian Government therefore needs to make informed evidence-based decisions by evaluating the benefits and trade-offs of different land uses.

Ecosystem accounting as a tool for decision-makers

Economic contributions of key regional industries in the Central Highlands



Economic contribution (Industry Value Added) to the Victorian economy from key economic activities in Victoria's Central Highlands (2013-14). The economic contribution of agriculture, water supply, tourism, carbon sequestration and plantation timber production substantially outweighs that of native timber production. Carbon sequestration is an estimate of potential value as there is no current market in Australia.

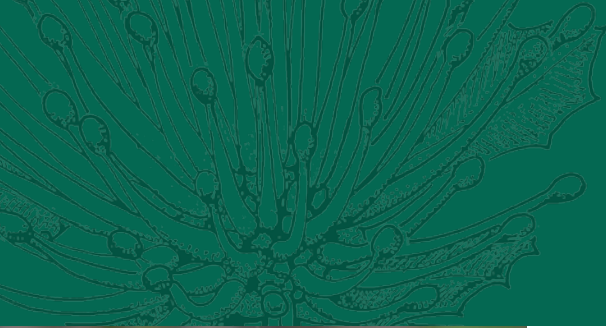
Ecosystem Accounting incorporates both economic and environmental data to compare various land use activities and the trade-offs between different activities. It is a powerful tool that decision makers can use to guide evidence based decisions about land management policies. The economic values presented here were calculated

using the System of Environmental Economic Accounting (SEEA), an internationally recognised statistical standard that is used in more than 50 countries.

The environmental-economic interactions were evaluated at three levels:

1. Values of ecosystem services, both those wholly or partly within the SNA, as well as those not currently included in the SNA;
2. Values of economic uses of ecosystem services by industries as their contribution to industry value added (IVA). The sum of all IVA in an economy equals Gross Domestic Product (GDP).
3. Potential gains and losses in IVA and ecosystem services involved with impacts and trade-offs between land uses.

Transitioning away from harvesting native forests would contribute net economic, social and environmental benefits to the Central Highlands



Economic contribution of industries such as tourism, water and carbon far exceeds that of native timber

Contributions of these productive activities to the regional economy have been compared using the UN's System of Environmental-Economic Accounting. This system expands traditional accounting methods to include the contribution of natural resources and ecosystem assets and services to the economy. Valuation was assessed in terms of, (1) the benefits of the economic activity of supply of goods and services using the metric of Industry Value Added, the price of exchange within the economy, and (2) the contributions of ecosystem services to those benefits, using a range of metrics including unit resource rent, replacement cost, stumpage and market-based payment systems.

Biodiversity value at risk

The region's native forests are home to 38 threatened species, including Victoria's animal emblem the critically endangered Leadbeater's Possum (*Gymnobelideus leadbeateri*). These tree-dwelling marsupials rely on hollow-bearing trees in montane ash forests for den sites. Mountain Ash (*Eucalyptus regnans*), begin forming cavities after 120 years. Forest harvested on less than 120 year cycles results in no new hollow-bearing trees for arboreal mammals.

The key threatening process for arboreal marsupials is the accelerated loss of existing hollow-bearing trees and the impaired recruitment of new cohorts of these trees because of logging and wildfire. Since 1939, the area logged is 115,421 ha and the area burnt by wildfire is 238,761 ha.

Monitoring over the past 28 years has shown that 47% of the total number of hollow bearing trees have been lost across the monitoring sites.

Regrowth forests post-logging lose more than half of the retained tree large trees within a few decades. Loss of these hollow-bearing trees in regrowth forest was four times the rate in old growth forest. Old growth forests support significantly greater numbers of animals and species than regrowth forests.

The number of listed threatened species has increased from 28 species in 2000 to 38 species in 2015. Species in the region have a clear value as evidenced by the efforts made to conserve many of them and the tourist visitor numbers to the region.

Employment in native forestry, plantation and tourism from Central Highlands Forests

The number of people employed in plantation timber production across Victoria is significantly higher than the number employed in native timber production. Managing the forest, harvesting, haulage and primary processing of plantation timber in Victoria in 2012 employed three times as many people (3300) as that for native forest timber (1100). See "Employment in Industries graph".

Figures from VicForests suggest that only 1 in 5 of those involved in managing, harvesting and haulage for native forest timber are permanent employees. The rest are contractors, many of whom are, or could be, employed in other industries.

Almost one third of forestry employees are in growing and managing roles. These would be retained if native forests were reserved for parks, tourism, water and carbon storage.

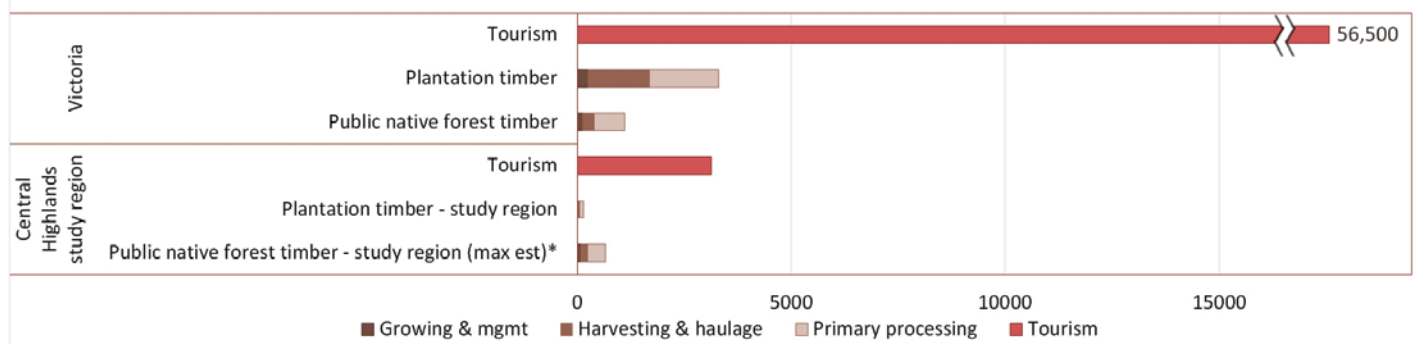
With respect to forests in the Central Highlands study region, 430-660* people were employed in managing the forest, harvesting, haulage and primary processing of native forest timber. Of these, 45-75* were employed specifically in managing forests.

Approximately 3300 people were employed in tourism (2012-13) in the Central Highlands study region, and this has been increasing by 100-200 people per year. In 2013-2014, the tourism industry accounted for 3,500 jobs, and provided an industry value added value of \$260 m.

**Note: Values for Central Highlands study region calculated as proportion of total native forests in Victoria scaled by area (min) & volume (max).*

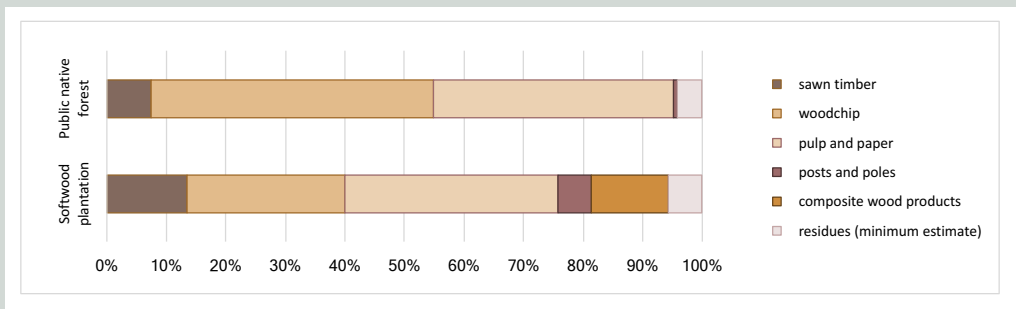
Employment in native forestry, plantation and tourism from Central Highlands Forests (Related Figures)

Employment in industries – Central Highlands and Victoria



Comparison of employment figures across tourism, native timber and plantation timber for all of Victoria and Central Highlands study region.

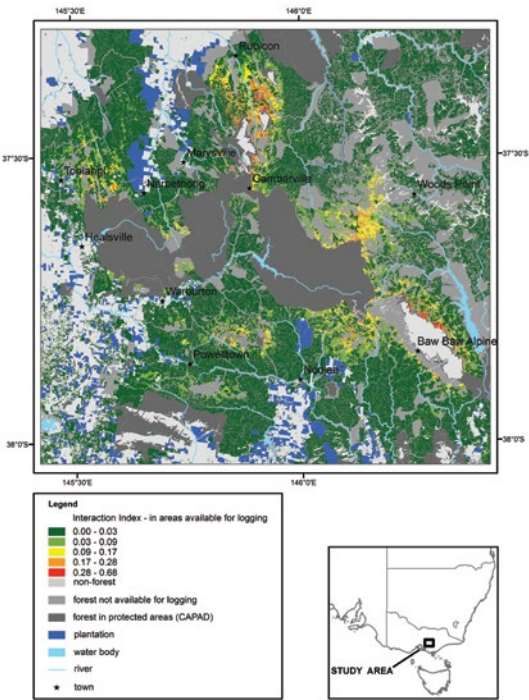
Uses of Forest Timber Victoria



Proportion of harvested volume of wood used for sawlogs, woodchip, pulp and other purposes in native and plantation forestry across Victoria.

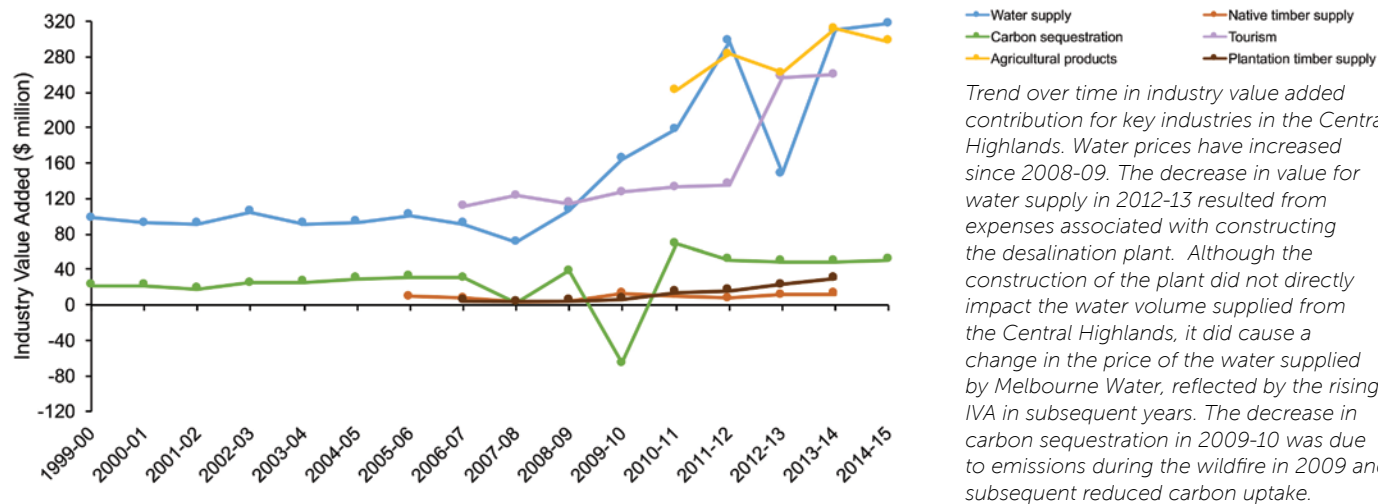
More than 87% of native forest timber harvested across Victoria is used for woodchip, pulp and paper. Only 7.5% is used for sawlogs. Alternatives to wood products from native timber exist in the form of recycled paper and plantation timber. This could be an alternative source of economic output that would allow a reduction in native timber supply from the Central Highlands.

Map of 'hotspots'



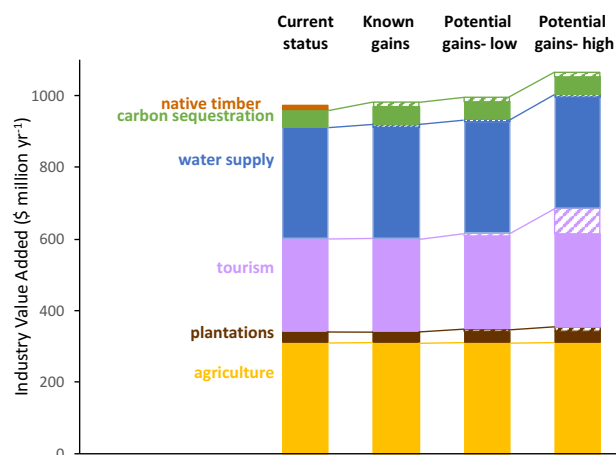
Spatial distribution of the value of the combined ecosystem services of water, carbon and native timber in the study region, with a combined interaction index. The interaction index of the highest combined values of these ecosystem services, or 'hotspots' is shown in red, orange and yellow. These 'hotspots' indicate areas where the maximum provisioning for native timber conflicts with maximising services of water provisioning and carbon storage in the areas of forest that are available for harvesting.

Industry Value Added contribution for economic activities in Vic Central Highlands



Potential gains in IVA with cessation of native timber harvesting

Cessation of harvesting native timber would contribute net economic, social and environmental benefits to the Central Highlands. Known gains: calculated gains in carbon sequestration and water supply. Potential gains: assumed gains in plantation timber production to substitute for native timber and estimated increase in tourism.



References

Ecosystem Accounting Work is drawn from Heather Keith, Michael Vardon, John Stein, Janet Stein and David Lindenmayer, *Experimental Ecosystem Accounts for the Central Highlands of Victoria - Final Report*.

Forest industry employment data is from Schirmer et al. 2013. *Socio-economic characteristics of Victoria's forestry industries, 2009-2012*.

Tourism employment data is from Tourism Research Australia 2015. *State Tourism Satellite Accounts* <http://www.tra.gov.au/research/State-tourism-satellite-accounts-2013-14.html>

Further Information

For more information about this TSR Hub research, contact Prof. David Lindenmayer - david.lindenmayer@anu.edu.au or visit our website at <http://www.nespthreatenedspecies.edu.au/>