

Sustainability of New Zealand's forest biomass



New Zealand's forests have a significant capacity to supply wood, thanks to their extensive and well-managed forest areas. These forests are a vital resource for the country's timber and growing bioenergy markets, providing a steady supply of wood for various uses – now and into the future.

Sustainable Wood supply

There are frequently questions around the sustainability of New Zealand's planted pine forests. Often these are around the environmental impacts of the forests and to a lesser extent on the sustainable volume of supply from them, particularly residual biomass used for energy.

Sustainable harvest volume refers to the amount of wood that can be harvested from a forest without compromising its ability to regenerate and continue providing resources in the future. This concept ensures that forest management practices doesn't deplete forest resources over time – simply put: do not cut more than you grow.

Wood supply into the future

We have projected the volume of wood supply until 2060. After a slight dip over the next 10 to 15 years potential harvest volumes will return to its current level around 32 M m³ per annum.

Of the total volume harvested, around 14 to 15 M m³ per annum is processed in New Zealand, the rest is exported as unprocessed logs.

This volume of harvest meets the definition of a sustainable harvest volume. New Zealand's planted

forest area has expanded steadily since data for the National Exotic Forest Description was first gathered in 1984. The amount of wood, carbon and energy stored in our planted forests has increased substantially and will continue to do so. The only caveat on maintaining a sustainable harvest volume being – do not cut more than you grow – and in the long run we haven't.

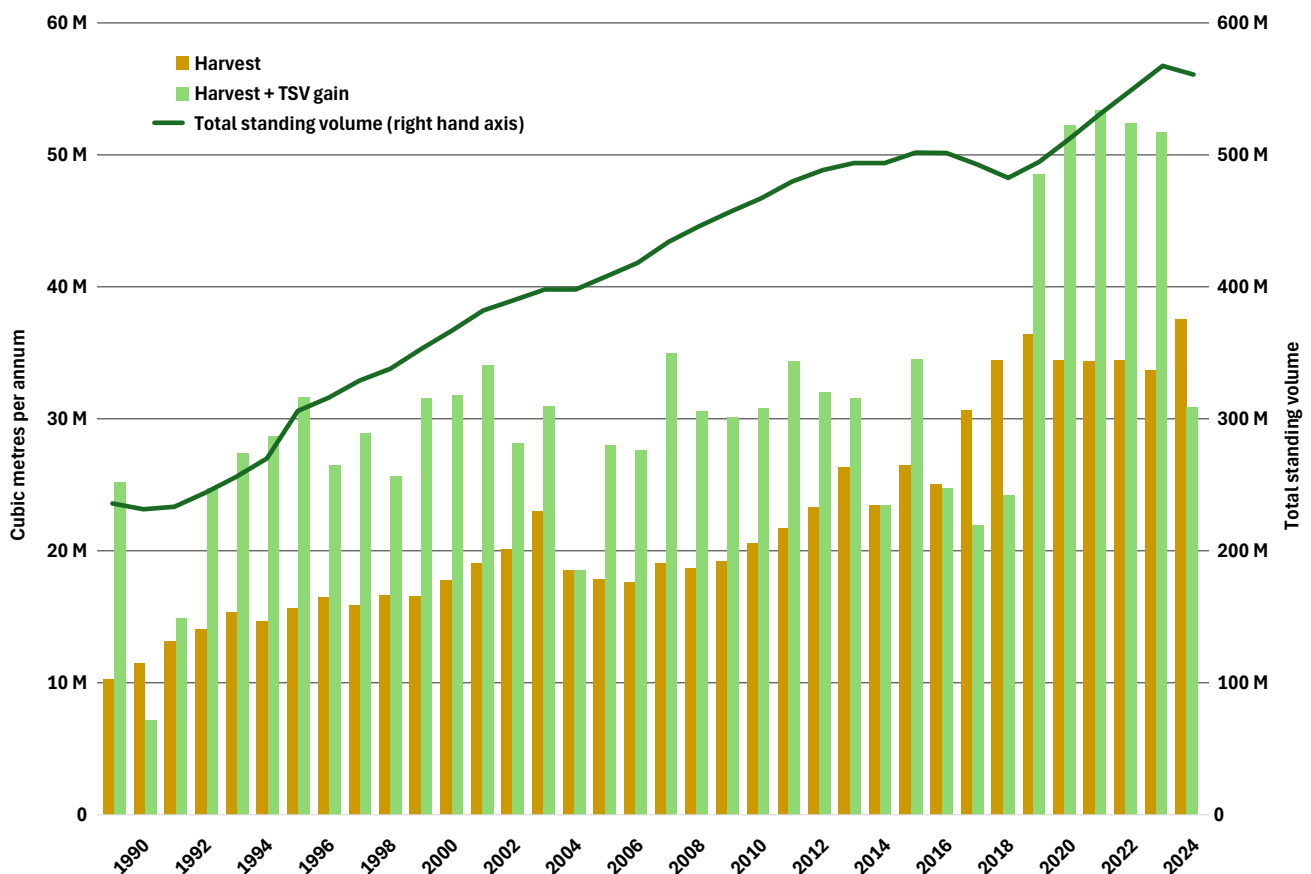
Standing volume over time

Our planted forests cover around 1.8 million hectares, around 6.8% of New Zealand's total land area. From this we produce around 34 million cubic metres of logs per annum, with the volume varying year to year according to the supply available and the market demand.

New Zealand's annual harvest (33 – 34 M m³ per annum) is less than the amount grown in the last year on average resulting in an increase in total standing wood volume.

The stock of wood standing in New Zealand's planted forests, across all age classes, has been expanding for the last 38 years, from 171 million cubic metres in 1988 to 567 million cubic metres in 2024. This is the product of increased forest area and increased forest productivity. The average annual increase in New Zealand's total standing volume has been around 10 million cubic metres per annum since 1984, resulting in an increasing level of sustainable harvest from the planted forest estate.

Annual Harvest & Annual Total Standing Volume increase





Residue harvesting impacts water quality about the same as existing forest harvesting operations.

Factors influencing forest sustainability

Beyond the volume of wood that can be harvested from our planted forests, several factors play a crucial role in maintaining forest sustainability considering residual harvesting:

- Soil fertility – healthy soil is essential for tree growth and forest health. Conventional log harvest does not deplete soils when harvesting operations comply with resource consents and regulations. Site factors (nutrient quantity, texture) and extraction of stem harvest residue may have some impacts on site fertility, affecting long-term sustainability and productivity.
- Erosion – forests generally hold soils together better than pasture due to strong, deep root systems and longer periods of time without soil disruptions. Residue harvesting is likely to have limited impact on erosion beyond that generated by primary roading and harvesting operations.
- Water quality – clean water is vital for the overall health of the forest ecosystem. It supports plant and animal life and helps maintain the balance of the ecosystem. The impact of conventional stem harvesting, with additional residue harvesting on water quality, nutrient and sediment loss is expected to be no more than existing harvesting operations, controlled by existing resource consents and NES-CF limits.

Biodiversity

Planted forests are botanically more diverse than pasture, croplands and orchards, but less so than native forests. Planting pine trees on ex-pastureland improves biodiversity. Harvesting affects the forest ecosystem severely, but these sites soon recover. Residue harvesting within a forest is comparable with conventional harvesting.

Mitigating harvesting impacts (conventional forest and residues)

Sustainable forest management practices aim to minimise the negative impacts of harvesting. An extensive range of potential solutions exist like sediment traps, fertiliser treatments, selective logging, replanting, and protecting sensitive areas to ensure the forest can recover and continue to thrive.

Some current best practices such as retention of riparian buffers provide benefits across multiple indicators of sustainability. Slash management is a critical issue and increased residue harvesting will mitigate many of the issues seen in 2018 and 2023, with slash causing damage outside of the forest.



Impacts on biodiversity and other environmental factors are minimised with sustainable forest management.



Erosion modelling and mapping at the stand level is aided by satellite technology.

Energy supply from New Zealand forests

New Zealand's forests have significant potential to contribute to the country's energy supply.

In mid-2024 New Zealand went into an energy supply shortage. The price of electricity increased substantially as did the price of gas.

Woody biomass could be used to displace much of the gas used in industrial process heat, and supply most of the demand for coal.

When coal is displaced by wood, GHG emissions are reduced by 97.5%. Displacing all the coal burned in NZ for process heat with wood could reduce our GHG emissions by 2 million tonnes per annum of CO₂-e. There is a significant opportunity for woody biomass, which is a very low carbon fuel (MfE, 2024) to displace high GHG fuels without having other negative consequences for the environment.

Acknowledgements

Thanks to the support from Ministry of Business, Innovation & Employment and the Strategic Science Investment Fund.



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI

Resources

Ministry of Primary Industries –
Wood Availability Forecasts 2021

Ministry for the Environment New Zealand's
Greenhouse Gas Inventory 2024

National Exotic Forest Description 1984-2024.

National Environment Standards –
Commercial Forestry.

Contact:

Peter Hall,
Team Lead, Process Development
Peter.Hall@scionresearch.com

Paul Bennett,
Portfolio Leader – Integrated Bioenergy
Paul.bennett@scionresearch.com

