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How claims of a net increase in forest cover mask the truth about the environmental impact of land clearing in Australia

Science Informing Policy Briefing Note 1/25

Authors
Heather Keith, Andrew Macintosh, Don Butler, Brendan Mackey[1]

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Contact: H.Keith @griffith.edu.au

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EXECUTIVE SUMMARY

It is not possible to achieve the Paris Agreement temperature goal of limiting global warming to 1.5-2°C, or net zero, or to prevent species extinctions, without halting and reversing deforestation and land degradation. Habitat loss is the main factor affecting native species decline in Australia and deforestation contributes on average 55 million tonnes of carbon dioxide equivalents ($CO_{2\text{-}e}$) per year. Acknowledging this, countries including Australia signed the Glasgow Leaders Declaration on Forests and Land Use, pledging to halt and reverse forest loss and land degradation, at COP26 in Glasgow in 2021.

In 2023, Australia produced its latest **State of the Forests** Report. The Report states that Australia has experienced a *net increase* in forest cover between 2016 and 2021. A similar net reporting approach is used in Australia's National Greenhouse Accounts for reporting under the UN Framework Convention on Climate Change. The reported increase in total forest area has been used by the Australian Government and others to downplay the issue of deforestation in Australia and its impact on nature and the climate, and to claim Australia is meeting its international forest obligations. The greenhouse gas removals associated with the reported net increase in forest area also contribute to claims made by Australia that it is meeting its emissions reduction targets.

A net increase in forest cover may seem like positive news, but the types of forest being bulldozed, where they are being lost, and the types and location of regrowing forests, determine how good or bad this statistic really is for nature and climate. If the gains are occurring in forests that store less carbon and house fewer native species than the forests being cleared, then that net forest increase can still result in a net negative outcome for native species and the climate. More importantly, if mapped gains in forest area are not really new forests, just greening or thickening of existing wooded lands after increased rainfall, then Australia's seemingly positive net increase in forest cover statistic maybe hiding even more substantial losses to biodiversity and much higher greenhouse gas emissions than claimed.

The analysis in this report finds that this is what has occurred. Forest losses have been concentrated in areas of higher conservation significance, with relatively high carbon stocks. In contrast, almost 85% of the reported increase in forest area since the early 2000s has occurred in existing native vegetation (mostly in the rangelands) rather than being regrowth on previously cleared land. There is also considerable uncertainty about the accuracy of the Australian Government's estimates of the reported changes in forest area in existing native or remnant vegetation, with the prospect that the reported increase in forest extent has been significantly overestimated.

Image Australian Conservation Foundation

KEY MESSAGES

- The Australian Government claims that Australia's forest area has been increasing since 2008, based on aggregated net forest reporting.

- Aggregated net forest reporting results in forest losses being "netted off" against forest gains. No distinction is made between losses and gains from natural and anthropogenic processes (e.g. forest loss from drought or disease is treated the same as deliberate forest clearing). Similarly, forest losses are treated as the equivalent as forest gains, even when the lost forests have vastly different biodiversity and carbon values to those associated with the areas of forest gain (e.g. where the loss of old-growth forest is netted off against gains in young regrowth or increases in forest cover in uncleared remnant vegetation).

- Aggregated net forest reporting:
  - obscures the loss of biodiversity and the carbon emissions from mature, old growth and primary forests; and
  - does not provide the information needed to report on targets for biodiversity and climate, assess and improve forest-related policies, or make claims about the sustainability credentials of Australian products.

- Despite the limitations of aggregated net forest reporting, governments and industry use the reported net increase in forest extent to downplay the impacts of land clearing and logging on biodiversity and climate change. This is typified by a response from a senior government official to questions regarding deforestation, where he stated that the Australian Government's position is that "Australia's total forest area has increased year on year since 2008, and we are one of the few nations to sustain such an increase".

- This report evaluates the nature and reliability of the reported changes in forest area in Australia since the early 2000s. The analysis shows that the forest gains do not balance out (or otherwise compensate for) the losses that are occurring through the clearing of native forests and woodlands. Key findings include the following.
  - Almost 85% of the reported increase in forest area since the early 2000s has occurred in existing native vegetation rather than being regrowth on previously cleared land – this implies a thickening of existing vegetation rather than new forest.
  - Most forest gains have occurred in the arid or semi-arid rangelands, while most forest losses have occurred to higher carbon stock forests in the intensive land use regions.
  - On average, the clearing of remnant forest in Australia's intensive regions releases approximately 23-120 times more greenhouse gas emissions (carbon dioxide equivalents ($CO_{2\text{-}e}$)) per hectare than could be plausibly removed from the atmosphere through the thickening of existing vegetation in the rangelands, where most forest gains have occurred.
  - Since 2000, emissions from the clearing of forests alone (not including sub-forest ecosystems) have averaged 55 million tonnes of $CO_{2\text{-}e}$ per annum.
  - There is considerable uncertainty about whether the reported net increase in forest area in Australia is real.
    - Australian Government analysis suggests the dataset it has used to estimate the increase in the forest area has relatively low accuracy in detecting areas of canopy cover change and that it tends to systemically "overreact" by misclassifying areas as experiencing change when none has occurred.
    - The Australian Government has suggested that the dataset it has used to estimate the increase in the forest area is too inaccurate to assess changes in forest cover associated with carbon offset projects that are purporting to regenerate even-aged native forests across millions of hectares of the rangelands. It is difficult to reconcile this position with the Australian Government's declarations regarding the increase in Australia's forest area. If the dataset is too inaccurate to detect forests across millions of hectares of rangeland carbon projects, the national estimate of net forest gain, which is drawn from the same dataset, is also likely to be inaccurate.

- To accurately represent contributions toward the goals and targets of the three 'Rio Conventions', including the Paris Agreement, progress on commitments to halt and reverse forest loss and degradation should be measured in gross rather than net terms.

- We recommend comprehensive forest change accounting that reports gross losses and gains in forest area using categories of forest ecosystem types with data on their extent and ecological condition. This accounting approach provides data on the state of Australia's forests that is more relevant for tracking forest health and the impacts of human activities on biodiversity and the climate.

BACKGROUND

Forests are increasingly recognised as critical to the world's biggest environmental challenges, from climate change to biodiversity loss and land degradation. All three 'Rio Conventions', the United Nations Convention on Biological Diversity (UNCBD), the United Nations Convention to Combat Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC), acknowledge the important contribution of forests to the achievement of their respective goals and objectives.

In 2021 at COP26 of the UNFCCC, Australia and around 140 countries, that together share management of more than 90% of the world's forests, signed the **Glasgow Leaders' Declaration on Forests and Land Use** committing "collectively to halt and reverse forest loss and land degradation by 2030". A year later, Australia became a founding member of the **Forest and Climate Leaders Partnership** to deliver the 'Glasgow Declaration'.

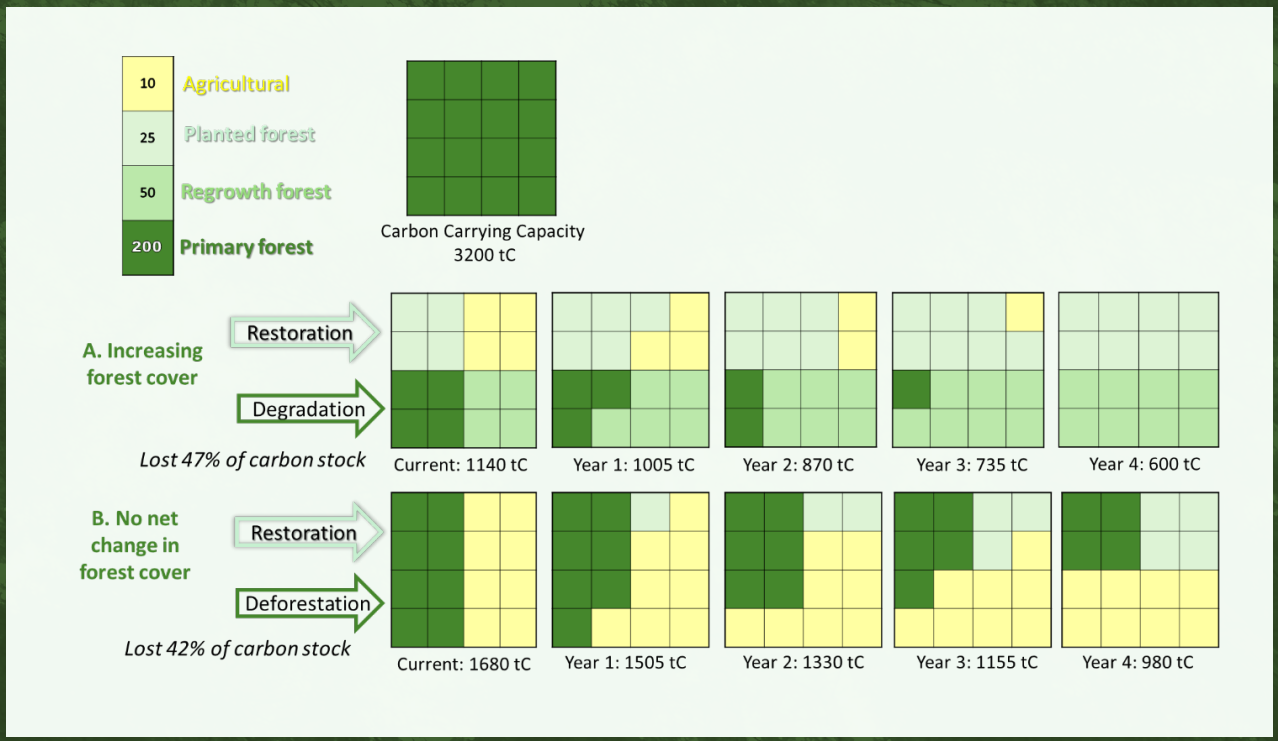
REPORTING AGAINST FOREST COMMITMENTS

Information on the loss of natural forests and the gains from forest regeneration is needed to help track biodiversity conservation commitments, land sector carbon emissions and associated targets, including those arising from the three Rio Conventions. However, under relevant international processes, governments are allowed to report on what is called "net forest loss", which is calculated by summing forest loss (a negative value) with forest "gains" (a positive value). In a given year, if the area of forest loss is less than the area of gain, then there is a net increase in the total forest area (see explanation in **Box 1**).

This approach of net forest accounting is used in *Australia's State of the Forests Reports*, where reported changes in forest area net out gains and losses in forest extent from natural and anthropogenic processes (**Figure 1**). Based on this approach, *Australia's State of the Forests Report* 2023 claims Australia's forest area has been increasing since 2008:

BOX 1. HOW DOES NET FOREST LOSS ACCOUNTING WORK

The basic concept of change in type and condition of forest areas without a loss in total forest area is illustrated here hypothetically. Area of forest cover may increase (A) or have no net change (B), but changes in carbon stocks occur due to changes in forest types. Degradation of primary forest and conversion to regrowth, and deforestation of primary forest and conversion to agricultural land both result in decreases in total carbon stocks. Restoration of agricultural land by re-planting results in increases in carbon stocks, but they will not return to the pre-clearing level for many decades, if at all where soils are degraded. Changes in carbon stocks due to land use should be compared against a reference level of the carbon carrying capacity (i.e. the total stock in the natural ecosystem of the primary forest). Carbon stock densities (tC ha^{-1}) are indicative of the different land use types.



> ***Australia's total forest area increased by 0.75 million hectares over the five-year period from 2016 to 2021, maintaining the increase in total forest area that has been observed since 2008.[1]***

Governments and industry use the reported net increase in forest extent to downplay the impacts of land clearing on biodiversity and climate change.[2] For example, in response to questions concerning deforestation in Senate Estimates in November 2024, the Secretary of the Department of Agriculture, Fisheries and Forestry stated:

> ***… our approach is that Australia's total forest area has increased year on year since 2008, and we are one of the few nations to sustain such an increase.[3]***

Later, the Deputy Secretary commented:

> ***… the answer is that we are doing better. As the secretary mentioned, on forestry regrowth and establishment, the FAO ranked Australia second globally for increase in forest area. That's increasing by an average of 446,000 hectares per year between 2010 and 2020, and we're in the top 10 countries for areas of forest that are legally protected. So we do have a good story to tell.[4]***

The data reported is net forest change, as shown as the black line in **Figure 1**, which does not provide information about the forest ecosystem types that have been lost or gained, nor their ecosystem condition. Therefore, there is no way of knowing whether the forest gains are equivalent to the forest losses with respect to biodiversity and climate. Understanding these differences in forest types requires disaggregated data, which is difficult to access and requires combining multiple data sets. Disaggregation as much as possible is shown in the figure with the bars for loss and gain identified with the components of primary, secondary, regrowth forest and plantations.

The legend indicates the ecological condition of the forest loss in broad classes: primary (i.e., forest that is in a largely natural condition and which can include mature and old growth forest), secondary (i.e., re-clearing of forest that has emerged on previously cleared land), losses in area of commercial plantations, as well as a small but increasing area of other losses not identified.

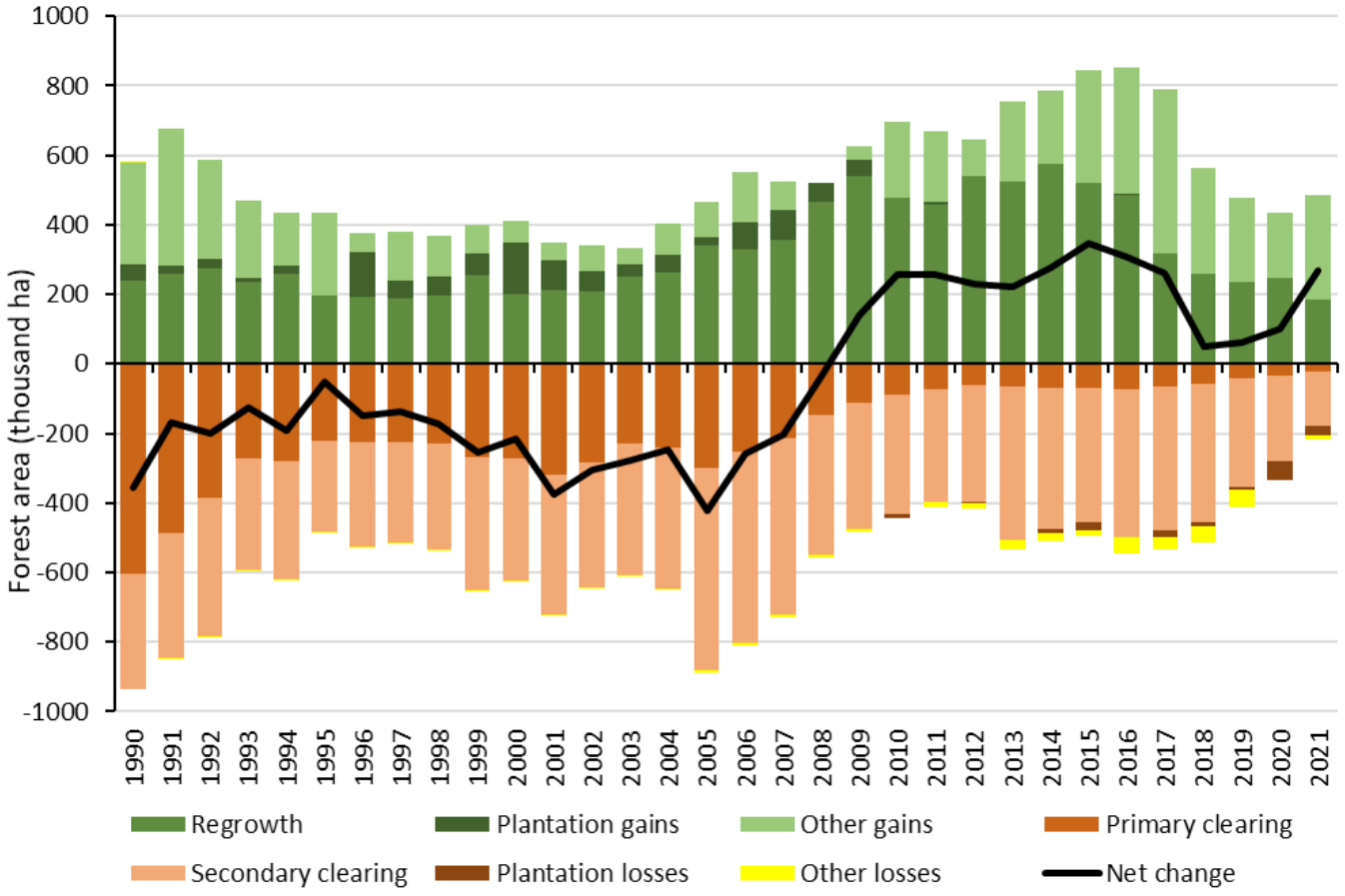


Figure 1. The loss and gain and net change in forest area in Australia from 1990-2021.

1 Montreal Process Implementation Group for Australia and National Forest Inventory Steering Committee (2024) Australia's State of the Forests Report 2023: Synthesis 2023. Commonwealth of Australia, Canberra, p 11.

2 Cattle Australia (2025) Election 25: Policy must recognise cattle as part of the climate solution. Available at: https://cattleaustralia.com.au/election-25-policy-must-recognise-cattle-as-part-of-the-climate-solution/ (28 October 2025).

3 Rural and Regional Affairs and Transport Legislation Committee (2024) Estimates - Department of Agriculture, Fisheries and Forestry. Committee Hansard. 5 November 2024, p 31. Available at: https://parlinfo.aph.gov.au/parlInfo/download/committees/estimate/28528/toc_pdf/Rural%20and%20Regional%20Affairs%20and%20Transport%20Legislation%20Committee_2024_11_05_Official.pdf;fileType=application%2Fpdf (14 November 2025).

4 Ibid.

Forest gain is differentiated as regrowth (i.e., young, regenerating forest on recently cleared land), gains in area of commercial plantations, and other gains that represent natural expansion of forest onto areas that have not been forest for many years and new environmental plantings, and changes in area of mangroves. Data are sourced from the **State of the Forests Report Criterion 1** and the **National Greenhouse Gas Inventory Report**.

A similar net reporting approach is used under the **UN Framework Convention on Climate Change**. In this context, the Australian Government reports on net emissions of carbon dioxide (and other greenhouse gas) from forests, grasslands, croplands, wetlands and settlements. The methods that are used for these purposes account for both emissions and removals from these lands, including forests. However, only the net emissions (gross emissions minus removals) are reported.

While net accounting is useful for certain purposes, it hides important information. Neither gross emissions nor removals due to human activities are seen in the reporting. Differences between the ecosystems where the emissions are sourced from, and the removals are sequestered into, are not identified in terms of the forest type (which influences ecosystem resilience to wildfire and droughts), age (most biomass carbon is stored in big old trees), and ecosystem condition (e.g. composition and structural biodiversity, invasive species, nutrient cycling). The **main mitigation value** of a forest ecosystem is the accumulated stock of carbon in living and dead biomass and soil, not net annual fluxes.

The key issue, therefore, is that forest and greenhouse gas reporting that relies solely on presenting the net forest area (or net emissions) obscures the fact that the areas of gains and losses are typically different forest types with significant differences in their vegetation structure and composition, animal populations, ecosystem condition and conservation significance. Their biodiversity and climate impacts and the ecosystem services they provide, are not comparable. For example, an area of old growth forest could be lost and "netted out" by an equivalent area of young regrowth or even areas of remnant vegetation that have experienced minor changes in crown cover. The differences between these ecosystem types for safe storage of carbon on the Earth is explained in **Box 2**.

BOX 2. ACCOUNTING FOR THE INTEGRITY OF FOREST ECOSYSTEMS

Mitigating climate change requires carbon to be stored safely and long-term in reservoirs on the Earth and so kept out of the atmosphere. Reducing emissions from fossil fuels and retaining the carbon stored in geological deposits is essential. Retaining carbon in biological forms in ecosystems is also critical for mitigation. These ecosystems need to be stable and resilient to store carbon in the long-term, minimise the risk of emissions, and promote landscape scale adaptive capacity of ecosystems in the face of increasing threats associated with climate change and habitat fragmentation. Hence, the ecosystems where carbon is stored need to be characterised by their integrity or capacity to provide safe storage. Not all land mapped as tree cover represents forest types that are equivalent for carbon storage, biodiversity and ecosystem services.

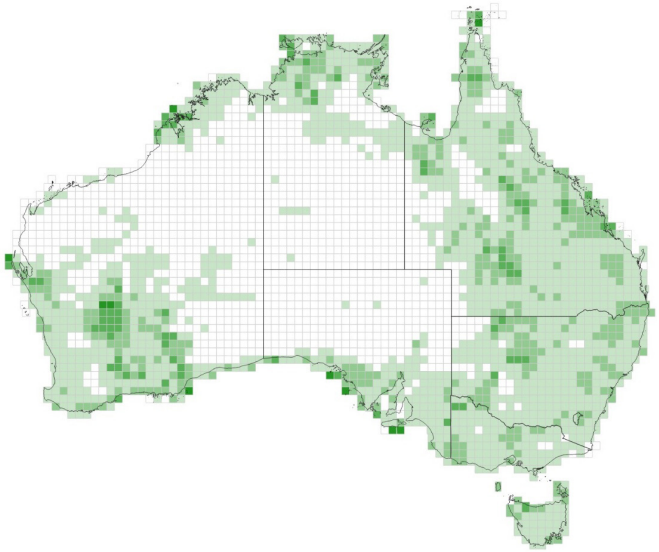


Figure 2. Areas of forest gain, 2000-2002 to 2019-2021. Coloured cells had at least 1% of land area that was forest in 2020 that was not forest in 2002. Darker cells indicate areas with greater percentage of area changing to forest.

Source: Analysis of **National Forest and Sparse Woody extent data, version 7**, forest areas were those classified as forest for at least 2 out of 3 consecutive years.

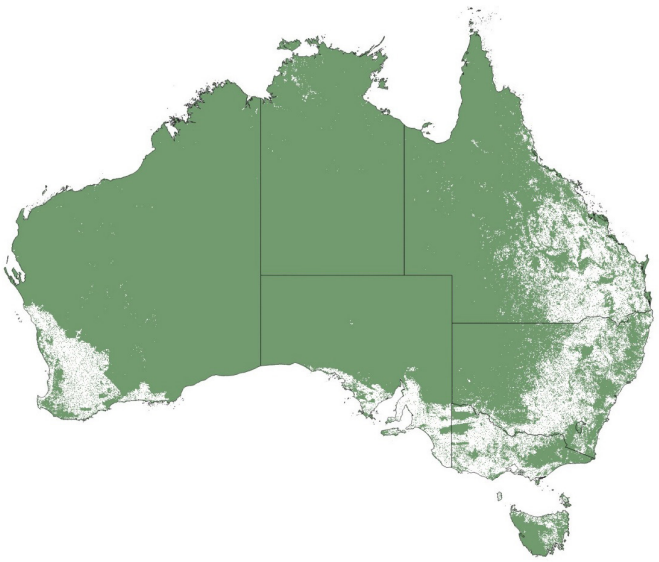


Figure 3. Extant native vegetation (green).

Source: Combination of **National Vegetation Information System extant native vegetation extent** and **NSW extant plant community types mapping**.

NATURE OF THE FOREST GAINS

Where have the forest gains occurred

Figure 2 shows the distribution of areas of forest gains since the early 2000s, as defined by crossing a threshold of percent canopy cover (≥20% over 0.2 hectares) from trees above a prescribed height (≥2 metres).

Almost 85% of the reported increase in forest area since the early 2000s has occurred in existing native vegetation rather than being regrowth on previously cleared land – this implies a "thickening" of existing vegetation rather than new forest. For reference, **Figure 3** shows the distribution of existing native vegetation (vegetation that has not previously been comprehensively cleared and retains a substantial proportion of its native composition and structure).

Most of the increase in forest area in existing native vegetation has occurred in the semi-arid, arid and northern rangelands, not in the intensive land use regions that have been extensively cleared, where there is a need for forest and woodland restoration and recovery to support threatened biodiversity.

How does the area of forest cover increase in existing native vegetation?

Where forest area increases in existing native vegetation, it involves increases in estimated canopy cover or height of trees in uncleared areas that have previously not met Australia's forest definition (areas containing trees ≥2m in height with canopy cover ≥20%, defined at 0.2-hectare scale – see **Box 3** for further information on forest definitions).

Increases in canopy cover from trees in existing native vegetation can involve increases in tree density (i.e. number of individual trees), increases in the size of tree crowns, or increases in leaf density within tree crowns[5].

Large areas of woodlands and shrublands in Australia naturally have canopy cover between 10%-30%. Because 20% crown cover is used to define forests, large areas of woody vegetation hover near the forest threshold. Due to this, there can be material changes in the reported forest area due to relatively small fluctuations in canopy cover caused by changes in seasonal conditions (i.e. rainfall and resulting plant water availability).

Image Australian Conservation Foundation

5 Crowley, G., Murphy, S. (2023) Carbon-dioxide-driven increase in foliage projective cover is not the same as increased woody plant density: lessons from an Australian tropical savanna. The Rangeland Journal 45(2), 81-95.

BOX 3. FOREST DEFINITIONS

There are significant ecological differences among natural forest ecosystem types that reflect their evolutionary history and adaptations to local environmental conditions including climate, topography and substrates. Forest ecosystems therefore naturally vary in terms of their species composition, magnitude of their carbon stocks and the proportion of carbon stored in living biomass, dead biomass and below ground, as well as how they respond to wildfires, droughts and other climate-driven extreme events. Within a forest ecosystem type, significant differences occur as the result of land use impacts and forest management for commodity production (i.e., commercial logging). The regrowth that occurs on land that has been deforested for the first time is not equivalent to the original natural forest.

The internationally agreed definition of forests used by governments to report deforestation under the **United Nations Framework Convention on Climate Change (UNFCC)** is:

> **An area of land spanning more than 0.05 hectares with tree crown cover (or equivalent stocking level) of more than 10 percent with trees with the potential to reach a minimum height of 2-5 meters at maturity in situ.**

Under the UNFCCC, deforestation is referred to as forest conversion, i.e., when a forest is cleared and replaced with grassland, cropland, wetlands, settlements, mining and other infrastructure. **However, this definition** does not recognize these fundamental differences between different forest ecosystem types; mature or old growth forest and young regrowth forests; or between natural forests and plantation forests.

The Australian national definition follows a similar approach:

> **An area of 0.2 ha or more, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. This includes Australia's diverse native forests and plantations, regardless of age. It is also sufficiently broad to encompass areas of trees that are sometimes described as woodlands. Woodland, savanna and eucalypt mallee vegetation are all included where they meet the criteria for height and crown cover.**

There are many examples of changes in forest type and condition that occur with no change in forest cover under these definitions. An old growth forest can be replaced with a plantation forest, and no forest loss has occurred. Logging all the canopy trees in an old growth forest and allowing natural regeneration to occur does not count as forest loss. The fact that it will be hundreds of years before the old growth forest regrows and achieves the same ecological functioning is not taken into account. Forestry operations involving logging rotations drastically reduce the age structure of a forest so there are few if any mature or old growth canopy trees, the vegetation structure is simplified, and tree species of commercial value are promoted. The young regrowth forest is also more vulnerable to bushfires, droughts and heatwaves. Trees in plantation forests, as the names suggest, do not naturally regenerate but are planted. Clearing natural forest to create grazing land in one area but allowing regrowth in another area by reducing grazing counts as no net change in forest area, even though the regrowth is small with young trees, often limited species and structural diversity, and allows introduction of invasive species.

The impacts of these changes in forest area are increased emissions, reduced carbon storage, degradation of habitat and threats to biodiversity. Changes are needed in accounting and reporting protocols to respond to the integrated biodiversity and climate crises and meet Australia's national policies and international commitments to halt and reverse gross forest loss. Area-based analyses of forest cover ignore the critical importance of ecosystem integrity in determining the benefits for carbon storage and biodiversity. The differences in ecological values for biodiversity and climate between categories of land use types are illustrated in **Table 1**.

	Ecosystem stability	Restoration time	Carbon density	Habitat for biodiversity	Ecosystem integrity rank
Production systems	Low	Annual to years	Low	Low	Low
Planted forest	Low-moderate	Years to decades	Low-moderate	Low-moderate	Moderate
Secondary/ Regrowth	Moderate	Decades to centuries	Moderate	Moderate	Moderate
Primary forest	High	Decades to millennia	High	High	High

Table 1. Categories of land use types describing gradients of intensity of human activities compared with degree of naturalness, and their ranks in terms of several ecological values and overall ecosystem integrity. 'Production systems' are agricultural systems for commodity production.

Why has forest area increased?

The observed increases in tree cover in existing native vegetation since 2008 are largely attributable to climatic factors, particularly the El Niño–Southern Oscillation (ENSO) and its effects on rainfall and plant water availability.

Droughts in the early 1990s associated with the 1991-92 and 1994-95 El Niño events, and the Millennium Drought that ran from 1997 to the late 2000s, dried the continent and resulted in a loss of tree cover in areas of existing native vegetation, particularly in the semi-arid and arid rangelands (where average annual rainfall is already low; <350 mm per year). The loss of tree cover associated with the dry conditions was the main driver of the decline in forest extent observed over this period. Between 1989 and 2008, the forest area decreased by over 4 million hectares, from almost 135 million hectares to just under 131 million hectares.

The two decades of dry conditions that started in the early 1990s have been followed by a wetter 15-year period, particularly over the periods affected by the La Niña events of 2008-09, 2010-12 and 2020-2023. The above average rainfall associated with these events resulted in a natural "greening" of the landscape and a rebound in tree cover, resulting in a reversal of much of the estimated forest loss over the preceding two decades.

Are the observed changes in forest area real?

There is considerable uncertainty about the accuracy of the Australian Government's estimates of the reported changes in forest area in existing native or remnant vegetation over the period 1990 to 2021.

Government analysis suggests the dataset used to evaluate forest area has relatively low accuracy in detecting areas of canopy cover change – it tends to systemically "overreact" by misclassifying 25m x 25m pixels as experiencing change when none has occurred.[6]

The Australian Government has cast further doubt over the robustness of its dataset through its response to research on human-induced regeneration (HIR) projects registered under the Australian carbon credit unit (ACCU) scheme. The research used the same government dataset to analyse the performance of HIR projects, most of which are claiming to regenerate even-aged native forests in arid and semi-arid rangeland areas that have never been comprehensively cleared. The research found limited evidence of additional regeneration in the credited areas of the HIR projects, where the forests are supposed to be regenerating.[7] The Australian Government has responded by claiming that the dataset is too inaccurate to assess changes in forest cover associated with HIR projects.[8]

It is difficult to reconcile this position with the Australian Government's declarations regarding the increase in Australia's forest area. If the dataset is too inaccurate to detect forests across millions of hectares of rangeland carbon projects, the national estimate of net forest gain, which is drawn from the same dataset, is also likely to be inaccurate.

Are there significant biodiversity and climate benefits associated with the observed increases in tree cover in existing native vegetation?

Even if it is assumed that the reported increases in forest area in existing native vegetation have occurred, these changes in tree cover are of limited significance for addressing the threats to biodiversity and mitigating climate change.

Changes in tree cover in remnant vegetation that are driven by cycles of wet and dry periods do not represent increased habitat for native species – they are part of a natural cycle, whereby tree cover increases and decreases in response to changes in water availability. Due to this, increases in tree cover in remnant vegetation is not a sign of an improvement in the condition of vegetation for native biodiversity.

Generally, the remnant vegetation in the rangeland areas where most of the increase in forest area has been detected is not of high conservation significance. This is because most of the native vegetation in these areas has not been cleared. The major threats to biodiversity in rangeland areas are largely unrelated to the amount of native tree cover. The main stressors relate to predation of native species by introduced animals, spread of invasive weeds, altered fire regimes and the impacts of grazing by introduced animals on the ground layer and small native shrubs in sensitive environments.

Increases in tree cover in remnant vegetation in these areas is also of limited benefit in mitigating climate change. This is because the increases in carbon stocks in the landscape are generally small and relatively short-lived.

6 Department of Climate Change, Energy, the Environment and Water (2024) National Inventory Report 2022. Volume 2. Commonwealth of Australia, Canberra, at 194-196.

7 Macintosh, A., Butler, D. et al. (2024) Australian human-induced native forest regeneration carbon offset projects have limited impact on changes in woody vegetation cover and carbon removals. Communications Earth & Environment 5, 149.

8 Macintosh, A., Evans, M. et al. (2025) Reply to: National-scale datasets underestimate vegetation recovery in Australian human-induced native forest regeneration carbon sequestration projects. Communications Earth & Environment 6, 803 (Supplementary Information, Table S1).

NATURE OF THE FOREST LOSSES

Where has the land clearing occurred

Since the early 2000s, most land clearing in Australia has occurred in the intensive land use regions in the east, south and southwestern parts of the continent (**Figure 4**).

These intensive land use regions support most of Australia's agricultural production (the 'wheat-sheep belt') and industrial and urban sectors. The land clearing that has occurred in these regions to facilitate economic development has resulted in extensive loss of Australia's forest and woodland ecosystems. Reflecting this, these regions have high concentrations of threatened species and threatened ecosystems and the remaining native vegetation in these areas is generally of high conservation significance (**Figure 5**).

Are there significant adverse biodiversity and climate impacts associated with the clearing of native forests and woodlands

The clearing of remnant vegetation and mature regrowth vegetation in the intensive land use regions is a major cause of biodiversity loss in Australia. Past clearing has dramatically reduced the extent and condition of native ecosystems in these regions and left them vulnerable to other stressors (e.g. invasive species). Even seemingly small clearing events in these areas can now have a significant impact, pushing native species to extinction and native ecosystems towards collapse.

Clearing of forests and woodlands in intensive land use regions results in significant greenhouse gas emissions. The regions are wetter and more productive than the rangelands, leading to higher natural carbon stocks. Clearing results in the carbon stored in the vegetation and soils being released into the atmosphere, thereby contributing to further warming. Since 2000, emissions from the clearing of forests alone (not including sub-forest ecosystems) have averaged 55 $MtCO_{2\text{-}e}$ per annum.[9]

DO THE LOSSES BALANCE OUT THE GAINS?

The nature of the ecosystems where increases in forest area have been detected means the "gains" do not balance out (or otherwise compensate for) the losses that are occurring through the clearing of native forests and woodlands.

Most of the gains in forest area involve increases in tree cover in existing native vegetation in arid and semi-arid regions, which provides limited climate and biodiversity benefits. In contrast, most of the losses are in wetter more productive regions that have high biodiversity conservation significance and where the clearing results in significant greenhouse gas emissions.

This is illustrated in **Table 2**, which compares the estimated average carbon stock losses (in $tCO_{2\text{-}e}$ per hectare) in areas that experienced human-induced forest loss over the period 2000-2002 to 2019-2021 to the estimated average carbon stock

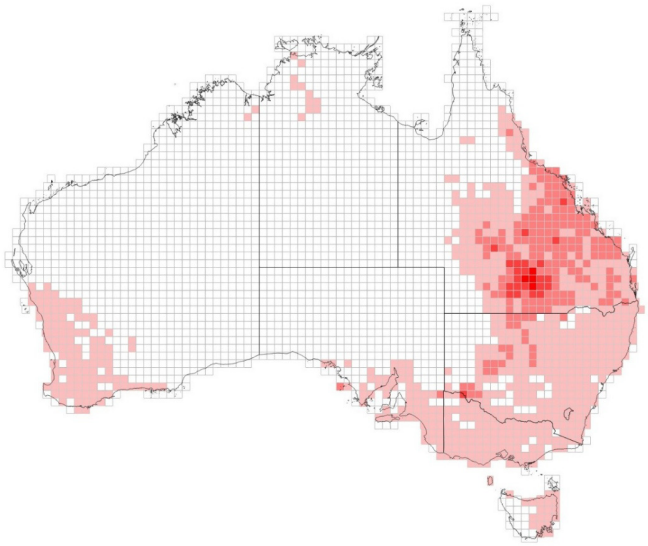


Figure 4. Areas of native forest clearing, 2000-2002 to 2019-2021.
Coloured areas had at least 0.1% of their land areas cleared of forest between 2002 and 2021, darker red areas indicate areas with larger % area showing forest loss indicative of clearing.

Source Analysis of National Forest and Sparse Woody extent data, version 7, in combination with fire scar mapping.

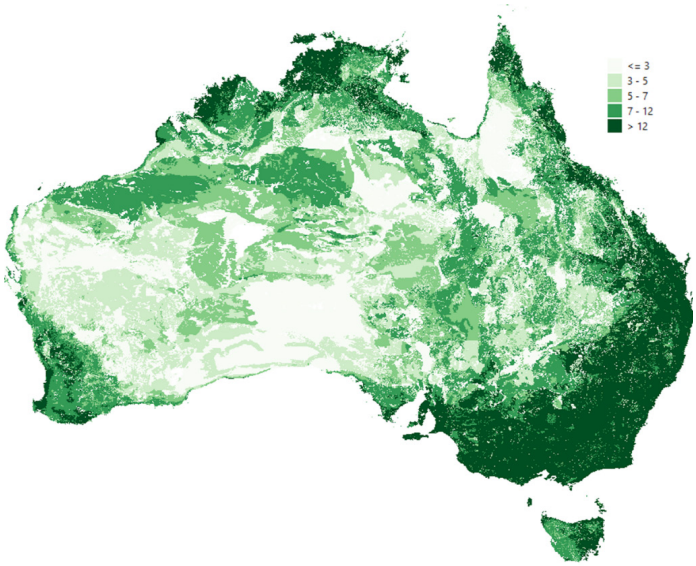


Figure 5. Threatened species richness.
Darker green areas contain habitat for more threatened species.

Source Summary grid for terrestrial threatened species extant habitats. Giljohann et al. (2022): Estimated spatial distributions for Australia's threatened species. v4. CSIRO. Data Collection. **https://doi.org/10.25919/vww1-pa31**.

9 Department of Climate Change, Energy, the Environment and Water (2025) 'Australia's National Greenhouse Accounts'. Commonwealth of Australia. Available at: https://www.greenhouseaccounts.climatechange.gov.au/ (28 October 2025).

gains per year (in tCO_{2-e} per hectare per year) in areas of forest gain. The clearing of remnant forest vegetation results in large stock losses, resulting in average emissions of 130 tCO_{2-e} per hectare in rangeland areas and 290 tCO_{2-e} per hectare in intensive land use regions. In contrast, most of the reported increase in forest extent, which has involved native vegetation expansion (or thickening) in remnant vegetation in arid and semi-arid rangelands, results in carbon gains of around 0.0 to 0.5 tCO_{2-e} per hectare per year. Based on this, we estimate that the clearing of remnant forest in Australia's intensive regions releases approximately 23-120 times more CO_{2-e} per hectare than could plausibly be removed from the atmosphere through the thickening of existing vegetation in the rangelands, where most forest gains have occurred.[10] By any measure, there is a large disparity between most of the forest losses and gains.

Losses		Gains	
Ecosystem type	**Carbon stock (tCO_2-e ha)**	**Ecosystem type**	**Carbon stock (tCO_2-e ha yr^{-1})**
Remnant vegetation clearing in the intensive land use regions	290	Native vegetation expansion in arid and semi-arid rangelands	0.0-0.5
Regrowth clearing in intensive land use regions	46	Reforestation by environmental plantings in intensive land use regions	10.4
Remnant vegetation clearing in rangelands	130	Forest regrowth in intensive land use regions	4.4

Table 2. Average carbon stock in areas of forest loss (tCO2-e ha), and average carbon stock gain per year in areas of forest gain (tCO2-e ha yr^{-1}), 2000-2002 to 2019-2021, by region (intensive land use regions vs rangelands).

Source Roxburgh, S. et al. (2019) A revised above-ground maximum biomass layer for the Australian continent. Forest Ecology and Management 432, 264-275; and datasets shown in **Figures 2 & 4**.

RECOMMENDATIONS FOR ACCOUNTING AND REPORTING CHANGE IN FOREST COVER

A. Commit to halting and reversing gross forest loss and degradation, including as Australia's contribution to the **Glasgow Leaders' Declaration on Forests and Land Use**.

B. Commit to halting human-induced extinction of known threatened species under obligation for the **CDB Kunming-Montreal Global Biodiversity Framework**.

C. Report forest area change, disaggregated by forest type and condition:
- Classification by forest type (SoFR or **NVIS** classes) to provide ecosystem extent
- Classification by forest age and condition (ecosystem integrity)
  - Initially classes of primary, secondary, regrowth, plantings and plantation
  - Forest age or time since disturbance and type of disturbance
- Progressively include additional indicators of ecosystem composition, structure and function
- Change in forest area reported as gross gains and losses of each category of forest.

D. Change how land carbon stocks are reported so that it includes:
- Carbon stocks by area of forest type and condition class
- Gross gains and losses in carbon stocks
- Changes in carbon stocks due to area of forest change or to activities on the same area.

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10 Emissions from clearing calculated on basis of total biomass stock loss (soil organic carbon losses were excluded). Removals associated with vegetation thickening in the rangelands calculated based on plausible sequestration in biomass (live and dead) over 25 years (i.e. cumulative sequestration per hectare).