North East NSW Forestry Hub

INTEGRATING TRADITIONAL AND EMERGING MARKETS FOR TREES

Pathways for regenerative forestry in north-east NSW

A report prepared for the North East NSW Forestry Hub Incorporated

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Any and all errors and omissions are the sole responsibility of the author.

Acknowledgement of Country

The author acknowledges that this report has been prepared while living on the Country of the Widjabul Waibul people of the Bundjalung nation. Their sovereignty over the land was never ceded nor their connection to Country broken. The author recalls with sorrow the manner of the dispossession of the First Nations People of this region, the effects of which are grievous and ongoing, and pays respect to the original people of this land and their elders past, present and emerging. Care for Country. Care for People. Country Cares for us all.

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Executive Summary

Forest resource security comes from having sufficient forests, for all the many purposes they serve. This report is driven by a vision of a wealth of forest resources, and a continent healed and made whole, while maintaining and enhancing its capacity to meet human needs.

In meeting the economic needs of a growing population, past efforts to make this continent productive for our domestic markets and export-oriented economy have led to very substantial environmental degradation. In some cases, this has undercut its ongoing capacity to sustainably provide for human needs, as well as ecosystems' stability. This is true for land, biota and water. In particular, overclearing and fragmentation of forests in Australia has been a major driver of extinctions and ongoing threats to a range of plant and animal species, and ecosystems.

This report charts efforts to reverse forest decline in the second half of last century, and in this century to the present. The earliest efforts focused mostly on reserving some forests for timber supply or conservation, and on self-sufficiency in exotic softwood timber supply, and this continued until the birth of the Landcare movement around 1990. This was accompanied by efforts to secure a "comprehensive, adequate and representative" reserve system and reliable timber supplies, culminating in the National Forest Policy Statement, the Regional Forestry Agreements and the Plantations 2020 Vision.

Measures associated with increasing investment in new timber plantations led to the development of the substantially tax-driven Managed Investment Schemes. These resulted in a significant expansion of hardwood plantations, mainly managed for the production of woodchips. The demise of these schemes has led to a decrease in the area of hardwood plantations since around 2010, while the area of softwood plantations has been relatively stable for many years.

Plantation establishment rates are showing recent signs of recovery, driven by the ability to generate Australian Carbon Credit Units under the Carbon Farming Initiative (CFI), the Commonwealth's Support Plantation Establishment program and some State-based incentive schemes. However, Australia is still far from self-sufficient in meeting its own timber needs. All these initiatives were developed against the background of increasing pressure from some environmentalists to manage more, and recently all, native forests for conservation in protected areas.

Neither Landcare nor new timber plantation development had produced durable solutions to the environmental degradation and resource insecurity issues they were meant to address, and there has been a recent broad acceptance that new and additional measures are required. This was notably the case in the Final Report of the Samuel Review of the Environmental Protection and Biodiversity Conservation Act (EPBC Act) in 2020 and Australia's 2021 State of the Environment Report.

Since 2010 we have seen the development of both a market for Australian Carbon Credit Units (ACCUs), now maturing, and a nascent market for Biodiversity Certificates issued under the Nature Repair Act 2023. While Landcare activities have enjoyed substantial multi-year budgets, including when Prime Minister Howard famously promised to put a billion dollars into the Natural Heritage Trust in 1996, carbon markets are now approaching a billion dollars per

annum, and they are still growing strongly, with nature and farm-based projects receiving most of the investment.

The Nature Repair Market has its first finalised methodology for certifying environmental planting projects' biodiversity benefits. Methodologies for a wide range of other biodiversity protection and enhancement project types are expected to follow. Since carbon sequestration projects can "stack" Biodiversity Certificates and ACCUs, it can be expected that Biodiversity Certificates will provide a significant additional incentive for environmental plantings and other project types that provide carbon sequestration and/or biodiversity benefits.

It is also possible that by gaining experience through the conduct of a voluntary scheme to certify biodiversity benefits, the Commonwealth could bring forward an improved system of offsets to development impacts under the EPBC Act. This would further encourage the development of projects aiming for certified regeneration of ecosystems through strengthened demand in a mandatory market.

For these drivers for investment in plantation forests and ecosystem repair projects to achieve maximum benefit, it is argued in this report that a more nuanced policy and regulatory framework is required. This report is focussed on arrangements for carbon markets to better align sustained carbon storage (necessary for valid offsets to emissions of fossil carbon) with management of forests, land and water that is ecologically, economically and socially sustainable in the long term.

It is recommended that regional communities and stakeholder groups, assisted by agencies and scientific researchers, should be supported to develop new regional plans. These should strategically target timber plantation development to efficiently meet the needs of value adding industries and a growing population, in addition to prioritising action on forest, biodiversity, land and water degradation issues, while considering their extent, impact, urgency and priority for financial support.

It is recommended that registration of new carbon and biodiversity projects should be conditional on their contribution to carrying out these new regional plans, as they become available. There is already a Commonwealth commitment to new regional plans under the Nature Positive Plan of the Albanese Labor government, although their exact intent and content remains unclear pending the development of an applicable National Environmental Standard.

It is important that planning for reforestation for environmental and timber production purposes consider the ways in which they can be integrated and/or complementary, as there can and should be both overlap and synergies. One way in which this could be important is in securing long term income streams from timber production from sustainably managed new forests, after they have reached the end of the carbon crediting periods.

The Nature Positive Plan of the Albanese Labor Government represents a fundamental change in Australia's approach to management of the environment. For many decades the national environmental discourse has been conducted between the poles of conservation and development. The Nature Positive approach, recommended by the Samuel Review, puts development and regeneration at the poles of the discourse. Balancing development with regeneration can lead to conservation (or sustainable development) as the net result, and eventually underpin a circular economy based increasingly on renewable resources.

It is recommended that the Commonwealth inquire more deeply into issues of permanence and risk in relation to forest and landscape carbon projects. Associated with this, the report discusses legal arrangements for the registration of management plans to secure a range of environmental outcomes on land titles, an approach already taken up by State legislation allowing for Carbon Rights, Forestry Rights and Conservation Covenants.

The report recommends development of a new CFI methodology to support biodiverse, multiple use ecoforestry plantations that can be sustainably managed for timber production and environmental benefits. This proposed project type can potentially access multiple income streams from timber, carbon and grazing, and possibly biodiversity payments, and therefore has potential to be highly scalable, particularly in coastal and adjacent higher rainfall landscapes.

The report recommends measures to improve the social license for forestry. To do so it is necessary to credibly position forestry (based increasingly on planted forests over time) as an industry that can help deliver environmental outcomes, while providing timber for the forest industries of tomorrow, including where integrated value-adding processes extract maximum value from renewable raw materials in the circular economy.

The report notes that plantation expansion has a significant time lag before large timber volumes are produced, so it will be many years before our current national trade deficit in timber products of over $4 billion per annum can be overcome. Moreover, timber industry sources indicate that to make up for historical shortfalls in housing construction and meet current demand over the next decade, around 40% of the softwood construction grade timber required at least until 2035 will need to be imported.

Since carbon sequestration in planted forests starts early and peaks, on average, around 12 years after tree establishment, it can provide strategically timed income to timber growers through sale of ACCUs, to combat the effect of compound interest and/or discount rates on planted forest investments before returns from thinning and harvest accrue. The report recommends development and use of decision support and other tools to enable land managers and investors to better optimise between carbon, timber and other income streams.

It also recommends complementary work be undertaken to examine the investment value of the range of reforestation opportunities in the region, potentially producing “heat maps’ of relatively favourable investment opportunities. It could also provide policy makers and legislators with information regarding where additional public funds may need to be directed to make project types with high public benefits but less financial investment value, such as riparian restoration or rainforest regeneration, more viable.

Mixed species environmental plantings already appear to be scaling up, in response to carbon market finance. This can be expected to accelerate if industry expectations of increasing prices for ACCUs into the 2030s, and more speculatively beyond, are met. Demand for Biodiversity Certificates, offsets required under State legislation and possibly offsets under the EPBC Act could substantially reinforce the investment value of this type of project.

With reforestation at the scale envisaged in this report, sustained timber yields could, over time, supply traditional sawn and roundwood timber industries at scale, along with new industries producing biochar, biofuels, bioplastics, biochemicals and biopharmaceuticals. The new forests would also restore the ecological fabric of our continent, protect our catchments, and support sustainable agriculture.

This will require the maturing of a nascent environmental repair and plantation development industry that can deliver the scale of regeneration and reforestation required, driven by new finance from environmental markets and ongoing public financial and other support, from all levels of government. These financial drivers need to be constrained within a framework of policies, legislation and regulation, strategies, plans, programs, incentives and administrative arrangements that effectively align these new investments with best practice in timber plantation development, natural resource management, and environmental regeneration.

Terminology

Some terms used in this report require definition to better enable readers' understanding. Definitions may be unique to this report in some cases.

Plantings refers to establishment on cleared land of trees and/or other vegetation by planting of seedlings from pots or tubes or by direct seeding or a combination of these means. It also includes maintenance and management operations necessary for levels of plant survival and early growth required to ensure the land and vegetation system can achieve its intended management objectives.

Timber plantations refers to plantings primarily intended for timber harvest, usually of one or a very limited range of species often including exotic species, established in large blocks so that planting, management and harvesting can be efficiently and economically undertaken, and located within economic haulage distance of timber processing and/or transport facilities.

Farm forestry (including agroforestry) refers to plantings of trees on rural landholdings for purposes often including harvest for either use on-farm, or for off-farm uses including sale of timber or other forest produce. The plantings will usually be integrated into farm landscapes to provide multiple benefits such as shade and shelter for livestock, crops or pasture, erosion, salinity and weed control, benefits to biodiversity including natural pest control, and landscape amenity.

Environmental plantings refers to plantings, typically of a wide range of locally endemic species, intended to address one or more identified environmental degradation issues such as biodiversity loss, lack of habitat for native animals, need for habitat connectivity, soil stabilisation or erosion control in waterways or drainage lines etc. Harvesting of timber or other forest produce is generally not an intended use and may be proscribed or limited by agreed management plans. Plantings are generally expected to lead to permanent forests.

Ecoforestry refers to establishment of new forests in rural landscapes that share some significant characteristics of environmental plantings with those of either farm forestry of timber plantations. It could more closely resemble either plantations or farm forestry in scale and management objectives. It's primary distinguishing features are that sustainable harvest of forest produce (without broad scale clearfelling) could be practiced, that the species chosen for establishment should make a significant contribution to conservation or enhancement of biodiversity, including provision of habitat and landscape connectivity, and that it may also address other landscape degradation issues. Ecoforestry would eventually result in the establishment of new, multiple use forests resembling native forests, potentially including adaptations to suit changed site or climatic conditions.

Reforestation for multiple uses includes ecoforestry and farm forestry, as both can include silvicultural treatments and harvesting, along with the provision of other environmental, productivity or sustainability benefits.

Private native forestry is active management of native forests on private land, which may include use of silvicultural or regeneration techniques, for multiple uses including timber production and/or biodiversity conservation. It is not given significant consideration in this report as there are not yet any applicable methodologies under the CFI or Nature Repair Market. This is not to say that there are not significant opportunities under both schemes in the future, but examining these would require a larger or additional report. Similar considerations have also precluded a fuller examination of how private native forestry could usefully conserve and regenerate biodiversity under offset schemes.

Forests refers to an area, incorporating all living and non-living components, that is dominated by woody vegetation 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 equal to or greater than 20 per cent. This includes Australia's diverse native forests and plantations, regardless of age. (ABARES, 2024a) It also encompasses some areas of trees that are described as woodlands. It therefore covers forest as would normally be understood and also more lightly timbered woodlands, but does not cover very sparse woodlands, shrublands or rangelands.

Key Findings

1. Neither Landcare nor new timber plantation development have produced durable solutions to the environmental degradation and resource insecurity issues they were meant to address, and there has been a recent broad acceptance that new and additional measures are required.

2. Timber plantation establishment rates are showing recent signs of recovery for softwood, driven by the Commonwealth's Support Plantation Establishment grants, State government initiatives, and the ability to generate Australian Carbon Credit Units, but there has been very little investment in new hardwood timber plantations. Australia remains far from self-sufficient in meeting its own timber needs so even with significant investment in new planted forests it will be many decades before the current national trade deficit in timber products can be overcome.

3. Integrating traditional markets for timber with emerging environmental services markets has potential to drive investment in reforestation for ecological restoration and forest products at scale. The additional returns from markets for environmental services, the timing of those returns, and the contribution of new forests to providing timber, sustainable management of natural resources and conservation of biodiversity, if communicated effectively, can lead to the development of a much more favourable investment climate for reforestation investments, across the ecosystem of possible investors and the spectrum of investment opportunities.

4. Ecoforestry, or the integration of thinning and harvest into the management of ecologically regenerative new planted forests, could be a major new form of forest establishment if given appropriate encouragement. Ecoforestry bridges the gap between forest establishment for timber and environmental benefits, filling the middle in the spectrum of reforestation investment opportunities. Ecoforestry has the benefit of diversifying the productive use of rural land and can be readily integrated with established farm production. Ecoforestry could potentially benefit from multiple cash flows including from timber production, carbon sequestration, grazing, biodiversity enhancement, and environmental restoration.

5. In the establishment and management of new forests it is not possible to maximise income from all possible sources, but it is both possible and economically efficient to optimise between them. Information and tools need to be developed and made widely available to enable this.

6. A more nuanced policy and regulatory framework for the carbon market is required, to better align sustained carbon storage with management of vegetation, land and water that is ecologically, economically and socially sustainable. Consistent with this, carbon risks and liabilities need to be more fully considered to ensure that contingent financial liabilities and risks of re-emission are adequately managed over extended timeframes.

7. Policies, planning processes and instruments, regulatory arrangements and incentive programs of all levels of government need review, and could require fine tuning, to support a more proactive approach to regeneration of our natural environment and achievement of self-sufficiency in forest produce. This needs to include ensuring a supportive broader regulatory framework to support ongoing development and implementation of markets for environmental services, and greater community and stakeholder involvement and ownership, particularly at regional and local scales.

8. Aggregation of environmental market projects can bring efficiencies in provision of required professional services, facilitate institutional and other investments to deliver environmental benefits at scale, and provide additional risk management opportunities, and are particularly relevant in the coastal zone where properties are smaller and land values are higher.

9. Project proponents, landowners engaging cooperatively in markets for environmental services, aggregators pooling many individual projects, and finance providers for their projects may all get greater assurance of desirable commercial and risk management outcomes where the continuing performance of obligations is secured through registration of rights to environmental outcomes as real property on property titles.

Recommendations

Recommendation 1: It is recommended that the NE NSW Forestry Hub support development of a proposed new CFI methodology for ecoforestry plantations (reforestation for multiple uses including sustainable timber production, biodiversity conservation, and landscape, catchment and other benefits). (Page 31)

Recommendation 2: It is recommended that, as a first step in building regional capacity for engagement in environmental services markets, the NE NSW Forestry Hub invite Southern Cross University and other stakeholders to jointly convene a seminar to assess the availability of forest mensuration data, allometrics, inventory methods etc to better enable calibration of forest growth and carbon accumulation models specific to the Hub area, for commercially significant environmental, ecoforestry and timber plantation types. If successful, his could be a prototype for a seminar series examining other aspects of regional capacity to benefit from environmental markets, including new methodology proposals. (Page 32)

Recommendation 3: It is recommended that the NE NSW Forestry Hub, with other stakeholders, identify and/or seek funding to develop or enhance decision support tools to better enable optimising between timber, grazing, carbon and biodiversity revenue streams. (Page 38)

Recommendation 4: It is recommended that the NE NSW Forestry Hub allocate or seek funding to enable analysis, including spatial analysis, of indicative returns from the range of reforestation investment opportunities within the Hub area that are identified in this report. (Page 38)

Recommendation 5: It is recommended that North East NSW forest stakeholders and relevant agencies put the NSW North Coast forward as a pilot area for development of a Nature Positive regional plan, as flagged by the Commonwealth in its Nature Repair Plan. If this is unsuccessful an alternative is for the regional community of interest to collaborate to identify and obtain funding to develop comprehensive planning, including spatial plans, to strategically target reforestation for both timber production and environmental repair. (Page 38)

Recommendation 6: It is recommended that the Commonwealth give a high priority to finalising its proposed National Environmental Standard for regional plans under the Nature Positive Plan, and accelerate the process to implement the plans to give national coverage, including by providing funding to responsible and representative organisations, noting that as far as possible the regional organisations should be community, local government, and industry stakeholder led, with agency support. It should also be noted that forest industries are significant industry stakeholders in many regions and their views and needs will be important to consider if Nature Positive is to achieve sustained improvements in vegetation management for human as well as nature benefits. (Page 40)

Recommendation 7: It is recommended that certified consistency with Nature Positive regional plans, when they are finalised, be a mandatory requirement for both CFI farm and vegetation projects and Nature Repair Market projects. Implementation of works to deliver the regional plans should also be supported by targeted incentives, and industry, business and landholder supports including promotion and extension. (Page 40)

Recommendation 8: It is recommended that regional stakeholders, directly and if possible through their national affiliations, support the Carbon Market Institute and NRM Regions

Australia in their efforts to harmonise the carbon and Nature Repair Markets in Australia. (Page 40)

Recommendation 9: It is recommended that interested regional or other forest stakeholders initiate discussions with relevant authorities to see if a Nature Repair Market methodology could be developed to certify the biodiversity benefits of ecoforestry. (Page 49)

Recommendation 10: It is recommended that the Commonwealth commission further research to quantify possible loss of landscape carbon in respect of which ACCUs have been issued, over project permanence periods, including where such losses may result from the likely impacts of climate change. This should build on the qualitative work in this area already done by the CSIRO. (Page 50)

Recommendation 11: It is recommended that forest stakeholders and their representative organisations in the region inform themselves about, and actively engage in, policy discussions around "permanence" and management of risks to the environmental, social and economic benefits and assets created as a result of the operation of markets for environmental services. In doing so it is suggested that aligning the operation of these markets with natural resource management that is environmentally, economically and socially sustainable in the long terms should be the overall goal. (Page 53)

Recommendation 12. It is recommended that the Commonwealth examine the differing forms of state and territory Carbon Rights legislation and consider whether it could play a role in encouraging adoption of best practice state legislation, for example by enacting best practice legislation for the Territories and encouraging emulation, through COAG discussion, or otherwise. In considering Carbon Rights legislation it could also be considered whether these should be a separate system to Conservation Covenants and Forestry Rights, bearing in mind that securing environmental outcomes as real property will generally entail a management plan registered on one or more land titles, and that one plan could prescribe management to deliver carbon, biodiversity, landscape or water protection, and/or timber production outcomes. (Page 56)

Recommendation 13: Regional stakeholder organisations representing landcare, environmental, farming and timber industry interests should share a leadership role in promoting the benefits of large-scale reforestation for environmental repair, sustainable agriculture and timber production, including hybrid or ecoforestry approaches, with a view to occupying and sharing the middle ground in the social discourse around trees and forests and their values. (Page 66)

Recommendation 14. It is recommended that consultation led jointly by appropriate Commonwealth and State agencies seek to identify appropriate regions and regional administrative structures to enhance community participation and/or leadership in repair of nature and development of new forest resources, including in planning and resource allocation, and community and landholder engagement. (Page 68)

Recommendation 15: It is recommended that further research and consultation with stakeholders be undertaken by the NE NSW Forestry Hub to determine if any changes to the Plantations and Reafforestation Act 1999 or the Plantations and Reafforestation (Code) Regulation 2001 are desirable to remove any unintended impediments to environmental carbon plantings, or to optimising environmental, carbon and timber outcomes from planted forest developments. (Page 68)

Recommendation 16: It is recommended that the NE NSW Forestry Hub seek to contract, or join with others to contract, preparation of a more focused and detailed report on the application of tax laws to the various classes of possible investors in timber, carbon and environmental forestry. (Page 71)

Recommendation 17: It is recommended that the NE NSW Forestry Hub consider organising, with other environmental market stakeholders in the region and within the next two years, an environmental services and markets trade event to encourage and allow service providers, project developers, aggregators and others to interface directly with potential clients. This could be held in conjunction with a conference focused on the implementation of environmental market projects in the coastal zone, which would allow interface between landholders, service providers, project developers, policy makers, regulators and other government and private stakeholders. (Page 76)

Introduction

This report seeks to position markets for environmental services within an historical context, to better understand their importance and functioning. In doing so, the report charts a national journey, undertaken over the last fifty years or so and that will extend into the future, from a primarily extractive and utilitarian view of our environment and natural resources towards a relationship based on repair, regeneration and ongoing adaptive and sustainable management.

This journey leads towards an appreciation that we are an interdependent part of the enormously complex relationships that support us and the range of life forms with which we share our continent. The development of markets for environmental services, within the context of a nature positive approach to managing the environment, is an important new milestone on that journey.

A range of government policies and initiatives have reflected and reinforced, and sometimes led, these changed attitudes over time. It remains a work in progress. In the 1960s and 70s a program to establish additional pine plantations occupied an almost exclusive position in national reforestation efforts and land clearing for agriculture was rampant. Since then, we have seen the birth and development of Landcare, more substantial efforts to become self-sufficient in timber, increasing protection and sustainable management of our natural forests and woodlands, and most recently prioritisation of repair, regeneration, and active stewardship that goes well beyond passive conservation or band aid approaches to repair.

Importantly, harnessing markets for environmental services, delivered in a complementary way with existing Landcare funding priorities and funded activities through shared regional planning processes, can lift regeneration activities to the same scale as the environmental degradation problems they are meant to address.

Nature Positive means our environment improves year on year. This reverses the trend since European settlement of progressive deterioration in the area and quality of our forests and natural areas, as well as degradation of the basis for our agricultural and pastoral productivity, the land. Nature Positive shifts the environmental discourse from being between the poles of resource use and conservation, to one that places regeneration opposite resource use. Conservation, or sustainable development, thereby becomes an attainable outcome.

Markets for environmental services can provide a driver for investment in ecological restoration and repair of the environment at scale. However, they need to be targeted effectively to strategically address priority environmental and sustainable production issues. If this is done well, they can optimally support aspirations for improved environmental quality now and in the future, while also maintaining and improving the productive capacities of our continent to provide for human needs.

Sustainable and resilient new planted forests in NE NSW

The creation of functional ecological corridors at continental and regional scales, particularly allowing north to south migration, will be of great importance if global warming impacts on Australia's biodiversity are to be minimised in coming decades. Moreover, given that the areas of new forest and other native vegetation augmenting and buffering such functional corridors will be managed from the time of planning and establishment, there may well be potential to actively assist the migration of plant and animal species to climates to which they are better adapted, over time.

In eastern Australia, for example, this could translate to a managed “sheath” of new native vegetation supporting a functional ecological corridor linking existing natural forests and roughly following the Great Dividing Range from Cape York to Gippsland. Regionally it would manifest as corridor networks allowing species to migrate between existing areas of high biodiversity and along ecotones including from coastal environments to the ranges.

In northeast NSW, optimal landscape management to support this would take into consideration the need to protect valuable agricultural and pastoral land for ongoing sustainable production, and the region’s great potential for wood and timber production. It could address significant threats to biodiversity, and land and water degradation issues through species recovery plans and provision of additional habitat across ecosystems, and plans for flood mitigation, riparian and wetland restoration, erosion control and other catchment protection.

At a farm scale enhanced vegetation cover would maintain or improve productivity, help address weed infestation, provide shade and shelter for livestock and diversify farm income through sale of carbon credits and/or timber and/or payments for other environmental services.

A catchphrase that has seen a lot of use over recent decades is “the right forest in the right place for the right reason”. At the landscape scale in northeast NSW, this prompts a vision of integrated forest and farming land where land is used within its capability, for its most productive uses, and in a way that its capacity for both production of goods and services, and conservation of nature, is optimised and sustained into the future.

Delivering the vision outlined above would require, among other things, securing substantial investment into three project types, namely timber plantations established for intensive wood production close to value-adding and transport infrastructure, environmental plantings purely for environmental and biodiversity protection and enhancement, and reforestation for multiple uses including for climatic, timber production, environmental, and other sustainability benefits.

Delivering the vision would also entail substantial growth of the emerging regional environmental repair industry, including its workforce, skills base and administrative and commercial infrastructure. Positioning the region to take advantage of markets for environmental services can provide a significant new source of investment. Steering this new investment and public resources to deliver the range of objectives outlined above, through participatory regional and local planning processes, would empower the regional community to work towards an environment that has capability to meet the range of human needs while repairing its natural attributes. A regional environment that we can continue to enjoy and be proud of handing to future generations.

The North East NSW Forestry Hub region

This report was commissioned by the North East NSW Forestry Hub. The region served by the Hub's activities covers the Upper North East and Lower North East Regional Forest Agreement areas. Together these cover from the Hawkesbury River in the south to the Queensland border in the north and extend from the coast up onto the Northern Tablelands.

This is a total area of 9,718,300 hectares (2rog Consulting, 2022). Of this area, 5,611,717 hectares is forested. Major tenure classes are shown below.

Tenure	Area (ha)	% of forested area
Crown leasehold	50,106	0.9
Crown – other	154,003	2.7
National Park	1,934,126	34.6
State Forest	847,510	15.1
Private	2,624,812	46.8
Indigenous owned	1,140	<0.1

Table 1. Areas of forested land in different tenures in the NE NSW Forestry Hub area
From NSW RFA Native Forest by Tenure dashboard (2025). NSW DPIRD, access here.

Three IBRA regions are partially represented in the Hub area, being the NSW North Coast, South Eastern Queensland and New England Tablelands bioregions. These bioregions have protected areas comprising 26.54%, 14.81% and 10.73% respectively of their total areas.

The Hub area includes a coastal strip of varying width and relatively low elevation, with substantial alluvial plains along the many river systems draining to the coast. Rugged and mountainous country, mostly forested, occurs to the west of the coastal strip up to the spine of the Great Dividing Range, where the Northern Tablelands slope more gently, mostly draining to the west into the Murray Darling system.

The hinterland and some coastal areas contain very significant areas of contiguous forest, with extensive clearing for agriculture mainly in areas with lower relief and better soils. These areas are mainly in the coastal strip, along the alluvial systems flanking rivers and streams, in the foothills and on the Tablelands. Overclearing has led to very extensive weed infestation in many areas, including for example largely unchecked spread of Camphor Laurel, lantana, privet and other weeds in the Northern Rivers and elsewhere.

Rainforests that occurred extensively in the region at the time of European settlement have been largely cleared except where topography made the timber difficult to extract. For example, the Big Scrub lowland subtropical rainforest that used to occupy 80,000 hectares between Lismore and Ballina in the north of the region had been cleared on all except 0.5% of its original range. Recent efforts have protected the remnants, and they are now being enthusiastically regenerated and expanded. All other remaining rainforests in the region are also protected by legislation. Acrimonious disputes about the ongoing use of some public native forests for hardwood timber production are ongoing.

The NE NSW Forestry Hub has commissioned research into the suitability of land within the region to support new timber plantations and environmental plantings. Extensive areas were identified as discussed elsewhere in this report.

The case for new planted forests

New forests for environmental and ecological benefits

Since colonisation of the Australian continent by Europeans around 230 years ago, roughly 40% of its forests have been cleared, mainly for agriculture and pastoralism. Clearing has particularly focused on forests growing on fertile and arable soils in areas with low to moderate relief and adequate rainfall, where agriculture and grazing can be profitably practiced.

Of the forest remaining, a substantial area has been subject to fragmentation, timber harvesting with varying degrees of sustainable management, and severe and increasing impacts from fire and invasive weeds (Bradshaw, 2012). Strategies to manage and regenerate forests and biodiversity in Australia will need to factor in the impacts of climate change on ecosystems, including those providing for a range of human needs. Strategies to manage forest biomass and biodiversity can contribute to both climate change mitigation and adaptation, but need multi-scaled plans and responses, particularly at the regional scale, as discussed later.

The area of forest in Australia decreased annually from the time of European settlement until 2008, and has increased each year since then, as shown in Chart 1 below. The recent increase is the outcome of a range of factors including:

- natural expansion of forest onto areas of grassland that have not held forest for many years
- clearing of forest for agriculture, regrowth of forest onto recently cleared land, and re-clearing of regrowth forest
- clearing of forest for urban expansion, mining or other infrastructure
- changes in the area of commercial plantations
- new environmental plantings and assisted regeneration
- changes in the area of mangroves.

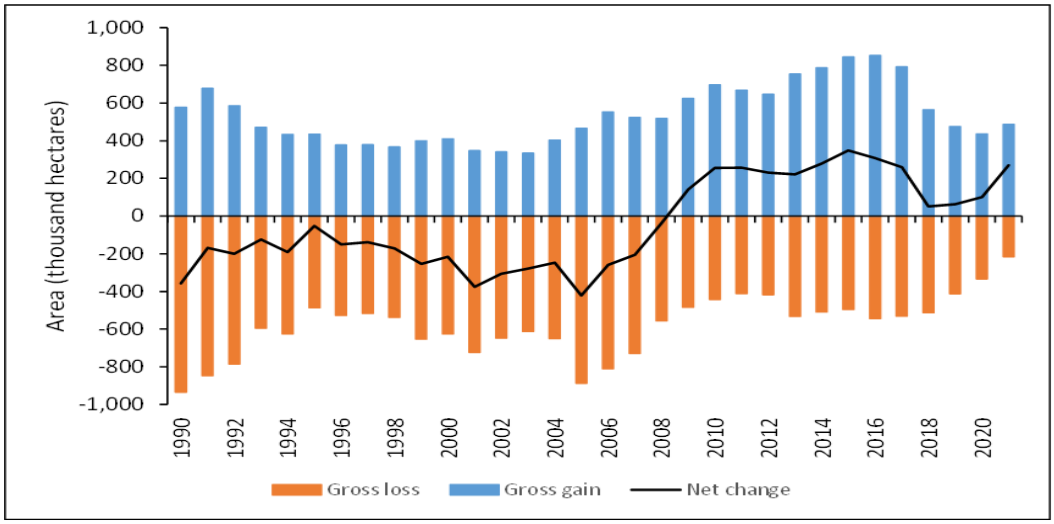

Chart 1: Annual gains and losses and net change in Australia's forest area, 1990 to 2021 (ABARES, 2024a) *(Access full report here)*

The greatest factors have been conversions of grasslands to forest, much of which was not due to direct human intervention, and forest to grassland, which is the net effect of diminishing clearing and reclearing activity, and regrowth on relatively recently cleared land. This is

illustrated in Chart 2 below, which shows the significant decrease in clearing in recent years, especially of previously uncleared forest.

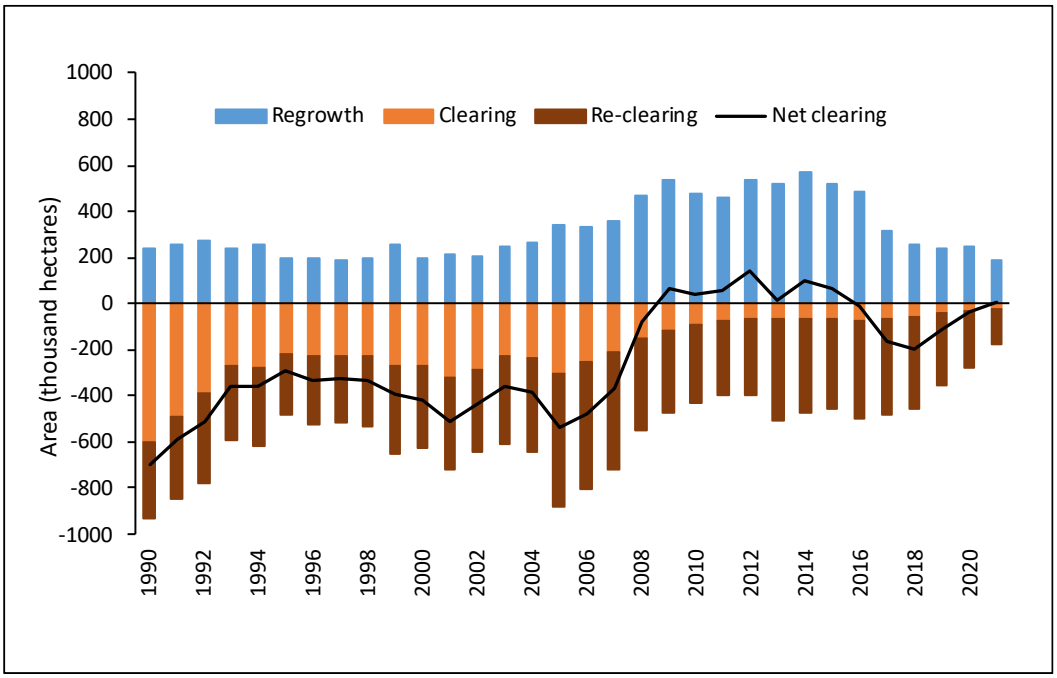

Chart 2. Annual areas of forest cleared, regrown, and re-cleared, 1990 to 2021 (ABARES, 2024a) *(Access full report here)*

According to *Australia's State of the Forests Report - Synthesis 2023*, in June 2021 Australia had 133.6 million hectares of forest, covering 17% of its landmass. This was made up of 131.5 million hectares of natural forest dominated by native tree species, 1.71 million hectares of commercial timber plantations and 0.24 million hectares of other planted forests comprising environmental plantings, sandalwood plantations and non-commercial plantations. 48.9 million hectares of Australia's natural forest is managed for biodiversity protection.

Historical forest clearance, fragmentation and degradation has resulted in significant environmental impacts[1] including threats to plant and animal ecosystems and species, including extinctions (Goncalves-Souza, Chase, & Haddad, 2025), net greenhouse gas emissions, compromised catchment values including impacts on water quality and reliability of stream flows, degraded aquatic habitats, salinity, and impacts on microclimates, soil biota and soil structural characteristics[2]. (Bradshaw, 2012) New forests are needed in Australia to ameliorate these problems, including through their ability to reduce atmospheric concentrations of carbon dioxide by storing atmospheric carbon in plant tissue and other organic matter.

Significant and accelerating local, regional and continental scale climatic changes associated with global warming are expected to exacerbate, and further complicate responses to, these environmental issues and threats to biodiversity. There is already strong evidence of measurable climate change effects on biodiversity. There is a need to link existing habitats to enable species migration and adaptation in fragmented landscapes at local to regional scales. (Lindenmayer, et al., 2010)

[1] A national approach to biodiversity decline
[2] Australia's strategy for nature 2024-2030

At regional to national scales, assisting genetic dispersal to more favourable climatic zones may also become important, particularly where species' ability to migrate is too slow to keep up with shifts in their preferred climatic envelopes. Increased frequency and severity of the impacts of wildfire, and the impacts of invasive species, will also need to be managed. (Canadell, et al., 2021)

The first significant Commonwealth initiative to support tree establishment to address environmental degradation was the National Tree Program, which was announced by Prime Minister Malcolm Fraser in 1982. The stated goal of the program was to reverse tree decline by the Bicentenary of European settlement, 1988. This goal was subsequently abandoned as unrealistic. In our Bicentenary year, the National Tree Program, the National Afforestation Program and the National Soil Conservation Program had funding, between them, of $8.5 million.

In 1989 Prime Minister Hawke announced that 1990 to 2000 was to be declared the Decade of Landcare. The National Landcare Program (NLP) was initiated with funding of around $32 million per annum. Also announced was the (first) One Billion Trees program. While the NLP and the One Billion Trees program raised a lot of awareness of the need for sustainable forest and land management, stimulated many community regeneration and repair projects, and contributed to skills and knowledge development, it did not keep pace with clearing of remnant and regrowth forest that continued at high levels throughout the Decade, nor have substantial impacts at scale on ongoing biodiversity decline or land and water degradation.

The early National Landcare Program has been followed by many related, expanded, and supporting initiatives including the ~$2 billion environmental labour market programs funded by the Hawke and Keating governments in 1992 and abolished by the Howard government in 1996, the Natural Heritage Trust, the Green Corps from 1997 to the early 2000s and the Green Army from 2014 to 2017, the National Action Plan for Salinity and Water Quality, Caring for our Country Phases 1 and 2, the Working on Country indigenous rangers program, funding for Indigenous Protected Areas, and support for the 54 Natural Resource Management regional organisations.

From 2023 Commonwealth natural resource management, sustainable agriculture and environmental protection funding and grant programs in the tradition of Landcare are once more centralised under the Natural Heritage Trust, with funding of $1.1 billion over five years,[3]including working with and through the 54 NRM Regions.

Since 2012, vegetation projects for greenhouse gas emissions abatement under the Carbon Farming Initiative have been ramping up in scale and number of project types. In 2023, the Commonwealth established the Nature Repair Market. This will allow for the issue of tradable Biodiversity Certificates to projects that produce durable contributions to conservation and enhancement of native biodiversity. These constitute the emerging markets with which this report is concerned, and they are dealt with in detail in later sections.

A result of all these trends has been emergence of a significant new industry based around environmental repair and regeneration, and increased professionalism in those who work in this industry. Green employment and training schemes such as the environmental labour market programs in the early 90s, and subsequently the Green Corps, Green Army and Ranger programs have assisted in this regard. Ongoing growth of this industry will be required to

[3] The Natural Heritage Trust - DCCEEW

undertake the scale of works required to reverse environmental and biodiversity decline in Australia, and this growth should be supported through appropriate industry assistance and workforce development, including through building on the existing Indigenous Ranger programs.

In recent years there has been broad recognition, including by governments, of the need for new approaches to environmental protection and repair. Australia's 2021 State of the Environment Report[4] found that climate change, unsustainable use of natural resources, habitat loss, invasive species, fire and pollution are driving a decline in the condition of our natural environment, including extinctions, and increasingly threatening ecological communities and vulnerable plant and animal species.

The Samuel Review of the Environmental Protection and Biodiversity Conservation Act,[5] published in 2020 also found that our natural environment was deteriorating and that current approaches to reverse this trend were inadequate.

> The Nature Positive Plan
>
> The Commonwealth response to the Samuel Review is called the Nature Positive Plan, published in December 2022. According to the Plan, Nature Positive is a term used to describe circumstances where nature – species and ecosystems – is being repaired and is regenerating rather than being in decline. This is a fundamental shift in the environmental discourse in Australia, which has in the past focused on compromise between resource use and conservation. Nature Positive looks at resource use and regeneration as the poles of the discourse. Where these are in balance, conservation (or sustainable development) is an attainable outcome.

Relevant new initiatives in the Nature Positive Plan include driving private investment in repair of nature through the development of markets for environmental services; developing, delivering and empowering relevant national strategies such as for biodiversity conservation[6] and climate change adaptation[7]; and developing new regional plans to better target available resources to strategically address Matters of National Environmental Significance.

Green Bonds are another recent initiative, that have been issued by national governments across the world since 2016. In Australia they are Commonwealth Government-backed debt instruments. The Australian Office of Financial Management issued the first Green Treasury Bond in June 2024. It was a $7 billion 10-year bond, with investors receiving regular interest payments until maturity, at which time their capital is returned.

Funds raised by the Commonwealth are to be invested in environmentally preferred industries, such as renewable energy transmission through Rewiring the Nation, measures to protect the Great Barrier Reef and water buybacks in the Murray-Darling Basin. Smaller allocations with possible benefits for vegetation management include the Saving Koalas Fund with $24.8million,

[4] Australia state of the environment 2021
[5] Independent Review of the EPBC Act – Final Report October 2020
[6] Australia's strategy for nature 2024-2030
[7] National Climate Resilience and Adaptation Strategy 2021 to 2025

projected to support 5,564 ha of koala habitat[8]. While only minor investments are currently vegetation related, Green Bonds could become more significant to forest management and reforestation in the future.

A 2022 paper (Mappin, 2022) from a team of scientists led by Bonnie Mappin from the University of Queensland has developed high level estimates of the costs, and carbon sequestration benefits, of restoring 30% of each Australian degraded terrestrial ecosystem. They found that spending approximately AU$2 billion p.a. for 30 years could restore 13 million ha of degraded land without affecting intensive agriculture and urban areas.

They calculate that this initiative would result in almost all (99.8%) of Australia's degraded terrestrial ecosystems reaching 30% vegetation coverage, enabling a trajectory to recover critical ecological functions, abate almost one billion tonnes of carbon dioxide equivalent and produce AU$12– 46 billion net present value in carbon credit revenue.

Under the Carbon Farming Initiative, environmental planting methodologies had resulted in the issuance of 3,178,929 ACCUs up to the end of February 2025. While this is only ~2% of the 160,879,144 ACCUs issued in total, sale of ACCUs would represent a significant early return on investment for those projects. Given that environmental planting projects receive a premium price for ACCUs based on their environmental benefits, it can be expected that there will be increased investment in this project type. This will be driven by the expectation of current and future returns from the carbon market, reinforced by operation of the Nature Repair Market.

Timber plantations

Apart from the environmental services provided by forests, we need them for timber production, and a range of other forest products such as oils, seeds, flowers, biochar, biofuels and many others. Multiple use forests and timber plantations also sequester carbon including in timber products, provide habitat and other environmental benefits, support some grazing, and provide opportunities for active and passive recreation.

Early European settlers in Australia found a wealth of useful tree species including those producing valuable timbers for domestic use as well as for export. However, deforestation, degradation and fragmentation of forests has left us with a native forest resource base which is the subject of ongoing dispute regarding its use for timber production or conservation, and from which the supply of wood products has been decreasing over the last few decades.

Australia’s plantation estate was 1.71 million hectares in 2022-23, having declined marginally (0.4%) compared to the previous year. Most of this decline was through hardwood plantations being converted to another land use, and they declined by 1.5% to 677.6 thousand hectares. Softwood plantations increased by 0.2% to 1 million hectares. (ABARES, 2024b) Timber plantations currently represent a very small proportion of rural land use, having accounted for around 0.5% of 371 million hectares of agricultural land holdings in Australia in 2015–16.

[8] Green Treasury Bonds 2025 Allocation and Impact Report on a page

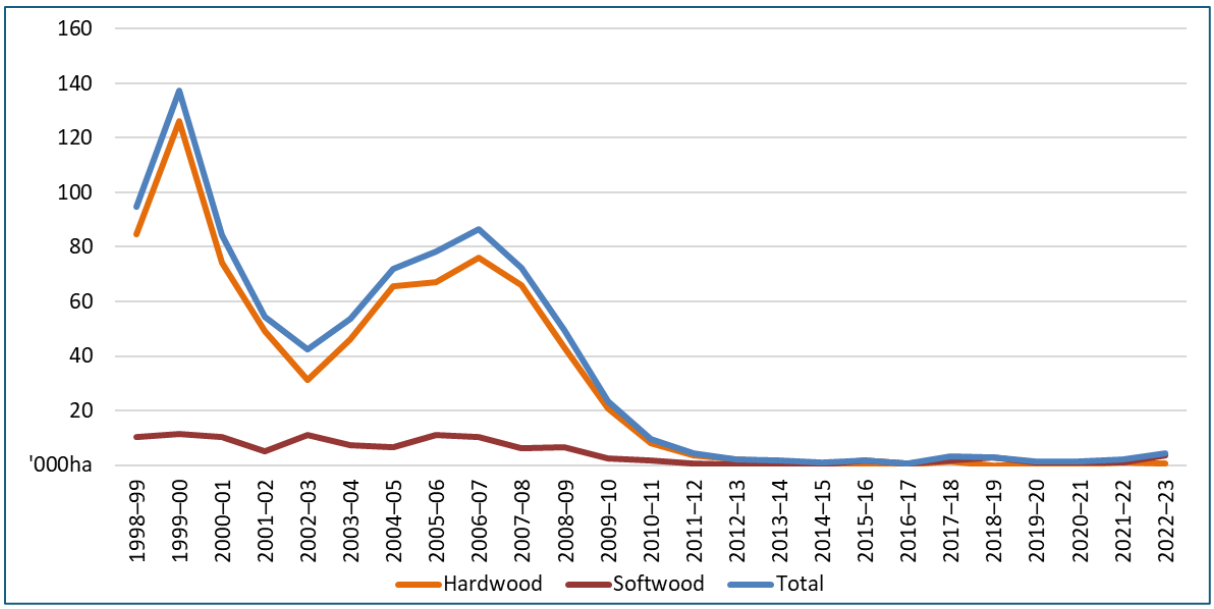

Chart 3. Area of new plantation forest established in Australia from 1998/99 until 2022/23
Source ABARES 2024

Approximately 90% of the total logs harvested in Australia now come from timber plantations, with native forestry accounting for the remainder. In 2022-23 the softwood plantation estate produced over 99% of all softwood logs, while hardwood plantations produced 78% of all hardwood logs. Most of the hardwood pulplogs (88%) were harvested from hardwood plantations and most of the hardwood sawlogs (61%) were harvested from native forests.

In NSW, in 2023/24 714,000m^3 (70%) of hardwood logs were harvested from native forests and 303,000m3 (30%) from plantations. Native forest hardwood logs had a gross value of $A101million while plantation logs had a gross value of $A35million. (ABARES, 2025)

In 2022/23 the total volume of logs harvested from Australian forests was 25 million cubic metres with a value of $A2.443 billion. Of the $A2.443 billion in log value, $A2.147 billion came from plantation grown wood. In the same year, Australia exported $A2.8 billion in timber products and imported $A6.9 billion worth. Australia therefore had a trade deficit in timber products of $A4.1 billion. (ABARES, 2024c)

As shown in Chart 3 above, few new plantations have been established since 2010, although there has been a recent uptick including the 4,500 hectares of softwood established in 2022/23, and this recent trend appears to have continued to the present. Longer term trends in hardwood and softwood plantation development are shown in Chart 4 on the following page.

Significant efforts to establish a softwood plantation estate in Australia commenced early in the twentieth century and accelerated from the 1960s, including through the Commonwealth Softwood Loan Agreements. This resulted in the establishment of around a million hectares of mainly exotic pine plantations. These provide most of the timber currently used in dwelling construction, among other products.

Plantations were mainly of Pinus radiata wherever conditions favoured its growth, with the Southern Pines (Pinus elliotii, Pinus carribea and their hybrids) in warmer and/or drier areas. Hoop Pine was also commonly planted in Queensland. From the nineties investment moved to the development of hardwood plantations, mainly for the pulpwood market. Around 95% of Australia's hardwood plantation log production is exported as woodchips. (Whittle, 2019).

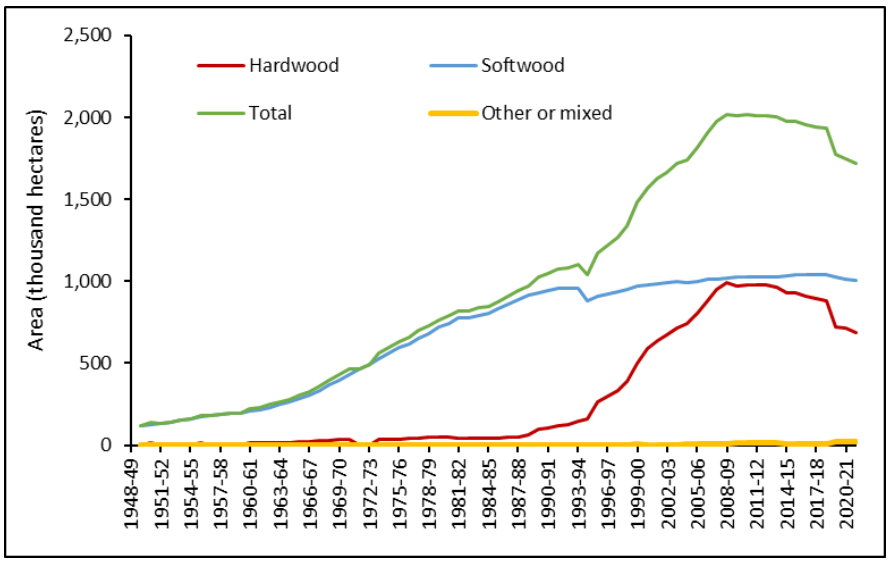

Chart 4. Change in area of hardwood and softwood plantations, 1948-2021
(ABARES, 2024a)

In 1997, the Australian, state and territory governments and the timber-growing and processing industry formed a partnership called *Plantations for Australia: The 2020 Vision*. The aim of the partnership was to increase the plantation estate to 3 million hectares by 2020. The *Export Control (Hardwood Wood Chips) Regulations 1996* allowed for the export of unprocessed woodchips from plantations, which reduced sovereign risk. The *Managed Investments Act 1998* subsequently allowed investors to claim immediate tax deductions for investment in establishing plantations.

Under these market conditions eucalypt plantations were favoured because of the short rotations for pulpwood production, strong prices on woodchip export markets and the favourable tax treatment. These factors resulted in the development of a significant number of Managed Investment Schemes (MIS) and plantation establishment rates peaked at around 126,00 hectares per annum in 1999/2000. By 2010 the total plantation estate had reached over 2 million hectares. However, following the collapse of a number of the MIS for reasons including the Global Financial Crisis, rates of new plantation establishment plummeted and have not since recovered, and some hardwood plantations have been cleared. See Chart 4 above.

Few hardwood sawlog plantations have been established in Australia except for relatively small resources, notably including in Tasmania and on the NSW North Coast. Because hardwood sawlogs require long periods of time between incurring land acquisition and forest establishment costs, and returns from timber sales, it has been difficult in the past to show an attractive return on investment at commonly used discount rates. Rather, needs for hardwood sawn timber have largely been met by harvesting public and private native forests, and imports.

Supply of logs from our native forests has been reducing dramatically over recent decades, mainly due to reservation of multiple-use forests for nature conservation, increased restrictions on wood harvesting in codes of forest practice and other regulatory instruments, and in 2019 the impacts of broad-scale bushfires. Yield of sawlogs from multiple-use public native forests declined nationally by 16% from 2011–12 to 2015–16, and by 25% from 2006–07 to 2010–11. According to spatial mapping provided by the NSW DPI Forest Science unit and commissioned

by Timber NSW[9], 88% of publicly owned forests in NSW are reserved from timber harvesting and managed for environmental protection, and only 12% remains available for timber supply.

In 2018 a Coalition Federal government announced a series of initiatives aiming to promote the establishment of an additional 400,000 hectares of new plantations (Department of Agriculture and Water Resources, 2018) While some useful initiatives were funded, including the Regional Forestry Hubs, the initiative did not stimulate significant additional plantation development.

In 2022 an Australian Forest and Wood Products Association report agreed that the goal of 400,000 hectares of new forest would help address a shortfall of timber needed to build 250,000 new dwellings by 2035[10].

Currently the Commonwealth is directly subsidising new plantation development through the Support Plantation Establishment program[11]. This program is disbursing $74 million through grants to eligible plantation establishment projects of up to $2,000 per hectare. Funding has been available from 2023/24 and Round 3 is open at the time of writing with remaining funding of $45.24 million.

At $2,000 per hectare the program can be expected to subsidise the establishment of around 37,000 hectares of new plantations, if fully subscribed. Up to the time of writing, the program has supported the establishment of 11,333.2 hectares of softwood plantations (81% of total) and 2,665.3 hectares (19% of total) of hardwood plantations. The largest grant to date was to Carbon Neutral Pty Ltd for a 1,928 hectare hardwood plantation in NSW.

The Support Plantation Establishment program and other recent funding initiatives from the Western Australian and Victorian governments, combined with the ability to earn Australian Carbon Credit Units from certain types of plantation forestry activities, are likely responsible for a recent uptick in softwood timber plantation establishment. However, if the relatively modest goal of an additional 400,000 hectares of plantation forest by 2035 is to be met, establishment rates still need to accelerate dramatically. It may be that additional measures are needed to incentivise hardwood timber plantations.

Forest and Wood Products Australia (FWPA) released a report entitled More Houses Sooner – Finding the Australian Dream[12] in February 2025. It details FWPA-commissioned modelling of housing demand and sawn softwood construction timber demand from 2024 through to 2034. The Report projects that to make up for past unmet demand for housing and to keep pace with current and future housing demand, up to and probably exceeding 40% of suitable construction grade softwood timber will need to be imported over that period, to supplement existing Australian plantations' output.

This would indicate that if the current softwood plantation estate (~1 million hectares) provides only 60% of projected demand then something of the order of 1.67 million hectares (an additional 670,000 hectares) would be required for self-sufficiency. Because new plantations will not produce sawlogs for a minimum of 20 years, Australia's need for imports of construction grade softwood seems locked in for at least that period.

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[9] Insights into NSW native forests | Wood Central

[10] Australias-Timber-Framing-Cliff.pdf

[11] Support Plantation Establishment program - DAFF

[12] More Houses Sooner: Australian Housing Demand & Timber Use Scenarios To 2034 - Forest & Wood Products Australia

Hardwood plantations grown for sawlogs have in the past generally been grown over 35-50 year rotations. Early thinning operations mainly produce pulp grade material, with poles, peeler logs and small sawlogs coming from later thins. Therefore, like softwood plantations, new hardwood plantations will not contribute greatly to resources for the timber industry for decades. This timeline could possibly be reduced by identification and adoption of techniques to more substantially value add early thinnings.

Farm forestry

The existing area of Farm Forestry in Australia is uncertain at all scales because farm forestry projects are generally smaller and sometimes do not seek approvals or provide reports to industry groups or regulators. A *Farm Forestry Report* produced by ABARES as a component of the *Forest inventory for private native forestry, farm forestry and Indigenous forestry*[13] (Daian, Wood, Lehmann, & Howell, 2022) confidently identified 73,400 hectares representing approximately 3,000 landholders. This area is a subset of the total area of farm forestry in Australia, being the part for which historical inventory data has been collected by stakeholders. An additional 60,000 hectares of likely farm forest was identified in the report, mainly through remote sensing, but presently is not validated by other sources.

Of the confidently identified area, 53,100 hectares are known to be managed for wood production. Farm forestry occurs in all Australian states, with the majority in Tasmania (45,600 hectares), and the balance in Victoria (10,700 hectares), New South Wales (9,000 hectares), Queensland (3,800 hectares), Western Australia (3,200 hectares) and South Australia (1,000 hectares). The Farm Forestry Report identified 1,200 hectares of farm forestry in the NE NSW Forestry Hub region. When considered in the context of the area modified for grazing in Australia (71 million hectares) farm forestry is only occurring on a tiny fraction of this land (0.1%). [14]

Current investment in planted forests in NSW and NE NSW

There is currently limited investment in new timber plantations in NSW, consistent with national trends. Two information sources are examined following. These are the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) various reports which provide information current up to 2022/23, and the Register of Authorised Plantations compiled by the NSW Dept. of Primary Industries and Regional Development which has information about plantation authorisation up to early 2025. The Authorised Plantations Register contains information about both “timber plantations” and “non-timber plantations”. Non-timber plantations are likely to, in the main, be environmental plantings in the terminology used in this report.

ABARES

According to the Australian Plantation Statistics 2022-23 update, the NSW timber plantation estate grew by only 0.7% between 2021/22 and 2022/23, and by only 5.4% since 2004/05. The total estate was 349,600 hectares in 2022/23. This was made up of 55,000 hectares of hardwood plantation and 294,300 hectares of softwood plantation. 2,900 hectares of softwood plantation was established an FY2023, and no new hardwood plantations (ABARES, 2024b).

[13] Forest inventory for private native forestry, farm forestry and Indigenous forestry: sector reports - DAFF
[14] Land use in Australia at a glance

The North East NSW region includes two distinct subregions, the NSW North Coast and the Northern Tablelands. The NSW North Coast has ~ 67,000 hectares of timber plantations including a hardwood plantation estate scattered throughout the subregion and a Southern Pine estate centred around the Casino-Grafton.

Decreases in plantation area occurred around 2014/15 and 2019/20 (Chart 7). These changes, respectively, probably reflect clearing without replanting of some of the plantations established by the Managed Investment Scheme companies, and the effect of the 2019 bushfires. The timber plantation data and information are published in the ABARES 2024 annual update on commercial timber plantations, collected by surveying Australian public and private plantation growers and managers.

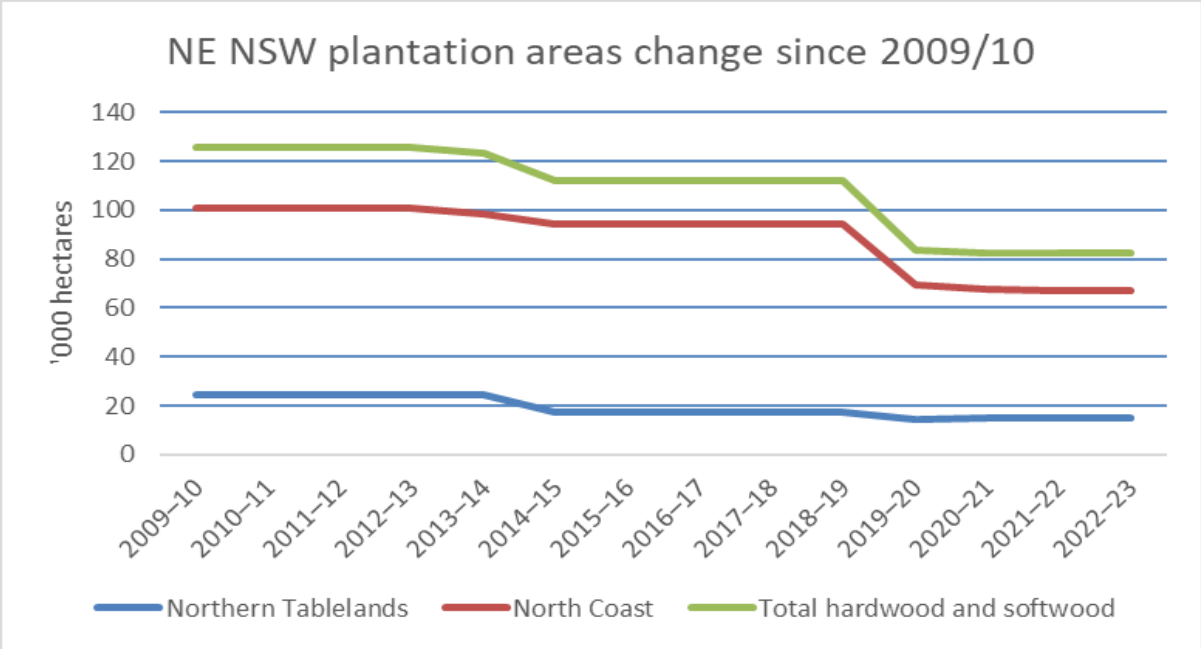

Chart 7. Trends in plantation area in NE NSW 2009/10 to 2022/23
(ABARES, 2024b)

NSW Authorised Plantations Register

Additional and more recent information about plantations can be gained by analysis of the Register of Authorised Plantations in NSW compiled by the NSW Dept of Primary Industries and Regional Development in compliance with the NSW Plantations and Reafforestation Act 1999.[15] Planted forests in NSW are required to be registered if they are to be harvested, if clearing of native forest is intended for establishment of the plantation, or if the plantation is over 30 hectares. Plantations under 30 hectares are classified as exempt farm forestry and do not require authorisation. Owners of any plantations can elect to have their plantations authorised[16]. Authorised plantations can be for timber production or non-timber plantations. Non-timber plantations includes environmental plantings.

[15] View - NSW legislation
[16] Tree and shrub plantings requiring authorisation

The Register differentiates between timber and non-timber (environmental) plantations and specifies the area that has been authorised and registered. Unfortunately, information about areas that cease to be managed for timber, are cleared or burnt, or are not replanted after harvest is not included in the register. Nonetheless, the Register is a useful source that shows the number of plantations authorised annually, the plantation areas authorised annually and the nature (timber or not for harvest) of each authorised plantation. The Register was obtained (current up to the end of February 2025) for analysis.

The location of plantings in the North East NSW region authorised under the NSW Plantations and Reafforestation Act is shown in Chart 5. Chart 6 shows the same authorised plantings for the whole of NSW.

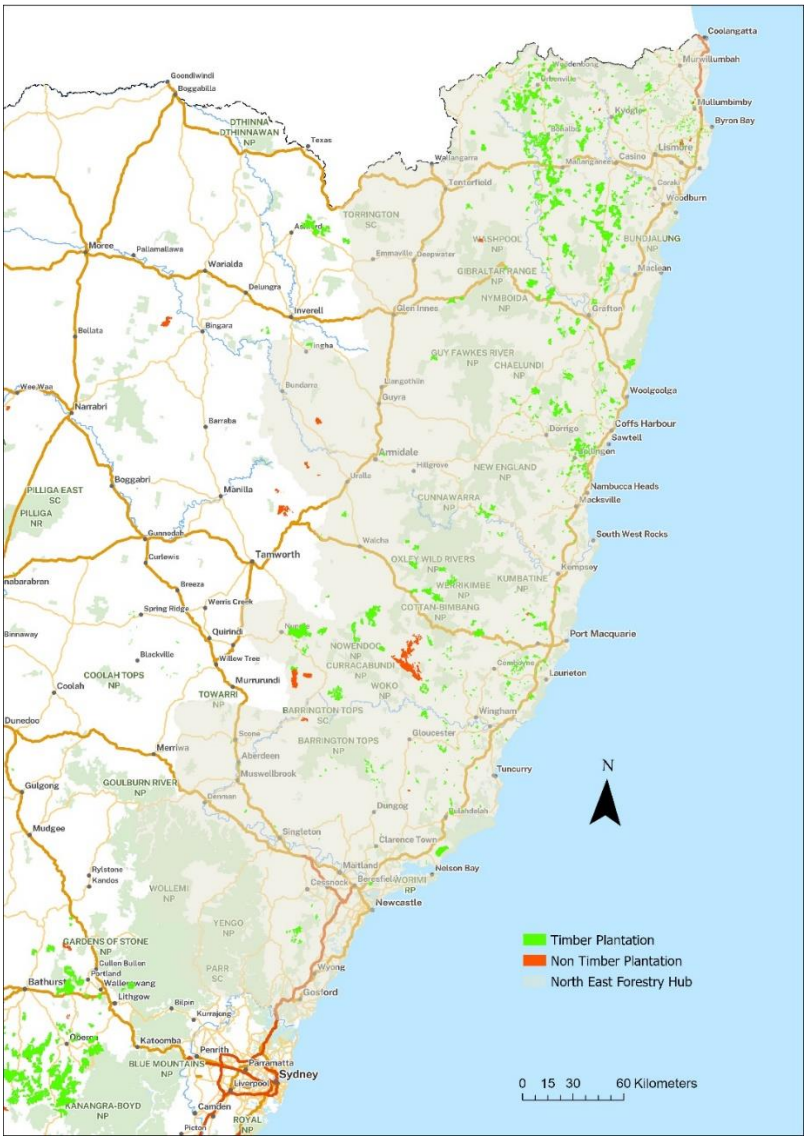

Chart 5. Authorised timber and environmental plantings in NE NSW (source: NSW DPIRD Plantation Unit, June 2025)

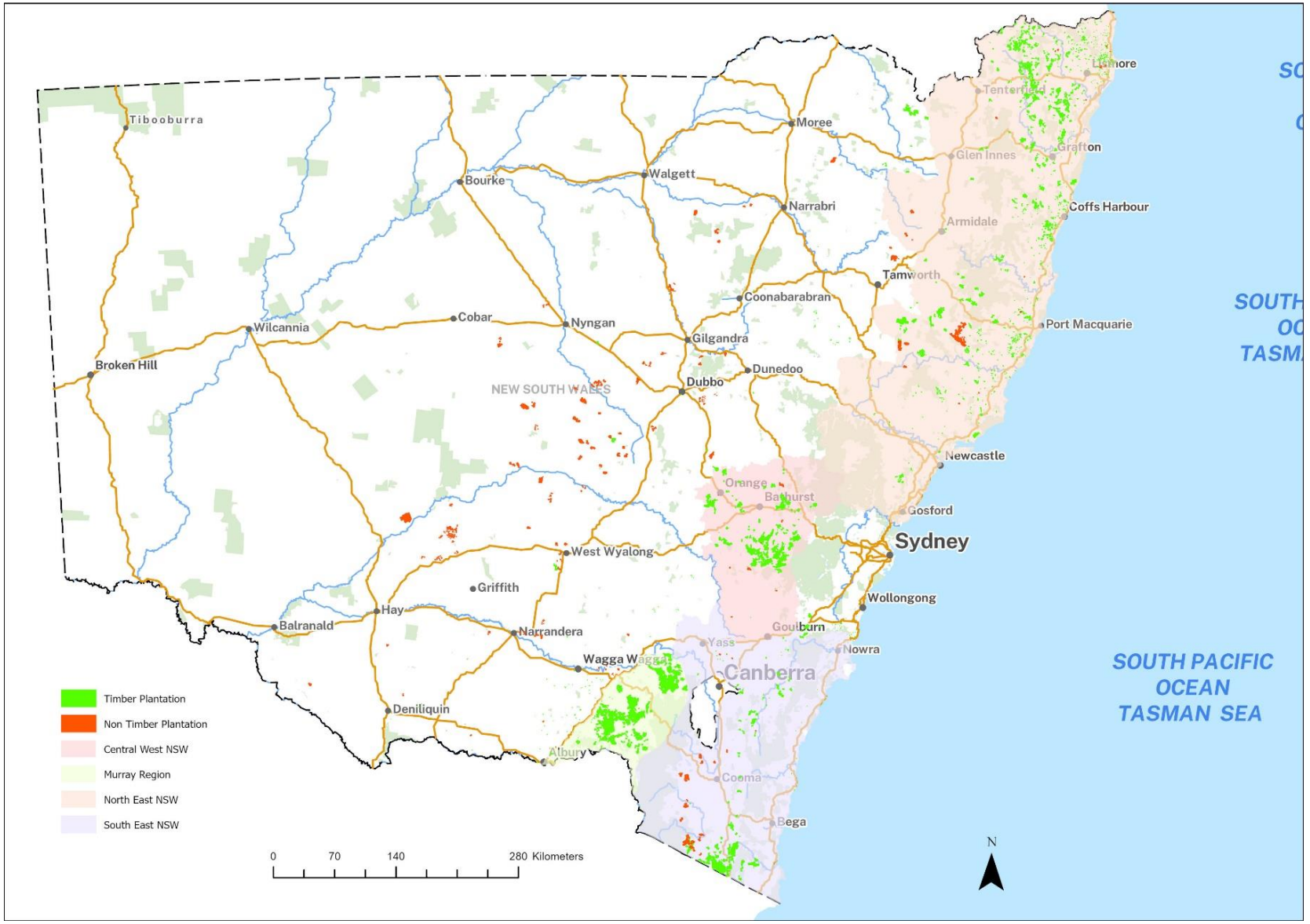

Chart 6. Authorised timber and environmental plantings in NSW (source: NSW DPIRD Plantation Unit, June 2025)

Charts below represent plantations within the North East NSW Forestry Hub area.

Timber plantations

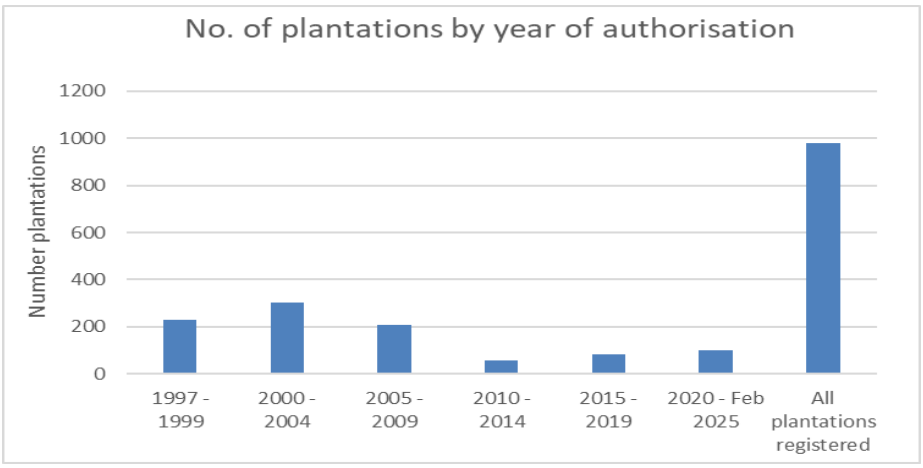

Chart 8. Number of authorised timber plantation in NE NSW Forestry Hub area by time authorised.
Source: NSW Register of Authorised Plantations

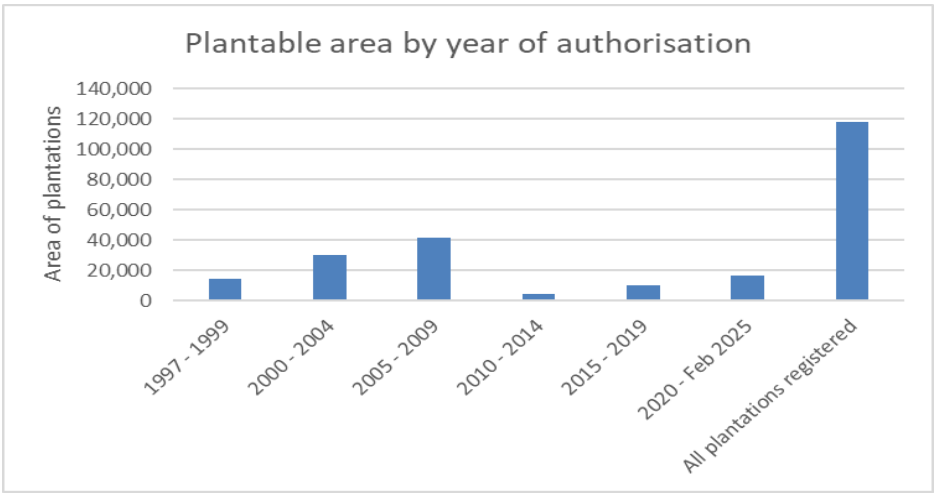

Chart 9. Area (ha) of authorised timber plantation in NE NSW Forestry Hub area by years authorised.
Source: NSW Register of Authorised Plantations

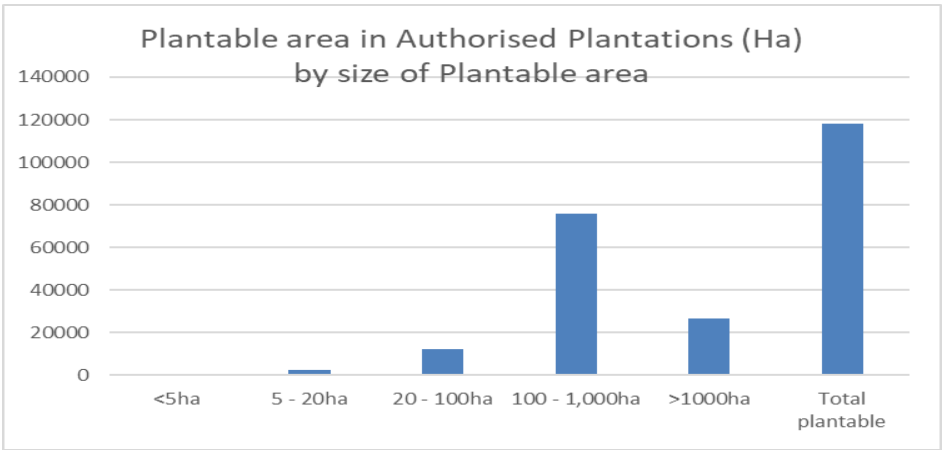

Chart 10. Area (ha) of authorised timber plantation in NE NSW Forestry Hub area by size class.
Source: NSW Register of Authorised Plantations

Non-timber plantations

New streams of finance for reforestation from carbon and nature repair markets are still developing. As discussed elsewhere in this report, investment interest in carbon markets has been mainly focused on low cost-base projects in areas of woodland in lower rainfall areas where marginal costs are lower and returns have been higher. Nonetheless environmental planting is starting to become significant including in NSW with 23,428 hectares of non-timber plantations authorised and registered in NSW during 2024 including up to the end of February 2025. Of these, 9,888 hectares were authorised in NE NSW, including one 6,881 hectare plantation in the Mid-coast/Walcha area. See Charts 11 and 12 below.

Chart 11. Area of new authorised non-timber plantation in NSW by year authorised.
Source: NSW Register of Authorised Plantations

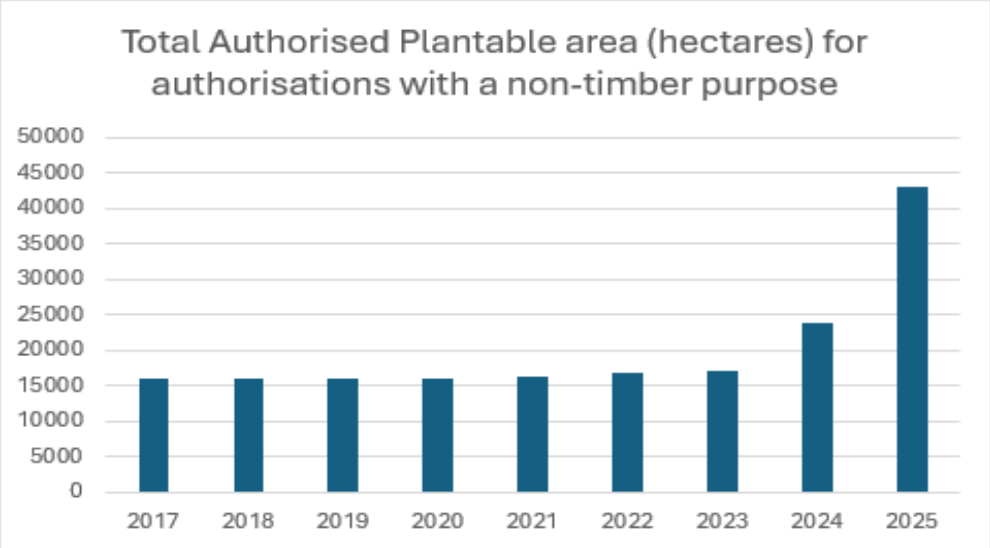

Chart 12. Cumulative area of authorised non-timber plantations in NSW up to early May 2025
Source: NSW Register of Authorised Plantations

Ecoforestry (reforestation for multiple-use forestry)

Earlier in this report it was suggested that three broad types of reforestation would be desirable. These are industrial timber plantations, plantings purely for environmental and biodiversity benefits, and reforestation for multiple use. Of these three opportunities, the most scalable may be multiple use reforestation. This is possible because of its potential to gain both multiple income streams and strong social license. It is also not always, especially for smaller plantings, as constrained as timber plantations by distance to timber processing facilities and may have lower establishment costs than some other environmentally desirable plantings.

Broadly and for discussion purposes, features defining this project type under the Carbon Farming Initiative could be:

- The establishment of a range of locally or bioregionally endemic species, with significant structural and floristic diversity, and to the extent possible similar to the forest endemic to the site.
- May include up to [a percentage to be determined] of stems of preferred timber species at establishment.
- May include thinning, pruning and sustained yield harvest as permitted activities, as long as canopy cover does not thereby fall below [a percentage to be determined] in any year within any [area to be determined] area of each Carbon Estimation Area.
- Sites may be grazed for pastoral and fuel reduction benefits, if the forest land cover and land use are not compromised.
- A hybrid modelling and measurement approach to biomass, timber and carbon estimation would be allowed, including the use of LIDAR technology.
- Management plans, including prescriptions for hazard reduction burning, canopy retention and thinning and harvesting intensity, would form the basis for conservative modelling and estimation of average standing carbon stocks over time.
- ACCU issuance would be limited to average standing biomass carbon stocks over 100 years, less deductions for risk.
- Nature Repair benefits could also be certified in accordance with monitored performance against any relevant methodologies.

Nature repair benefits could be expected to accrue through the contribution of the project to on-site biodiversity conservation, benefits to landscape connectivity, and improved water catchment and faunal habitat values. Fauna habitat benefits can be expected to increase as the trees age and complement the carbon sequestration benefits which are mostly realised early in the life of the trees but then continue at decreasing rates for an extended period.

There are currently two proposals submitted to the Emission Reduction Assurance Committee for the development of such a methodology known to the author, being one from Greencollar and Verterra, and one from The Carbon Store Pty Ltd.

Recommendation 1: It is recommended that the NE NSW Forestry Hub support development of a new CFI methodology for ecoforestry plantations (permanent reforestation for multiple uses including sustainable timber production, biodiversity conservation, and landscape, catchment and other benefits).

A CFI Ecoforestry Methodology as described above would enable claiming ACCUs for ecoforestry projects that could occupy an important, scalable place in establishment of new

planted forests. However, it may be that one CFI methodology for an ecoforestry model might not fit with all commercially viable non-monocultural plantation types where thinning and/or harvest is part of intended management.

While there are existing CFI methodologies for timber plantations and environmental plantings, they may be less than optimal to meet the needs of regional stakeholders. It is also possible that there may be other useful and scalable modes of forest establishment, management, and uses of forest products, or ways of measuring carbon sequestration, that are not supported by current CFI methodologies or methodologies under development.

Timber plantation, forest industry and regeneration industry stakeholders should therefore be consulted over time to gain their input regarding other new CFI methodologies and carbon mensuration approaches appropriate to the NE NSW Forestry Hub area. The same could be true for methodologies for the Nature Repair Market that are tailored to NE NSW environments and regional biodiversity conservation.

There has been a lot of forest plot measurement, stand level mensuration, development of allometrics and collection of growth data already undertaken in the NE NSW Forestry Hub area over the past few decades, and this would be useful to inform future data and information collection, and model development and calibration. While some may be held as commercial in confidence information, it would be useful to see what is available, in the public domain or for more limited uses.

Recommendation 2: It is recommended that, as a first step in building regional capacity for engagement in environmental services markets, the NE NSW Forestry Hub invite Southern Cross University and other stakeholders to jointly convene a seminar to assess the availability of forest mensuration data, allometrics, inventory methods etc to better enable calibration of forest growth and carbon accumulation models specific to the Hub area for commercially significant environmental, ecoforestry and timber plantation types. If successful, this could be a prototype for a seminar series examining other aspects of regional capacity to benefit from environmental services markets, including new methodology proposals.

Where are new forests needed?

Foregoing discussion in this report indicates the need to expand the present area of forested land in a way that strategically addresses both environmental degradation and timber supply issues. It has been suggested that forests to meet these needs will lie on a spectrum between plantations established primarily for timber production and forest planted purely for environmental purposes, including new forests established for multiple use in, as it were, the middle ground.

Importantly, the expansion of forest area contemplated needs to be undertaken while maintaining, and where possible enhancing, sustainable production of other primary produce such as food crops and animal products.

It is a matter for detailed regional planning processes to prioritise issues, areas and locations for these three strands of reforestation activity. Broadly, timber plantations need to be in timber supply zones within economically viable haulage distances from mills and other value adding

facilities or clusters. Environmental reforestation will be needed where priority degradation issues require repair works.

Large-scale ecoforestry could be located with some flexibility depending on its principal management objectives, which could lie somewhere on a spectrum between a focus on timber production or addressing environmental needs. Small-scale ecoforestry is less constrained to particular locations because timber produced will often be used on-farm or locally.

Farmers are often willing to do the forestry work themselves using farm equipment (e.g. for establishment, weed maintenance and harvesting activities) making it less important to be located within a traditional forestry area or wood supply zone. Farmers are also more innovative and nimble when it comes to marketing and value adding. For example, they are well positioned to find local markets for thinnings and can value add by portable milling and producing their own bioproducts, some of which can be used on farm. Sawn timber and bioproducts can also be economically transported much further than raw logs.

Importantly, at the farm scale, ecoforestry and farm forestry would need to complement and support other productive land uses such as cropping, horticulture and grazing. It would therefore be best planned at fine scale on the basis of land capability and suitability, so that land with higher value uses is protected for those uses, and where possible enhanced by strategically located trees for shade, shelter and the other benefits of trees in farmed landscapes.

However larger scale ecoforestry plantings would need to meet fairly strict economic criteria for timber production to be profitable. To be economically viable they would need to be close to thinning markets and on reasonably good quality sites that are capable of timely production of a high proportion of poles and sawlogs. Being adjacent to transport infrastructure such as rail hubs could be another consideration. They should also meet ecological criteria such as being located in areas not well served by existing conservation forests, form corridor linkages or otherwise contribute to biodiversity conservation.

It is therefore suggested here that new forests are needed:

- where they can best meet needs for their ecological, economic, social and other services
- with consideration of property, catchment, regional and national scale issues
- as agreed or supported by regional communities and their representatives following comprehensive stakeholder consultation
- with the best available scientific advice and government agency support

The Commonwealth could play a valuable role in resourcing regional planning processes, while also providing leadership in establishing and communicating national priorities through a National Environmental Standard, and providing frameworks, templates and benchmarks to help ensure adequate and comprehensive consideration of factors relevant to sustainable natural resource management.

Fortunately, the Nature Positive Plan already commits the Commonwealth to something similar. Unfortunately, consideration of the need for ongoing sustainable management by and for the timber industry appears not to be under active consideration as part of these plans.

Timber plantations and the value adding infrastructure that relies on them are scale dependent. In order to base world class vertically integrated wood processing technology within a region,

many hundreds of thousands of hectares of plantations producing steady and reliable streams of uniform and good quality wood from desirable species over decadal timeframes are required. These plantations need to be within financially viable haulage distances of primary processing plants.

Smaller value-adding infrastructure such as sawmills, plywood mills and engineered timber product plants need less timber but still require reliable and logistically feasible wood flow at scale. High value-add and boutique timber processing plants need fewer inputs and have more locational and logistical flexibility.

Industrial plantation development should therefore leverage off the existing plantation estate by expanding and consolidating resources in the existing NPI regions and close to existing, planned or potential value adding infrastructure, to develop the scale required for industry plans and strategies for growth. In doing so it is important to acknowledge the hiatus in plantation development that has occurred since around 2010.

Ideal wood flow for industry follows the pattern of what foresters call a "normal forest". This is a forest estate where equal areas are harvested each year at the optimum rotation age. Efficient creation of a normal forest requires establishment of equal areas of forest each year up to the first year of final harvest. It is therefore vital than efforts to establish new plantation estates involve a regular annual planting program that is sustained for decades. Such an estate then produces a steady flow of wood, in the absence of disastrous impacts such as extensive wildfire.

Many plantation land capability, suitability and availability studies have been carried out in Australia, at a range of scales, over the past few decades. In these studies, capability is generally taken to mean "having the capacity to support growth of the relevant vegetation", suitability takes into account the landscape and social context and good landuse practice, while availability refers to the likelihood of land managers choosing plantation development as an attractive option, usually but not exclusively for economic reasons.

A land suitability study covering the NSW North East RFA Region was carried out by *2rog Consulting* in 2022 for the North East NSW Forestry Hub[17] (2rog Consulting, 2022). The report identified 630,000 hectares of cleared land suitable for hardwood (mainly Blackbutt and Spotted Gum) plantations, 730,000 ha of cleared land suitable for southern pine plantation and 740,000 ha suitable for radiata pine plantation. The report identified considerably smaller areas as optimal for the establishment of these plantations.

The report noted that fewer geographic constraints applied to farm forestry plantings and environmental plantings. 1.52 million ha of land was found to suitable for farm forestry and 3.52 million ha was found to be suitable for environmental plantings. Given that ecoforestry has characteristics of both environmental plantings and farm forestry these estimates underline the scope for new ecoforestry plantings.

Private native forestry (the active management of native forest on private land) is already contributing both environmental and timber production benefits both regionally and nationally and could be made more productive of all its benefits with improved forest management. These private native forests could also be expanded by new farm forestry or ecoforestry plantings.

[17] North East NSW Forestry Hub | Report » Land suitable for new planted forests in North-East NSW

Cooperation with neighbours, and working through Landcare and with producer groups, can enable landholders to link farm plantings to achieve synergistic benefits across larger landscapes. Public funds could provide incentives to encourage such linking initiatives, so that these and their benefits can be aggregated up to regional and potentially national scales.

Incentives may also be required, in addition to revenue from environmental services markets, for some environmental plantings. Environmental plantings need to target one or more specific environmental degradation issues, and these issues need to be identified, defined and prioritised in relation to their severity, urgency, extent, and impact on both natural processes and the landscape's ability to meet human needs.

Measures required to address these issues also need to be identified, costed and planned, including processes for monitoring, evaluating and reporting progress. There is broad general agreement that this work is most efficiently undertaken at a regional or bioregional level, thereby allowing consideration of regionally significant issues including those that occur at sub-catchment and local scales.

Plantings purely for environmental purposes will generally need to exclude timber harvesting and will therefore need all the support possible from markets for environmental services, plus additional government subsidy where other sources of funding are insufficient. Examples where government subsidy may be needed are rainforest regeneration where very high establishment and management costs are common, and riparian restoration where complex vegetation establishment and regeneration issues, risks including flooding, and logistical problems can make for expensive projects.

Regional planning for reforestation

Most market analysts expect substantial rises in prices for ACCUs over the next decade and they could well reach levels that make establishment and management of various types of forests profitable land uses that are able to successfully compete with various existing agricultural and pastoral activities. A current example is the high level of investment in regrowth management projects in drier areas away from the coast, where land prices are lower, land parcels are larger and the cost of generating ACCUs is modest.

While it is too early to determine if the high level of conversion of land from grazing to forest use in these regions will cause significant problems for the regional communities in which it is occurring, some concerns have been raised. For example, in South West Queensland several local governments commissioned work to investigate possible impacts of carbon farming on their regional economy and community[18]. They currently remain keen to see co-existence of the new industry of carbon storage with more traditional land uses, but are watching developments.

The recent increase in establishment rates of environmental plantings may indicate that for this type of forest establishment the rates of return are already considered acceptable by investors. If so, we could be on the cusp of high levels of investment driving an increase in biomass for carbon storage in coastal areas. It is important that the type of biomass in which carbon is stored is driven by considerations of long-term sustainable landscape management rather than just by internal rate of return (IRR) calculations.

[18] Study into the Impacts of Carbon Farming in SWQ Communities — South West Queensland Regional Organisation of Councils

IRR and similar calculations of investment value will remain the primary drivers for investors, so a policy and regulatory framework that appropriately combines constraints and incentives is required to align the investments with the landuse patterns we, as Australian and regional communities, want. A powerful tool available to achieve this is best practice regional planning for sustainable natural resource management (NRM).

There is an existing relevant body of NRM planning that has been completed by regional NRM organisations throughout Australia, including under Phase 2 of the National Landcare Program between 2018 and 2023. These Plans build on work undertaken in the past, and there has been some effort to make them fit for purpose to facilitate and underpin the carbon market. (Preece, et al., 2013)[19] There are 54 NRM regions, represented at the national level by NRM Regions Australia.[20]Two examples of such Plans are the North Coast Local Land Services Natural Resource Management Plan 2022 – 2026[21] and the Hunter Region Natural Resource Management Plan 2023-2028.[22]

The Plans were required to support the following outcomes:

1. There is a restoration of, and reduction in threats to, the ecological character of **Ramsar sites** through the implementation of priority actions.
2. The trajectory of species targeted under the **Threatened Species Strategy, and other Environment Protection and Biodiversity Conservation (EPBC) Act priority species**, is stabilised or improved.
3. Invasive species management has reduced threats to the natural heritage Outstanding Universal Value of **World Heritage properties** through the implementation of priority actions.
4. The implementation of priority actions is leading to an improvement in the condition of EPBC Act listed **threatened ecological communities**.
5. There will be increased awareness and adoption of **land management practices that improve and protect the condition of soil, biodiversity and vegetation**.
6. There is an increase in the capacity of agriculture systems to adapt to significant **changes in climate and market demands for information on provenance and sustainable production**.

The Commonwealth Government committed to further development of regional plans for environmental protection and regeneration as a component of its Nature Positive Plan in 2022. It is suggested that the new regional Nature Positive planning process (summarised in Box 1 below) could provide a suitable framework for detailed planning for prioritisation of land suitable for, or requiring, reforestation for the range of purposes considered in this report.

Preparation of one Nature Positive Plan has so far been commenced in NSW. According to DCCEEW:

"In 2024, the Australian and New South Wales governments agreed to develop a pilot regional plan to help manage the tensions between environmental values and urban development pressures in the Central Coast and Lake Macquarie. This work will:

[19] Articles – Biome5 Environmental Consulting & Research
[20] NRM Regions Australia | Regional natural resource management
[21] North-Coast-Local-Land-Services-NRM-Strategic-Plan-2022-2026
[22] Hunter Region Natural Resource Management Plan 2023 - 2028 - Local Land Services

- *improve strategic identification of biodiversity and its protection*
- *provide certainty for stakeholders and support effective decision-making*
- *reduce duplication of effort or confusion for proponents*
- *manage important biodiversity into the future.*

The department is working collaboratively with New South Wales Government to map environmental values, determine conservation priorities, and identify options to minimise the potential impacts of development and improve biodiversity outcomes in the region."

It is worth reiterating that planning for future timber production is an important element to consider in, or in association with, such plans.

Nature Positive Regional Planning

According to the Nature Positive Plan, new regional plans will be developed first in a number of "test-bed" regions experiencing development pressure and with high biodiversity values. They will aim to speed up decision-making and deliver nature positive outcomes at a landscape scale, including by addressing cumulative impacts. Regional plans will enable active management of our landscapes, oceans, waterways and places through a three-level spatial system:

- Areas of High Environmental Value, where development will largely be prohibited;
- Areas of Moderate Environmental Value, where development will be allowed, subject to an approval process and any agreed rules. Development in these areas will be required to adhere to a mitigation hierarchy, under which impacts should be avoided then mitigated or, if this is not possible, offset; and
- Development Priority Areas, where the planning process has determined development can proceed, usually without a separate Commonwealth environmental approval.

The plans will also identify areas necessary for restoration and management, and help Australia meet its biodiversity objectives, including the 30x30 target. Areas adjoining or connecting Areas of High Environmental Value will be particularly important. A National Environmental Standard for Regional Planning will be developed.

A digital platform for regional plans will present up-to-date monitoring data and information to demonstrate how the regional plan is benefiting sustainable development and nature positive objectives across the landscape, over the term of the plan. The incorporation of First Nations people's values, aspirations, knowledge and science will be an objective of all regional plans.

Box 1. Regional plans under the Nature Positive Plan

A recent report[23] prepared for the South East Queensland Forestry Hub has tested returns from a range of plantation options, including Southern Pines, Hoop Pine, Spotted Gum and Gympie Messmate, including where timber production, carbon and grazing are possible income streams. An agroforestry model was also analysed. They found internal rates of return were very significantly improved by sale of ACCUs, and marginally by including grazing. Grazing however, has significant additional benefits in reducing fire risks, in additional to any financial benefit.

[23] SCQldHub_PlantationSuitability Report_Final

Some combinations of plantation species and ACCU sales showed rates of return on investment that could well be attractive to a range of investors. Using additional spatial analysis with Geographical Information Systems and the FullCAM software suite to model carbon yields the team working on the report were able to predict the pattern of returns across the landscape to produce indicative "heat maps" of areas relatively prospective for different kinds of forest carbon investment.

Recommendation 3: It is recommended that the NE NSW Forestry Hub, with other stakeholders, identify and/or seek funding to develop or enhance decision support tools to better enable optimising between timber, grazing, carbon and biodiversity revenue streams.

Recommendation 4: It is recommended that the NE NSW Forestry Hub allocate or seek funding to enable analysis, including spatial analysis, of indicative returns from the range of reforestation investment opportunities identified in this report

Recommendation 5: It is recommended that North East NSW forest stakeholders and relevant agencies put the NSW North Coast forward as a pilot area for development of a Nature Positive regional plan, as flagged by the Commonwealth in its Nature Repair Plan. If this is unsuccessful an alternative is for the regional community of interest to collaborate to identify and obtain funding to develop comprehensive planning, including spatial plans, to strategically target reforestation for both timber production and environmental repair.

In the last few years there has been increasing discussion on the need to better align carbon abatement with other environmental and biodiversity goals. A recent report[24] authored for the Carbon Market Institute and NRM Regions Australia, documents the ways in which carbon markets support the attainment of biodiversity outcomes, ways in which that support is not optimised, and ways in which desirable outcomes for biodiversity may be compromised.

The report argues for better integration of regional NRM planning into carbon project development and for the examination of a range of measure for various stakeholders to consider and adopt as appropriate. Key considerations identified by this important report are as detailed in Box 2 on the following page.

Some of the considerations suggested for government have been and will continue to be adopted and trialled through the Nature Repair Market, and having the CFI and Nature Repair markets working in a complementary fashion and capturing any possible synergies is desirable. Underlining this and suggesting ways that the two markets can be harmonised and empowered and made more accessible and effective is an important direction setting and policy development initiative.

An illustration of the nascent stage of policy development in this area is that currently, while there is a requirement for carbon project proponents to state whether their project is consistent with existing regional NRM plans, and this information is available on a public register, there is no actual requirement for such consistency, no process for evaluating the level of consistency, or for certification or approval from the plan owners.

Finally, all states and territories and local governments have their own planning requirements. For example, in NSW land use is regulated by State Environmental Planning Policies (SEPP) and

[24] Carbon-For-Nature-Report_Final.pdf

Local Environment Plans (LEP). There is likely to be interplay between these instruments and regional NRM and/Nature Positive Plans, and this should be anticipated and considered regarding any required actions by the responsible policy makers and regulators.

For the Commonwealth Government:

- Support development of a national biodiversity co-benefit verification standard and framework
- Implement a national register to improve transparency and information available on carbon farming co-benefits to provide evidence of the benefits
- Improve ACCU methods through new priority and review processes to recognise, enhance and protect nature
- Legislate for and invest in regional NRM organisations' role
- Resource First Nations participation, leadership and economic opportunities
- Develop a carbon market strategy that articulates the role of carbon crediting in supporting decarbonisation while also setting goals for reversing deforestation and ecological restoration
- Create an Australian Government Nature-Positive Fund for investments through the Nature Repair Market
- Review of enhanced Safeguard Mechanism should consider purchase of ACCUs with co-benefits
- Deliver expanded and improved Agriculture Biodiversity Stewardship and Carbon Farming Outreach programs with on-ground support from regional NRM organisations

For the carbon industry

- Integrate nature-related risks and opportunities into the Australian Carbon Farming Industry Roadmap and update the Australian Carbon Industry Code of Conduct
- Undertake ACCU method exploration to support co-benefit identification and integration

For regional NRM organisations

- Update regional NRM plans (where necessary) with carbon sequestration potential information to guide carbon for nature projects
- Seek funding for updated climate-smart modelling to be incorporated into all regional NRM plans
- Analyse how regional NRM plans and planning resources are informing carbon project planning

For business

- Integrate systemic organisational planning towards a net zero and nature positive economy
- Prioritise carbon for nature in ACCU compliance purchasing
- Engage in voluntary carbon for nature purchases to leverage existing ACCU purchases

For researchers and academics

- Explore carbon for nature schemes to enable informed policy and program delivery
- Explore non-biodiversity co-benefits arising from carbon farming projects

For the agricultural sector

- Invest in on-farm natural capital measurement methods and tools to promote landholder participation in carbon for nature projects and enable uptake

Box 2. Key considerations for stakeholders identified in ***Carbon for Nature***.

Recommendation 6: It is recommended that the Commonwealth give a very high priority to finalising its proposed National Environmental Standard for regional plans under the Nature Positive Plan, and accelerate the process to implement the plans to give national cover, including by providing funding to responsible and representative organisations, noting that the regional organisations should be community, local government, and industry stakeholder led with agency support. It should also be noted that forest industries are significant industry stakeholders in many regions and their views and needs will be important to consider if Nature Positive is to achieve sustained improvements in vegetation management for human as well as nature benefits.

Recommendation 7: It is recommended that certified consistency with Nature Positive regional plans, when they are finalised, be a mandatory requirement for both CFI farm and vegetation projects and Nature Repair Market projects. Implementation of works to deliver the regional plans should also be supported by targeted incentives and industry, business and landholder supports including promotion and extension.

Recommendation 8: It is recommended that regional stakeholders, directly and if possible through their national affiliations, support the Carbon Market Institute and NRM Regions Australia in their efforts to harmonise the carbon and Nature Repair Markets in Australia.

Forests and markets for environmental services

Climate change – an underlying environmental market driver

Climate change, driven by the release of greenhouse gases into the atmosphere, mainly from combustion of fossil fuels and from deforestation, has been recognised as a serious problem for several decades. Before the industrial revolution, the concentration of CO2 in the atmosphere had been relatively stable at around 280 parts per million (ppm[25]) for the previous 6,000 years. In 2022 the CO2 concentration had risen to 421ppm. This is the highest level in the atmosphere since 4.1-4.5 million years ago, when ocean levels were 5-25 metres higher than at present, and average temperatures were nearly 4 degrees Centigrade higher.[26]

In Australia, the changing climate has included an average surface warming of 1.51^{0}C +/- 0.23^{0}C since 1910, while sea surface temperatures around Australia have increased by an average of 1.08^{0}C since 1900. This warming has led to an increase in extreme heat events on land and in the oceans, and higher ocean temperatures have also been associated with extreme intensity rainfall events on the Australian east coast. In the south-west of Australia there has been a decrease of around 16% in April to October rainfall since 1970, while in the south-east there has been a decrease in rainfall of around 9% in April to October rainfall since 1994. Other changes include more severe fire weather and a longer fire season, reduced snow cover, increased ocean acidity and rising sea levels.[27]

Global and national responses to climate change

Global efforts to combat climate change commenced in the 1980s, with the Intergovernmental Panel on Climate Change (IPCC) being formed in 1988 and the first meeting of the Conference

[25] The "ppm" unit refers to the number of carbon dioxide molecules per million air molecules.
[26] Carbon dioxide more than 50% higher | NOAA
[27] State of the Climate - CSIRO

of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) taking place in March 1995.

Greenhouse gas emissions trading has formed part of the discussions and agreements about combatting climate change from around that time. This followed the earlier operation in the USA of successful schemes to stop acid rain, that were based on markets for permits to emit oxides of sulphur and nitrogen that formed sulphuric and nitrous acid when released into the atmosphere.

There has, therefore, been over 30 years of development of international emissions trading schemes, including through the Kyoto Protocol and most recently the Paris Agreement. These allow for the trading of emission allowances between nations. There have also been regional, state and other jurisdictional schemes, and a significant voluntary market for a range of emission reduction products. Most trading markets include both reducing emissions and increasing sequestration through activities referred to under the UNFCCC as Land Use, Land Use Change and Forestry (LULUCF).

In Australia the National Greenhouse Gas Inventory was implemented in 1994 to enable Australia to report to the UNFCCC. To enable reporting of the LULUCF sector a model called FullCAM (for Full Carbon Accounting Model), was developed[28]. This model initially aimed to provide an unbiased estimate of continental terrestrial biomass, and therefore carbon stocks, disaggregated to the scale of a single 30 metre x 30 metre Landsat pixel, as well as to detect landcover change, infer land use change and calculate change in accountable carbon stocks over time. It was designed to meet the requirements of the IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry.

In 1995 the Greenhouse Challenge, a program to assist Australian companies to cost-effectively reduce their net emissions, was established and hosted in the Commonwealth Dept of Primary Industries. This program started working in forestry and agriculture from around 1997, and the Greenhouse Challenge Vegetation Sinks Workbook was published in 1998. This was the first manual globally to be produced by a national government on quantifying carbon sequestration in vegetation management projects. It was intended for the use of project managers seeking to generate carbon offsets or credits and had examples of accounting for avoided deforestation, reforestation and improved forest management project types.

Since those early days vegetation management projects have been part of several emissions abatement programs and initiatives in Australia, including the NSW Greenhouse Gas Abatement Scheme, Greenhouse Friendly, Climate Active and implementation of projects under various international accounting standards for voluntary market projects. Most recently the Carbon Farming Initiative (CFI) was commenced through legislation[29] passed by the Commonwealth Parliament in 2011.

[28] The FullCAM Carbon Accounting Model: Development, Calibration and Implementation
[29] Carbon Credits (Carbon Farming Initiative) Act 2011 - Federal Register of Legislation

The Carbon Farming Initiative

The Carbon Credits (Carbon Farming Initiative) Act 2011 established a rigorously regulated scheme for issuing Australian Carbon Credit Units (ACCUs) to projects that operate in accordance with legislated methods (also called Methodologies) to reduce net emissions of greenhouse gases. Methodologies are signed into law as regulations by the responsible Minister, acting on advice of the department responsible for climate change matters and an expert committee focused on scheme integrity. A methodology is a set of requirements and rules for running a project under the Australian Carbon Credit Unit (ACCU) Scheme, usually referred to as the Carbon Farming Initiative or CFI.

Importantly, the Carbon Farming Initiative (CFI) enjoys bipartisan support, having formed a key part of climate change mitigation measures implemented by both Labor and the Coalition when in government.

Demand for ACCUs was bolstered by recent changes to the Safeguard Mechanism under the Albanese Labor Government. The Safeguard Mechanism was originally established in 2016 by the former Coalition government to limit emissions from Australia's largest greenhouse gas emitters. It now requires corporations with annual direct emissions exceeding 100,000tCO_2e to reduce their emission by nearly 5% per annum in order to play their part in meeting Australia's overall targets for 2035 and 2050. The 2050 target is for net zero. New enterprises with emissions over the Safeguard Mechanism threshold coming online will need to be net zero from commencement.

There are many publications and web sites explaining the detailed operation of the CFI, and how to develop emission abatement projects and participate in the scheme. These include a primer published by NSW Dept of Primary Industries[30] and their web resources[31], as well as comprehensive guidance from the Clean Energy Regulator. The intention here is not to focus on the administrative processes set up to enable and regulate participation but rather to focus on policy, regulatory, and other environmental market aspects that could support or hinder regenerative and sustainable landscape and vegetation management at scale, while making a valid contribution to the reduction of or our national greenhouse gas emissions.

Since coming into force in September 2011, and up until 28 February 2025, the CFI had issued 160,879,144 ACCUs to the proponents of 2,178 projects (not including 325 revoked projects). Of these ACCU's, a majority (83,036,501 ACCUs or 51.6% of the total) have been issued in respect of two project types, avoided deforestation, and regrowth management[32]. Vegetation establishment projects for both environmental and timber plantation purposes were issued with 4,098,810 (2.5% of the total ACCUs issued), with environmental planting projects receiving the majority of these (3,178,929 ACCUs) compared with 919,881 ACCUs for timber plantations.

[30] Introduction to carbon farming - NSW DPI
[31] Carbon Farming CommPrac | Department of Primary Industries
[32] The regrowth management project type includes those using the Human Induced Regeneration and Native Forest from Managed Regrowth methodologies. Avoided deforestation projects used the Avoided Deforestation and Avoided Clearing of Native Regrowth methodologies.

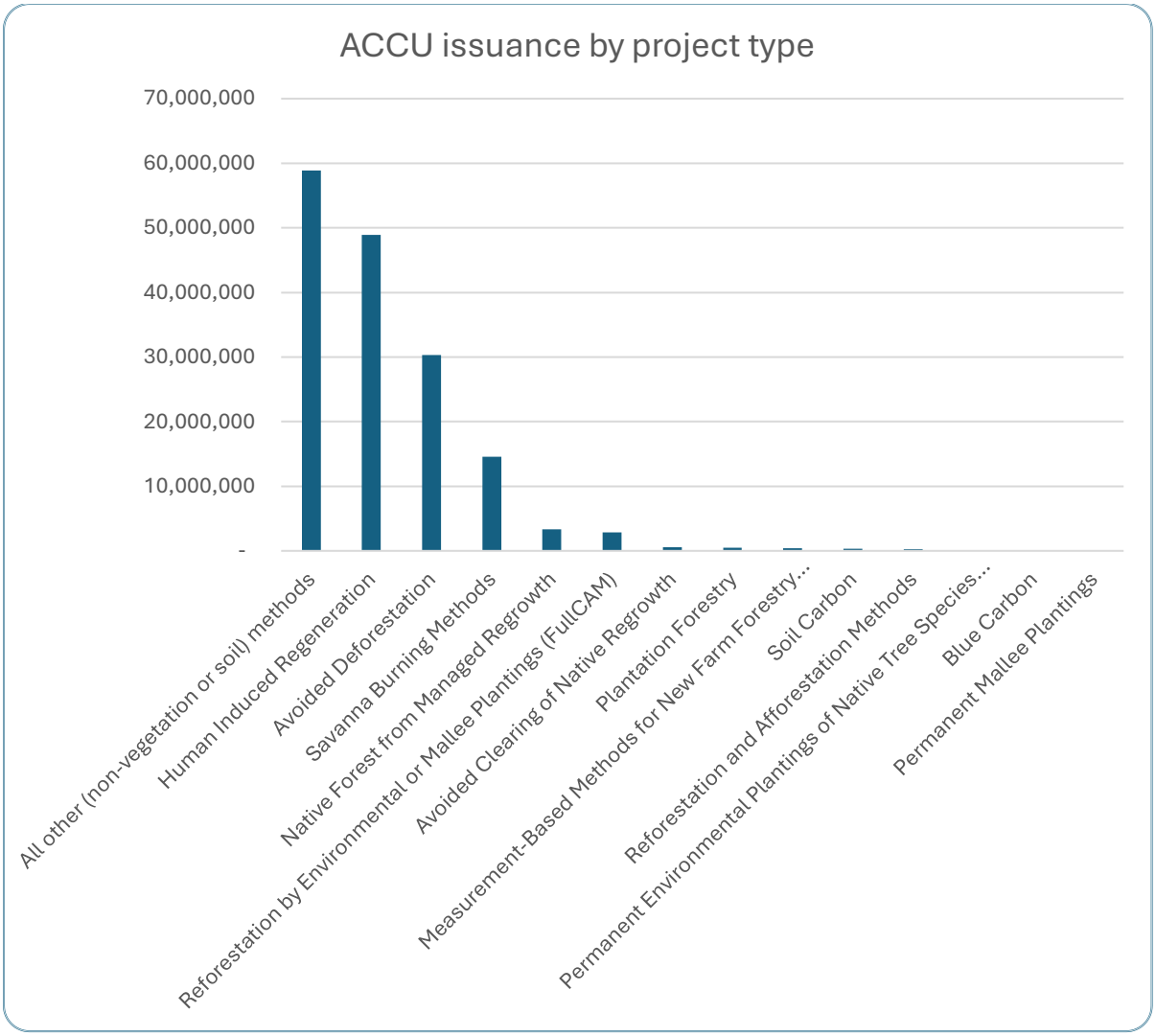

Chart 12. ACCUs issued under the CFI by project type
From: DCCEEW web site. Downloaded 15 March 2025

Total ACCUs issued to all project types are as illustrated in Chart 11 above. The group comprising "All other (non-vegetation or soil) methods" comprises 32 methodologies for accounting emission reductions in agricultural and pastoral practices, industrial processes, commercial operations, waste management etc. Reducing emissions of methane from landfills has produced by far the most ACCUs among these projects.

The "*Human-induced regeneration of an even-aged native forest*" methodology (HIR) has resulted in the largest number of ACCUs issued, followed by "*Avoided deforestation*" (AD). Both of these project types have attracted criticism from some academics, scientists and concerned environmentalists[33]. This criticism has been rebutted by carbon project developers and has not been supported by enquiries such as the Chubb Review.

The Avoided Deforestation method[34] was, however, revoked in 2023, following recommendations of the 2022 Independent Review of Australian Carbon Credit Units (the

[33] For example see ACF-Aust-Institute_integrity-avoided_deforestation_report_FINAL_WEB.pdf and Analysis of the report of the Independent Review of Australian Carbon Credit Units Final 150223.pdf
[34] Carbon Credits (Carbon Farming Initiative) (Avoided Deforestation) Methodology Determination 2013 - Federal Register of Legislation

Chubb Review). This means that no new projects can be credited under this method, however projects that started their crediting periods before 16 February 2023 are unaffected and will continue to generate ACCUs for the duration of their 15-year crediting periods.

The government considered that the integrity standards were met for projects up to the revocation date but that any new projects would find it hard to demonstrate "additionality"[35]. Buyers for carbon credits, however, have shown a preference for other ACCUs including a category called "Generic-No Avoided deforestation", which has traded at a premium to "Generic" ACCU bundles that include those from Avoided Deforestation[36].

Human Induced Regeneration (HIR)[37] projects have also attracted critical attention from some stakeholders in recent years. Concerns have been raised about the additionality of emission reductions from some or many HIR projects[38]. The methodology does not require the demonstration of a history of clearing of the project land and allows for de-stocking as a primary mechanism for achieving regeneration of forest across project land. Concerns have been expressed that regrowth in some cases may be due to climatic factors and is not necessarily additional.

These concerns were allayed to some extent by the Chubb Review which found there were no major integrity issues with the method. Some new requirements, for example to demonstrate progress towards the achievement of modelled outcomes at "gateway" times during the crediting periods of projects, have recently been introduced. The method expired after 10 years of operation in 2023, but again, projects registered before the methodology lapsed will continue to receive ACCUs for the term of their crediting periods.

The HIR methodology is expected to be replaced by the Integrated Farm and Land Management Methodology, which has been under development by the Carbon Market Institute, DCCEEW and other stakeholders for the last few years. It is expected to cover some other project types as well and enable substantial new project activity and issuance of ACCUs. At the time of writing, because the two previously available methodologies for regrowth management projects have lapsed, no new regrowth management projects have been registered for around two years.

ACCU buyers have shown a significant preference for ACCUs perceived to be bundled with co-benefits, and an aversion to ACCUs with perceived reputational risks. This is particularly the case with purely voluntary buyers, and less so with entities who are legally required under the Safeguard Mechanism[39] to meet emission reduction targets. This creates a spectrum of preferences and price premiums for the range of method and project types, and for individual projects. This has sometimes been characterised as a spectrum between "industrial" and "charismatic" carbon.

[35] Avoided Deforestation Revocation Decision Summary
[36] Platts launches No Avoided Deforestation differential for ACCUs | S&P Global
[37] Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013 - Federal Register of Legislation
[38] What the Beare and Chambers Report Really Found and a Critique of its Method (16 March 2022).pdf
[39] The Safeguard Mechanism was created by legislation that requires Australian entities responsible for emissions exceeding 100,000 tonnes CO2e per annum to meet targets to reduce their emissions over time. They can use ACCUs to reduce their net reportable emissions.

According to CORE Markets[40], at the end of 2024 the price differential between Generic, Generic-No AD, HIR and Savannah Burning ACCUs had largely disappeared, and prices for these had converged at around $35 per ACCU. However, prices for ACCUs from soil carbon, environmental planting and First Nations-managed savannah burning projects were attracting significant premiums at around $44, $48, and over $50 per ACCU respectively.

This reinforces a view that very large-scale investment will follow the best opportunities for return on capital, with low risk. Reputational and branding benefits are also important considerations, in addition to meeting obligations regarding environmental, social and governance (ESG) matters, but particularly for voluntary buyers.

There is a hierarchy of costs for different emission reduction project types, and it is fundamental to emissions trading that the market enables entities that need to reduce their emission to take advantage of the least expensive opportunities first. Avoided Deforestation has a low cost to generate ACCUs, as the carbon payment only needs to be greater than the present value of profits that would be made after clearing the land, making other required improvements such as fencing and watering points, and increasing stocking rates. Essentially the farmer is being paid to forego a development opportunity and do nothing except meet scheme registration and monitoring and reporting requirements. These are in practice often done by service providers.

The Avoided Deforestation methodology was one of the first CFI project types to generate financially and environmentally significant abatement, and the first vegetation project type to do so. Many early credits were delivered during the operation of the carbon pricing scheme introduced by the Gillard Labor government through the Clean Energy Act 2011. This Act mandated a fixed price of $23 in 2012/13 and $24.15 in 2013/14, before it was repealed by the incoming Abbott Coalition government in July 2014. It was replaced by the Emission Reduction Fund in late 2014 but fixed price obligations on emitters continued until the end of the final surrender period of the Carbon Pricing Mechanism on 2 February 2015.[41]

Regrowth Management project types were the next vegetation project type to be implemented at scale, with most initial ACCU sales being to the Commonwealth through the reverse auction system set up under the Emission Reduction Fund by the Abbott Coalition government. Average purchase prices for each auction were published[42] and early prices were around $A12per ACCU[43]. Since most of these ACCU parcels were generated by or through consultants, brokers, aggregators and other intermediaries, it could be inferred that returns to landholders were some fraction of such prices, but were still sufficient to compensate for the foregone development opportunity of maintaining the land in a non-forested state.

The fact that ACCUs have since traded at up to $A50 per ACCU and at the time of writing trade at around $A35 per ACCU indicates the substantial returns that have been and are being realised from these relatively inexpensive project types. One pioneering Australian carbon project developer, Greencollar, is reported to have sold 49% of its shares in 2020 to US-based private equity firm KKR for $A100 million, and subsequently to have sold 33% of its shares to

[40] The many facets of ACCU price dynamics – a guide for anyone with a carbon exposure | Insights | CORE Markets
[41] CCA-CFI-Review-published.pdf
[42] Auction results | Clean Energy Regulator
[43] Report of the Expert Panel examining additional sources of low cost abatement

Ontario Teachers Pension Plan (OTPP) in December 2021. OTPP then acquired KKR's shares in 2023, reportedly at a market valuation for Greencollar of $A800 million[44].

It is unsurprising that project types with a higher cost base per ACCU, like plantation forestry and environmental plantings, have struggled to attract investors interest, when profit margins are so high for regrowth management projects in particular. Plantation forestry projects need to rely substantially on income from timber, while charismatic carbon project types such as environmental planting and First Nations-managed savannah burning projects benefit financially from their ability to generate carbon with co-benefits that attract significant payment premiums.

It is central to the approach adopted in this paper that sustained landscape carbon storage is best, and perhaps only, achieved through forest, land and water management that is economically, environmentally and socially sustainable over the long term. It should not, but probably does, need to be underlined that efficiently growing trees for timber is a vital part of overall sustainable and regenerative forest management.

It is important therefore that environmental market investment decisions that will largely be made on the basis of return on capital are made within a policy and regulatory framework that, as far as possible, aligns investment imperatives with sustainable development objectives, and carbon storage with best practice national, regional and farm scale biomass and biodiversity management. This may involve a shift from some past and current policies and practices that prioritised broad market engagement from sellers, and containing costs for ACCU buyers.

The Nature Repair Market

The Nature Repair Market has been established as part of the Commonwealth's response to the Samuel Review of the EPBC Act and the most recent State of the Environment Report,[45] that documented ongoing processes of biodiversity decline and ecosystem degradation in Australia. The enabling Act and Regulations, and the first project methodology and associated Biodiversity Assessment Instrument have all been finalised, providing an initial administrative infrastructure to certify biodiversity protection and enhancement projects. According to the Department of Climate Change, Energy, the Environment and Water[46](DCCEEW):

"The Nature Repair Market is a voluntary national market. It enables people to take action to restore and protect the environment. The scheme establishes a marketplace where individuals and organisations can undertake nature repair projects and attract investors. Projects under the Nature Repair Market encourage land management practices that improve biodiversity. These projects could include:

- *planting trees on farmland*
- *re-establishing vegetation along waterways*
- *protecting and managing existing habitat or native vegetation.*

Projects can be undertaken on Australian land and waters, or both."

The enabling legislation, the Nature Repair Act 2023 is similar to the Carbon Credits (Carbon Farming Initiative) Act 2011 in terms of the rigour and stringency of its requirements, and some

[44] Carbon project provider GreenCollar bought in $800m deal
[45] Australia state of the environment 2021
[46] Nature Repair Market - DCCEEW

basic processes. It allows for the registration of Nature Repair projects on a public register, and certification of the biodiversity benefits of projects. These certificates are then able to be traded as intangible personal property (the same form of property as ACCUs). The expectation is that they will find a healthy voluntary market, including buyer interest from commercial and other entities looking to offset their environmental impacts and bolster their reputations for environmental and social responsibility.

The Commonwealth is also looking at an enhanced system of environmental offsets under the EPBC Act, consistent with the findings of the Samuel Review, and it could be assumed that experience in the operation of the presently voluntary Nature Repair Market would inform the development of a new system for offsets. It could also be speculated that the Nature Repair Market would form the basis of a compulsory offsets system after sufficient practical experience has been gained and the system has been fine-tuned.

Given the presently voluntary nature of the scheme, it is unlikely to generate revenues for reforestation projects at the scale of the compulsory carbon market. Nonetheless, Nature Repair Market revenues to projects with other funding sources could make them more viable. It is likely to significantly reinforce and leverage the present market preference, and financial premium, for "charismatic carbon", in addition to giving returns to biodiversity projects outside the carbon trading arena.

It is clear, and commercially significant, that Nature Repair Market Biodiversity Certificates will be able to be issued to carbon market projects where there are suitable methodologies, so that the benefits are additional. This is referred to as "stacking" of benefits.

Like carbon market projects, Nature Repair projects must follow methodologies, which are regulations signed into law by the relevant Minister, and stipulate eligibility, conduct of projects, measurement of biodiversity protection or enhancement, and reporting requirements.

Measurement and evaluation of the contribution to protection and enhancement of biodiversity uses standards and processes detailed in a Biodiversity Assessment Instrument (BAI). The BAI sets out things that methods need to include so that they describe biodiversity and biodiversity changes in a consistent and comparable way that enables different types of nature repair projects to be compared and assessed. Measurement of project impacts is through the use of State and Transition Models that track progress towards a "reference" original ecosystem at the site(s).

A range of other tools, databases and technical guidance are provided for the use of project proponents, including among others:

- An Approved Benchmark Sources List (initially only for the Replanting Native Forest and Woodland Ecosystems Method). As an example, the Benchmark source listed for NSW is the Plant Community Type (PCT) Benchmarks.[47]
- Data submission guidelines
- The International Union for the Conservation of Nature Global Ecosystem Typology
- The National Vegetation Information System (NVIS)
- Nature Repair Market Mapping Guidelines
- The National Biodiversity Assessment System, which has been developed by CSIRO and DCCEEW. It provides a nationally consistent approach to assessing biodiversity and

[47] NSW plant community type classification | Biodiversity | Environment and Heritage

forecasting the biodiversity benefits of projects. Access is through the Platform for Nature Repair (PLANR).

It is a scheme requirement that significant documents including the Project Plan, progress reports and application for a Biodiversity Certificate must be compiled with the assistance and professional expertise of a qualified and experienced ecologist, biologist or similar professional.

The first methodology available to project proponents is the *Nature Repair (Replanting Native Forest and Woodland Ecosystems) Methodology Determination 2025*[48]. A detailed summary of the requirements for operating a Nature Repair project using this methodology is available from the Clean Energy Regulator[49]. It details the rules and requirements for Nature Repair Market projects that revegetate cleared land by replanting locally endemic ecosystem types and supporting ecological connectivity.

Since "stacking" of projects under the CFI and Nature Repair Market is allowed, there may be current opportunities to design and conduct planting projects that meets the requirements of both the Reforestation by Environmental and Mallee Plantings – FullCAM 2024 method for a carbon project and the Nature Repair (Replanting Native Forest and Woodland Ecosystems) Methodology Determination 2025 for a Nature Repair project. It should be noted though that separate project monitoring, verification, reporting and other processes will need to be undertaken for each market.

Other methodologies currently flagged for development include:

- An enhancing remnant vegetation method—to encourage protection and enhancement of existing native vegetation.
- A permanent protection method— to protect and conserve biodiversity in line with Australia's national goal of protecting 30 percent of land by 2030.
- A native forest method to protect, restore and manage native forests.
- An invasive pest management method to focus on the control of specific feral pests or weeds.
- A rangelands method to manage and enhance habitat in the arid and semi-arid areas of Australia.

There seems to be a belief among some policy makers that multiple use forestry is inconsistent with the provision of biodiversity or other environmental benefits. This is presumably because of an underlying attitude that forest silviculture and timber harvesting are processes antithetical to the survival of forest dwelling and forest dependent species. Impacts of these processes on species, including threatened species, are actually dependent on factors including the scale, pattern and intensity of silviculture and harvesting, availability of alternative habitat, and the overall degree of disturbance permitted by agreed management over time.

Species are already adapted to survive disturbance which is a universal feature of both managed and unmanaged landscapes. Moreover, where reforestation for multiple purposes is scalable in managed landscapes it can undoubtedly provide considerable benefits to

[48] Nature Repair (Replanting Native Forest and Woodland Ecosystems) Methodology Determination 2025 - Federal Register of Legislation

[49] https://cer.gov.au/document_page/replanting-native-forest-and-woodland-ecosystems-method-information-pack

environmental values including biodiversity conservation and enhancement, catchment protection and sustainable management of productive landscapes.

Recommendation 9: It is recommended that interested regional or other forest stakeholders initiate discussions with relevant authorities to see if a Nature Repair Market methodology could be developed to certify the biodiversity benefits of ecoforestry.

Risk and permanence

Proponents of sequestration and vegetation protection projects under the CFI can currently choose a "permanence period" of either 25 or 100 years. This is the period over which the project proponent is responsible to protect and maintain the credited carbon sequestered in the relevant project vegetation or land. Where project proponents choose a 25 year permanence period, the ACCUs awarded for the tonnes of CO2 sequestered or protected are discounted by 20%, or a percentage specified in the applicable methodology or scheme rules. Projects opting for the 100 year period do not suffer this permanence period discount.

For example, for plantation forestry projects that choose a 25 year permanence period under the *Carbon Credits (Carbon Farming Initiative— Plantation Forestry) Methodology Determination 2022*, higher rates of permanence period and other discounts of between 25% and 38.75% apply to certain types of projects. These deductions are in addition to a deduction of 5% from the ACCUs to which any sequestration or vegetation protection project would otherwise be entitled, to cover the risk of losses (reversal of sequestration) over time. This "risk of reversal buffer" deduction applies whether projects have a 25 or 100 year permanence period.

These arrangements are put in place to manage risks to the Commonwealth, because when sequestered carbon is credited as an ACCU and reported in Australia's national accounts under the Framework Convention on Climate Change and the Paris Agreement, any subsequent re-emission of that carbon at any time must be reported in our national accounts. Therefore, the Commonwealth takes on a permanent contingent liability in issuing ACCUs, which becomes actual if the carbon is re-emitted. If the re-emission occurs after a project's permanence period has ended, the Commonwealth will be solely responsible.

There are a range of risks to carbon sequestered in land and vegetation-based projects, including risks from natural hazards such as drought, flooding, fire, pests and diseases, and exacerbation of these risks and new risks from the impacts of changing climate.

There are also risks caused by possible changes in the management practices that have led to the carbon storage, particularly after the expiration of permanence periods. These risks arise mainly because after crediting periods end, under current arrangements, there is no provision for further carbon income to assist in management of land which may no longer be able to generate any, or acceptable, income from other land use options. The driver of financial opportunity at that time could motivate land managers to change back to a more profitable landuse, for example by clearing regrown forests for grazing.

Natural and climate change risks to projects

CSIRO Land and Water produced a report[50] (Roxburgh, Paul, & Pinkard, 2020) for the Climate Change Authority in 2020 entitled "*Technical review of physical risks to carbon sequestration under the Emissions Reduction Fund*". It provides an exhaustive qualitative analysis of known risks to credited carbon across six different generalised types of ERF sequestration projects. The project types analysed were increasing carbon in agricultural soils, planting new forests, "blue carbon" (intertidal ecosystems) projects, savannah burning projects, regrowth management and avoided deforestation/avoided clearing projects. Risks were evaluated to the year 2050, or around the end of a 25 year "permanence" period. They noted that risk is further increased, but uncertainties became too great, if evaluation is extended to 100 years.

However, even over twenty-five years there were significant risks identified to both accumulation and retention of carbon, including those arising from both direct and indirect effects of climate change. Different risks were analysed by reference to the severity of the consequences and the probability of their occurrence. Consequences were assigned to five classes ranging from 'Insignificant', with less than a 5% expected loss of abatement over the long term, through to 'Catastrophic', where greater than 80% of achieved abatement could be lost, or less than 20% of planned abatement achieved, combined with a subsequent loss in capacity to sequester additional carbon into the future.

The report says that "*although the consequence classes are defined numerically, in the absence of detailed modelling to quantify the possible impacts of the risk factors across the different ERF activities on sequestration outcomes, the numerical classes are here used as a guide to ranking outcomes, based largely on qualitative information*."

These consequence classes were then assigned a degree of probability of occurrence across three probability classes, being likely to occur (>66% probability) as likely as not to occur (33%-66% probability) and being unlikely to occur (<33% probability). The risk analysis then combined the probability and severity of risk into four "risk priority classes", Low, Medium, High and Extreme. Over the timeframe to 2050, no Extreme risks were identified, but multiple "high" risks apply to some project types.

The report concludes that the highest risks overall were to the "soil carbon" and "planting new forests" project types and the lowest risks were to those projects that protect mature or maturing native forests. Blue carbon and savannah burning projects face moderate levels of risk. Soil carbon projects have a risk profile several times the severity of avoided deforestation.

Direct climatic factors with likely high impacts on carbon storage included additional heat stress limiting growth and increasing mortality, consistent elevated temperatures shifting preferred climatic conditions, reduced soil water availability, changes to soil respiration and soil microbial processes, and changes to timing/seasonality of crop growth. Drought, fire, and pests and diseases were also expected to cause additional problems to both retention and accumulation of carbon in many project types. These risks are in addition to current levels of risk from these factors.

Recommendation 10: It is recommended that the Commonwealth commission further research to quantify possible loss of landscape carbon in respect of which ACCUs have been issued, over project permanence periods, including where such losses may result

[50] ERF Review - CSIRO Technical Report on Climate Risk - Final

from the likely impacts of climate change. This should build on the qualitative work in this area already done by the CSIRO.

Risks to project proponents

A natural event or disaster causing an unexpected reversal of sequestration and/or unexpected emissions is unlikely to directly entail penalties such as a requirement to relinquish ACCUs. The risk of these events is what the 5% "risk of reversal buffer" is intended to cover. However, issuance of ACCUs will cease until the credited carbon stocks recover[51] and even temporary loss of the income stream from expected ACCUs could undermine the overall business case of a project.

Also, the Regulator may, at their discretion, require the project proponent to take positive action to restore the lost carbon. This could involve taking additional protective measures such as additional fire protection or fencing, or activities to promote regeneration in affected areas. Whether this is likely to include expensive measures such as replanting is presently unclear, but it is clear that the Regulator has extensive discretionary powers in these cases.

Failure to meet scheme obligations regarding fire and other natural hazard risk management, or failure to meet obligations to restore lost carbon could trigger a requirement to relinquish ACCUs equivalent to those in respect of which carbon has been re-emitted. It should be borne in mind that if these have to be purchased for relinquishment, it will be in different market conditions to those obtaining when ACCUs were issued to the project and could potentially be at significantly higher prices.

Policy risks

Crediting periods start from the date a project is declared as an eligible offsets project or at a date chosen by the project owner within eighteen months of the declaration, and permanence periods start from the time of first ACCU issuance. There may therefore be a time gap of only a few years between the start of the crediting period and the start of the permanence period. This is also true for the end of the crediting period and the end of the permanence period. Both of these are commonly 25 years.

Therefore, an ACCU issued to a project at the end of its crediting period represents carbon that may only be required to be stored for a few years until the end of a 25 year permanence period. It can then be re-emitted without penalty under the CFI (but subject to any State or Territory government requirements, or new Commonwealth requirements, for vegetation protection at the time).

Land managers have proven willing to forego substantial payments in order to retain the flexibility to manage their land without ongoing CFI obligations after 25 years. Indeed, it appears that the 25 year time horizon was introduced, with the advent of the Coalition's Direct Action Plan and the Emissions Reduction Fund (ERF), to accommodate land managers' reluctance to enter into long term, binding land management agreements, and thereby secure broad participation on the supply side. Farmers and other land managers have a strong aversion to their land being "locked up".

Prior to the ERF, all CFI vegetation projects were required to have a 100 year permanence period. This was seen as a significant impediment to landholder participation. The number and

[51] Reducing the risk of fire and preserving sequestered carbon in ACCU Scheme projects

percentage of CFI projects opting for the 25 year permanence period are as detailed in Table 1 below

Method, projects, permanence and ACCUs					
	No of Projects	No in NSW	Number using	Percent using	ACCUs issued
Methology type			**25 yr permanence**	**25 yr permanence**	
All other (non-vegetation or soil) methods	340	151	n.a.	n.a.	58882200
Human Induced Regeneration	462	165	337	73%	48888689
Avoided Deforestation	62	62	2	3%	30306813
Savanna Burning Methods	86	0	5	6%	14541209
Native Forest from Managed Regrowth	35	0	7	20%	3305370
Reforestation by Environmental or Mallee Plantings (FullCAM)	259	88	111	43%	2887130
Avoided Clearing of Native Regrowth	16	0	14	88%	535629
Plantation Forestry	171	25	165	96%	510864
Measurement-Based Methods for New Farm Forestry Plantations	3	0	3	100%	409017
Soil Carbon	724	203	717	99%	320424
Reforestation and Afforestation Methods	9	3	0	0%	249243
Permanent Environmental Plantings of Native Tree Species (RMT)	8	3	1	13%	42556
Blue Carbon	2	0	1	50%	0
Permanent Mallee Plantings	1	0	0	0%	0
Revoked projects	325				323858
Total projects and ACCUs	**2503**				**161203002**
Total projects not revoked and ACCUs from projects not revoked	**2718**				**160879144**

Table 1. Number of projects, number in NSW, permanence and ACCUs
From: DCCEEW web site. Downloaded 15 March 2025

To illustrate the implications of this, at the present time nearly 50million ACCUs have been issued to HIR projects and of these around 73% have been issued to projects that have opted for the 25 year permanence period. If 73% of ACCUs from HIR projects sold for say, $A25 per ACCU, then the credits foregone by land managers opting for 25 year permanence would have a market value of ~$A182 million. Land managers obviously have a strong desire to maintain the flexibility to manage their land how they wish in the future.

The apparent proposition that at least 80% of carbon sequestered and/or protected by projects to which 25 year permanence periods apply will remain protected beyond the permanence period seems open to question. There appears to be no basis in science or applicable research for this assumption. If so, it appears inconsistent with the legislated CFI offset integrity requirements for evidence-based and conservative estimation of abatement.

The environmental value of carbon storage for short periods is also questionable. The climatic benefit is in sequestering carbon from the atmosphere, but the benefit accrues over time. According to the IPCC, an emission of a quantity of CO2 into the atmosphere decays over time as it is absorbed by terrestrial ecosystems, the oceans and long-term geological sinks. It has been estimated that 20% to 35% of a CO2 emissions is still in the atmosphere at the end of 10,000 years (Commonwealth of Australia (Climate Change Authority), 2023)[52].

The Climate Change Authority has raised these issues with the Commonwealth. Most recently the Authority in its 2023 Review of the Carbon Credits (Carbon Farming Initiative) Act 2011[53]stated:

"*Internationally, most carbon markets adopt 100 years as the period for which carbon must be stored (sequestered) to be considered valid for counterbalancing emissions. For sequestration*

[52] Sequestration Insights Paper - Publication Report 1.0.docx
[53] 2023 Review of the Carbon Credits Act 2011 - publication.pdf

projects under the ACCU Scheme, a permanence obligation helps keep carbon out of the atmosphere by requiring it to be maintained in trees and in soils. The ACCU Scheme currently credits projects with either a 25-year permanence period or a 100-year permanence period. The authority recommends encouraging projects with the shorter period transition to a 100-year permanence period, and considering further approaches to ensure the scheme wide average storage duration is at least 100 years."

However, they further stated in the same report:

"The inclusion of a 25-year option was introduced in 2014 to overcome barriers to participation. The authority's consultation suggests these barriers are likely to persist, including Australian Government regulations and policies complicating state governments' ability to consent to a 100-year commitment on leasehold or other Crown land (where the majority of projects are currently undertaken); impacts on native title rights and the consent process; the impact on land value, finance and insurance from the requirement to maintain carbon stocks long after crediting stops; and succession planning.

Ceasing the option of a 25-year permanence period for new projects could help increase the permanence of carbon sequestered under the scheme by ensuring new projects are required to be bound by the permanence obligations for 100 years. The authority's view is that the 25-year permanence period option should be retained to support the agriculture sector's participation and recognise the valuable abatement from land managers under the ACCU Scheme. However, the government should review the discount and treatment of projects with 25-year permanence periods and consider how the scheme can overall achieve higher average permanence."

Recommendation 11: It is recommended that forest stakeholders and their representative organisations in the region inform themselves about, and actively engage in, policy discussions around "permanence" and management of risks to the environmental, social and economic benefits and assets created as a result of the operation of markets for environmental services. In doing so it is suggested that aligning the operation of these markets with natural resource management that is environmentally, economically and socially sustainable in the long terms should be the overall goal.

Minding the Carbon Store

An alternative approach on the issues of long-term protection of vegetation was taken in the pioneering "*Minding the Carbon Store*" project, an avoided deforestation project operated by The Carbon Pool Pty Ltd in 2006 and managed by the author of this report. The Carbon Pool bought back the rights to clear around 12,000 hectares of remnant vegetation in SW Queensland, in the runup to the Queensland Government's ban on broadscale clearing of remnant vegetation at the end of 2006. This project resulted in the sale of one million tonnes of Greenhouse Friendly certified abatement to Rio Tinto Aluminium. In that case vegetation was protected by Carbon Rights Agreements registered on the property titles of project land for 121 years, so that the verified offsets issued for the 20th year of emissions reduced against a static baseline would still be guaranteed 100 years of storage. A buffer of 20% of certified abatement was reserved for risk management. The project was successfully completed based on a voluntary market carbon price of a few dollars per tonne of CO_2e.

Changes, particularly including unexpected or retrospective changes, to legislation and regulations, policies and regulated practices in the forest and agricultural industries, including in the new markets for environmental services, can create uncertainty and distrust among stakeholders, including landholders and investors. They can stifle investment and sour stakeholder attitudes even when the overall effect of changes may be beneficial, or the changes are unavoidable or made for unrelated reasons.

Examples of unexpected changes affecting landholders, industry and investors in recent decades include the absence since 2023 of any methodology allowing investment in new regrowth management projects, legislated changes in permissible use of private and leasehold land including changed or extinguished clearing rights, withdrawal of areas of multiple use forest to the conservation estate resulting in stranded private assets, and changes to the requirements of some CFI methodologies such as the additional "gateway checks" introduced to regrowth management projects.

A further example of sovereign risk may be created at the end of the permanence periods of vegetation projects, if landholders have assumed they will have a right to clear vegetation and this right is then limited or extinguished, for example by State or Territory land and vegetation-related legislation.

While changes creating perceived or real sovereign risk may sometimes be necessary, they should always be minimised to the extent possible, particularly with respect to changes with retrospective effect, if landholder, investor and other stakeholder confidence is to be maintained. Compensatory mechanisms should be employed as far as possible where private interests are adversely affected to achieve public goods. For these reasons the Commonwealth needs to lead and facilitate participatory policy discourse with a view to achieving consensual and clearly understood, science-based policy and regulation around risk and permanence for land and vegetation-based CFI projects.

Carbon Rights and Conservation Covenants

Each State in Australia has legislation allowing, in some form or other, the registration of Carbon Rights on the title to land[54]. Carbon Rights are a form of intangible real property, known in law as an "incorporeal hereditament". This class of property includes easements, covenants and *profits a prendre*, and can be registered on the title to land.

This gives intangible real property such as Carbon Rights strong protection under law. These rights "run with the land" and bind subsequent owners of the land for the term of an agreement. Future owners are said to "take with notice" of the registered interest, not just the owner who agreed to the registration of the Right. Carbon credits such as ACCUs, on the other hand, are intangible personal property or a "chose in action".

Currently, different approaches have been adopted in a somewhat "railway gauges" situation among the States. These include carbon rights defined as a *Natural Resource Product* in Queensland, a *profit a prendre* in NSW, a particular form of *Forestry Right* in Victoria, and simply as a Carbon Right in Western Australia. An important practical effect of Carbon Rights legislation is to allow a relevant land and/or forest management plan to be registered on the land title for a specified period, along with agreements as to the allocation between the parties

[54] https://www.unswlawjournal.unsw.edu.au/wp-content/uploads/2017/09/31-3-5.pdf

of benefits and responsibilities arising from or pursuant to the plan. This includes the ability to agree entitlement to any carbon benefits (such as ACCUs) that may arise from implementation of the plan.

The West Australian legislation, for example, details a system of registrable Carbon Rights supported by Carbon Covenants that can be both positive and negative. In some Australian jurisdictions it is possible to have the land, Forestry Rights (to the trees) and Carbon Rights each in different ownership.

In NSW, amendments to the Conveyancing Act 1919 provide for the creation and ownership of carbon sequestration rights in land as a profit a prendre. This is defined as a "*right conferred on a person by agreement or otherwise to the legal, commercial or other benefit (whether present or future) of carbon sequestration by any existing or future tree or forest on the land after 1990*". Covenants can also be registered on title to address matters associated with the carbon rights such as the provision of access to the land, maintenance and management of the trees, ownership of the trees, benefit sharing etc.

Carbon Rights enable robust legal agreements on a spectrum from aggregation of projects under one entity responsible for measurement, reporting and verification processes, trading in ACCUs and disbursing returns across a pool of properties, through to simple offtake agreements between a landowner/proponent and an ACCU buyer. While not always necessary to underpin carbon transactions, they are likely to be particularly important to longer term projects, such as where obligations over 100 years are the subject of agreements, and more generally, where strong property rights are needed.

Given that for some project arrangements, including multi-State or national projects it may be convenient or necessary to use Carbon Rights agreements, the inconsistent approach across the States and Territories could cause unnecessary difficulty.

With the development of the Nature Repair Market there may also come to be increasing reliance on Conservation Covenants. These are another type of agreement that can be registered on the title to land, creating obligations around the management of land and often centred on a management plan. Again, arrangements for conservation covenants are different in each State

The Commonwealth has legislated for tax benefits in relation to both income and capital gains taxes for approved covenanting arrangement to protect biodiversity. There is a complex interplay of Commonwealth and State Government arrangements and requirements to be negotiated by landowners, and their advisors, who wish to implement biodiversity conservation projects and maximise commercial and/or taxation advantages in doing so.

In NSW the Biodiversity Conservation Trust and the Dept of Environment and Heritage can provide relevant and useful advice. Under the Biodiversity Conservation Act 2016[55], there are three private land conservation mechanisms available through the Biodiversity Conservation Trust. There are also some arrangements that can be put in place with local councils:

Biodiversity stewardship agreements (BSAs) enable landholders to generate and sell biodiversity credits for offsetting some unavoidable impacts of development, must be in perpetuity, and are supported with technical advice and stewardship payments.

[55] About the Biodiversity Conservation Act 2016 | Biodiversity | Environment and Heritage

Conservation agreements provide for permanent or long-term protection and conservation management of land and may be funded in accordance with the priorities outlined in the Biodiversity Conservation Investment Strategy.

Wildlife refuge agreements are entry level agreements that can be terminated at any time or converted to a higher form of agreement.

Section 88 covenants and land being gifted to local councils are other options for landowners wanting to get better protection of biodiversity over time.

Recommendation 12. It is recommended that the Commonwealth examine the differing forms of state and territory Carbon Rights legislation and consider whether it could play a role in encouraging adoption of best practice state legislation, for example by enacting best practice legislation for the Territories and encouraging emulation, through COAG discussion, or otherwise. In considering Carbon Rights legislation it could also be considered whether these should be a separate system to Conservation Covenants and Forestry Rights, bearing in mind that securing environmental outcomes as real property can entail a management plan registered on one or more land titles, and that one plan could integrate, for example, the means to deliver carbon, biodiversity, landscape or water protection, and/or timber production outcomes.

Aggregation and Carbon Rights

Aggregation of carbon projects is an existing management model under the CFI, wherein a corporate entity with appropriately qualified staff, expertise, management systems and capital can act as the project proponent and manage multiple land-based projects on behalf of landowners, under agreements regarding the parties' respective roles, contributions and obligations, and benefit sharing. These arrangements and agreements can be the subject of Carbon Rights registered on land titles.

There is an interesting parallel in law for the aggregation or pooling of carbon rights. This is what is known as a "scheme of development". This is the name given to arrangements where, for example, all homes in a new estate must be built to a certain specified standard, in order to protect the value of all the other buildings, and this obligation is registered as a covenant on each land title.

A scheme of development is based on the principal of "mutual recipricosity". This means that each individual property is both burdened and benefitted by binding obligations, including on future owners of each property, with the overall objective of protecting the value of each property.

It is not hard to see a parallel in aggregation arrangements where individual carbon or other environmental market projects gain common access to investment, risk management, monitoring, verification and reporting services and marketing benefits through pooling arrangements, either endogenously managed and owned, or through external service providers (aggregators).

Landowners engaging cooperatively in markets for environmental services, aggregators pooling many individual projects, and finance providers for their projects may all get greater assurance of desirable commercial and risk management outcomes where the continuing performance of obligations is secured through registration of rights as real property on property titles.

Characteristics of reforestation investments

Who owns existing planted forests

Timber plantations

Timber plantations in Australia have been increasingly in private ownership over the last two decades, as governments have sold their (mainly softwood) plantation estates. This has occurred in Queensland, South Australia, Victoria and Tasmania. New South Wales and the Australian Capital Territory are the only jurisdictions where a majority of plantations are still in public ownership, as shown in Chart 12 below.

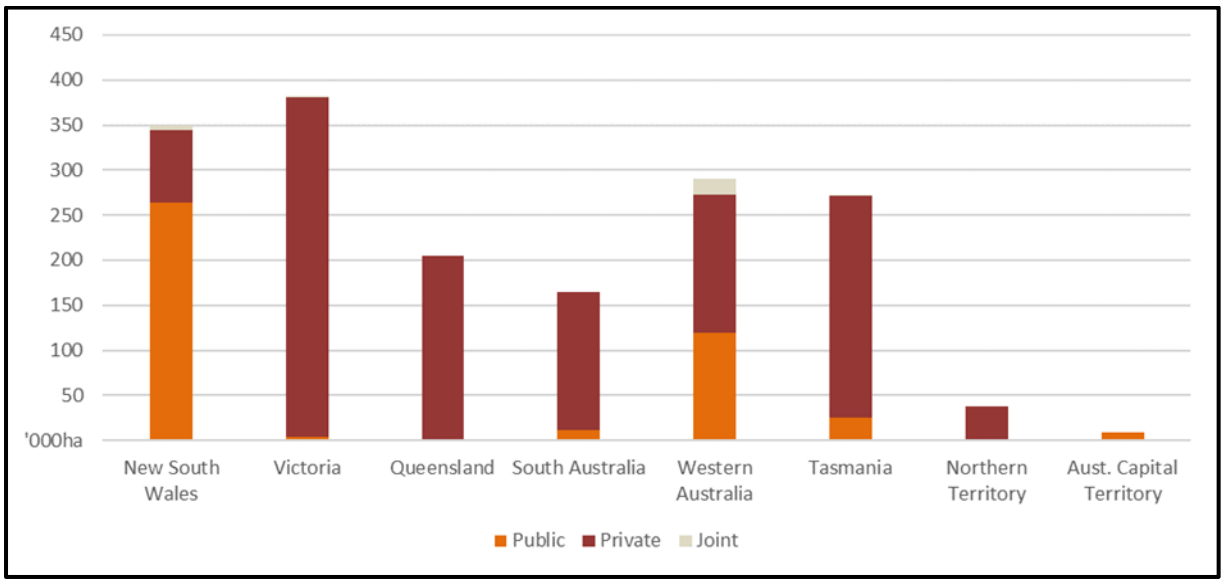

Chart 12. Government and private ownership of forests by State/Territory
From: (ABARES, 2024b)

Chart 13 below shows how ownership of plantation forests has changed over time, in favour of greater private ownership. By 2022/23, the majority of timber plantations were owned by institutional investors. State and Territory governments were the next biggest owner, followed by farm foresters and other private owners, while the timber industry owned the smallest fraction. Managed investment schemes, which had dominated ownership of hardwood plantations in the 2004/05 to 2009/10 period, were no longer significant owners by 2019/20.

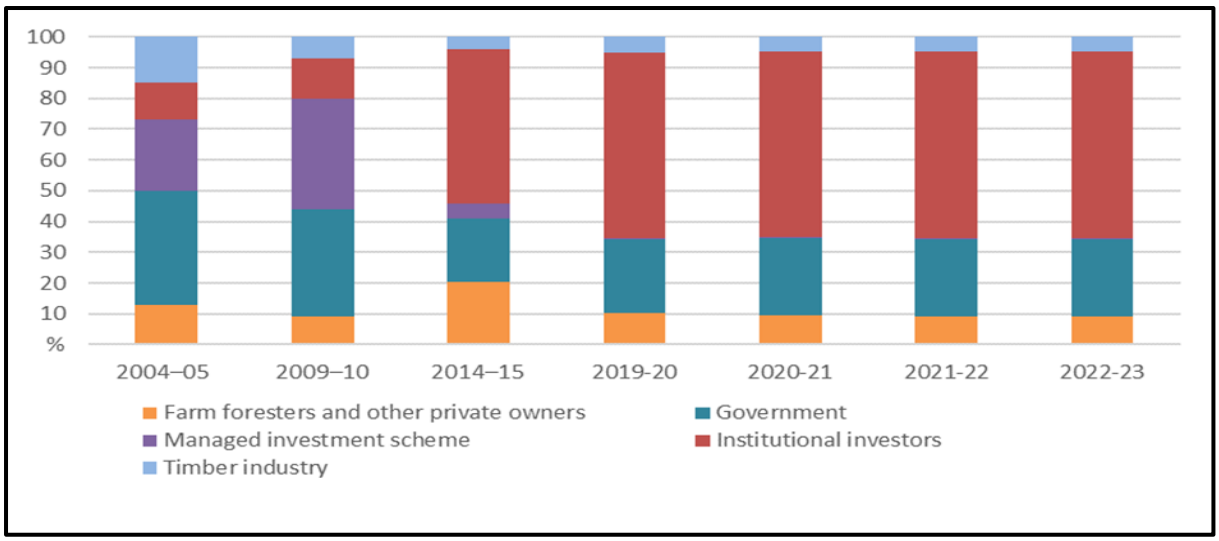

Chart 13. Ownership of timber plantation forests in Australia over time
From: (ABARES, 2024b)

Environmental plantings

Environmental and Landcare plantings are presently highly disaggregated across Australian landscapes. They were, until the last decade or so, established on farms or other privately or publicly owned rural land and at relatively small scale. They have often been for trial and demonstration purposes, and to help address local environmental degradation or biodiversity loss issues. These plantings have been supported by the various Landcare funding initiatives detailed earlier in this report and have often been implemented with voluntary labour from individuals and community "care" groups.

Commonwealth, state and local government, and private industry support for these activities has increased substantially since the 1990s. Community awareness of the importance of the issues addressed by Landcare has also increased, and in the last several years local governments, wealthy private individuals, environmental organisations and philanthropic sources of funding have all provided additional resources for environmental planting projects.

Since 2012, environmental plantings have also been eligible for financial returns from carbon markets. All these factors have resulted in a recent significant expansion in environmental planting activity, as discussed earlier. The land base for these projects is still predominantly rural and farming land in private ownership, and some land in public ownership, often managed by Local Government.

Environmental plantings have yet to reach (or perhaps have only just reached) the level of investment value that would support the purchase of land for the purpose of conducting environmental planting projects at scale. Neither is it necessary, given the range of legal arrangements that can be put in place, where necessary, for commercially focused environmental planting projects to access land.

Investors in planted forests

For all the classes of investors identified below, acceptable return on investment is fundamental, and positive social license has become increasingly important to gain investor interest and lead to favourable investment decisions. Impact and ethical investing, where investors seek out investment opportunities with social or environmental benefits has

increased its market share in recent decades and influenced investor behaviour across the board.

The additional returns from environmental markets, the timing of those returns, and the contribution of new forests to providing timber, sustainable management of natural resources and conservation of biodiversity, if communicated effectively, can lead to the development of a much more favourable investment climate for reforestation investments, across the ecosystem of possible investors and the spectrum of investment opportunities.

Timber plantation development, ecoforestry and expansion of environmental plantings to landscape scale have different drivers. Environmental plantings can store more carbon in forest biomass and have potential for extra income from Biodiversity Certificates or offsets. ACCUs from environmental plantings may also benefit from a price premium based on their charismatic characteristics such as providing habitat for endangered species.

Plantation forestry, usually grown in monocultures, relies on returns from timber production with additional strategically timed cash flows from carbon when new estates are established. They also have the advantage that sustainably produced timber is essentially a carbon neutral material for all its many uses. However, some of the benefits of growing and utilising wood may not be captured by current carbon accounting approaches that don't credit forest growers with carbon storage in timber products, or where it is substituted as a biofuel for fossil fuels.

Ecoforestry, or the integration of thinning and harvest into the management of ecologically regenerative new planted forests, could be a third major form of forest establishment if given appropriate encouragement. It bridges the gap between forest establishment for timber and environmental benefits, filling the middle in the spectrum of investment opportunities, and could potentially benefit from all the above cash flows, in addition to strong potential to integrate with and support established farm production.

A report[56] published as part of the Next Generation Forest Plantations Investment Project[57] undertaken by the School of Ecosystem and Forest Sciences at the University of Melbourne[58]recommended five things to attract new capital into the establishment of new plantations.

1. Implement impact measurement and reporting for tree planting.
2. Increase awareness of forestry as an investment class, especially among financial intermediaries such as financial advisors and the managers of responsible, ethical and impact funds.
3. Build the case for optimising land utilisation by integrating trees with existing land uses.
4. Collaborate with those entities that are pioneering the inclusion of natural capital into the valuation and risk assessment activities of land-based enterprises.
5. Bridge different scales of investment in trees planted for harvest.

(Dembek & and York, 2019)

[56] Next Gen Forestry Financial Sector Report v0.1-5.pdf
[57] Next Generation Forest Plantation Investment
[58] The overall project produced several excellent repots on a range of topics relevant to new investment in plantations. It was supported by some large forest industry businesses and the Commonwealth Government.

They found that apart from the currently limited knowledge of planted forests as an investment option, and frequently negative perceptions, there was also a mismatch between the needs of large investors and the scale of available planted forest investments.

It is possible that the aggregation business models that have become common in markets for environmental services, discussed elsewhere in this report, could also assist in scaling up planted forest investment opportunities. In doing so, measures to de-risk and increase efficiencies of tree growing operations could be implemented, along with improved communication of positive social and environmental impacts.

Institutional investors

Over 60% of timber plantations in Australia are now owned by institutional investors, often assisted by Timberland Investment Management Organisations (TIMOs). TIMOs find, evaluate and manage forest estates on behalf of the institutional investors who generally own the forest and land assets. Institutional investors can include banks, merchant banks, superannuation and pension funds, insurance and reinsurance companies, hedge funds, mutual funds, and endowments.

A form of investment available to both institutional and retail investors is a Real Estate Investment Trust (REIT). REITs are structures that obtain investment capital from many investors (including institutional investors) to own, operate or finance income-producing real estate, that can include forestry assets.

Institutional investors were able to purchase many of the plantation estates of the Managed Investment Schemes at very favourable prices, after those MIS went into receivership during and following the Global Financial Crisis. Institutional investors have also been major purchasers of State-owned plantations as these have been privatised in Queensland, Victoria, Tasmania, South Australia and Western Australia.

Institutional investors generally make large scale purchases of securities and other assets, seeking diversified portfolios of mature investments with low risk overall. Within these allocation strategies forestry assets have been a minor portfolio component, but valued for characteristics including low volatility, low risk, low correlation with other assets and a positive correlation with inflation. Private planted forest investment opportunities will need to scale up, again underlining the advantages of aggregation, for institutional investors to be interested.

Institutional investors are highly regulated and have a fiduciary duty to their clients to invest wisely against predetermined investment guidelines and for specified objectives around returns and risk. Fund managers with somewhat greater freedom around their investment decisions are asset managers and investment bankers, professional funds managers and private equity funds.

For this class of investors to have investments in the new forestry/carbon/biodiversity class of assets there is a clear need for some form of project aggregation to achieve the required scale of investment and risk management. With an adequate level of aggregation, however, very large-scale investment could be possible. The current ownership of Greencollar by a Canadian pension fund is one example.

While it is unclear whether they currently have significant exposure to forestry or environmental market investments, it is worthy of note that total assets in the Australian superannuation industry have recently topped $A4.2 trillion[59]. This is the world's fourth largest investment pool.

Governments

Governments, mainly in New South Wales and Western Australia now own less than 25% of Australia's timber plantations. It is outside the scope of this report to consider these plantations' ownership or management, other than to say that where they are still major owners of forest assets and with strong professional expertise and workforce skills, state forestry organisations are well placed to take advantage of emerging markets for environmental services in combination with more traditional ones for timber.

Governments also invest in new planted forests through grants and other direct subsidies, tax concessions, provision of infrastructure such as for transport, and through extension and information services and forest research. These investments are made for the public good rather than direct financial return but are of great value to forest industry development nonetheless. Governments also regulate markets to operate efficiently, assist in market development, and provide security at all levels under the rule of law.

Private investors

The next largest component (~10%) of the national plantation estate is owned by private investors. This class of investors includes farmers and other rural landholders but also private funds such as endowments, sovereign wealth funds, family offices and foundations. It also includes retail investors, wholesale (sophisticated) investors, self-managed super funds and High Net Worth Individuals (HNWIs). These investors have a high degree of autonomy in their investment decisions and have flexibility to allocate funds to forestry where they believe returns are healthy and social license issues are not a concern.

Many private investors are likely susceptible to persuasion on ethical and sustainability grounds if major financial and social license concerns can be allayed. They frequently rely on financial advisors and the case for new forest investments could be very effectively targeted at these advisory firms and individuals and their professional associations. Implementing strategies to achieve this would be highly useful and perhaps within the ambit of organisations like Forest and Wood Products Australia, the Carbon Market Institute and state-based forest industry organisations.

Timber industry

Finally, entities such as vertically integrated forest and timber businesses, sawmilling companies, and farm and property-owning family businesses that are also involved in the forest and timber industries own less than 5% of the timber plantation estate. Forest industry businesses have an obvious interest in securing adequate raw material to supply production Growing your own can remove risk in areas where the future availability of raw material is uncertain.

On the other hand, having two very different types of businesses under single ownership may not in fact be efficient and there has been a strong trend in some jurisdictions for the value-adding and manufacturing activities to be separated from the primary production of wood.

[59] Australia soon to be second in world for retirement savings as superannuation pool soars - ABC News

Timber industry firms that invest in plantations are probably best characterised as similar to the other private investors described above, although they will tend to have more appreciation of the many values of trees and forests and are unlikely to require persuasion that planting trees for harvest should have broad and powerful social license.

Emerging markets' effect on investment

The development of markets for the environmental services provided by forests significantly improves the viability of investment in planted forests, by changing both the quantum and timing of cash flows. This applies across the spectrum from plantations established primarily for timber production to plantings (and assisted natural regeneration) primarily for environmental benefits.

The discussion following focuses on carbon markets. While the Nature Repair Market has now been established with its legislative framework and one methodology, it is too early to see what value will be placed on, and what level of investment will be stimulated by, the issue of Biodiversity Certificates. It seems likely that in the short-term, projects that are viable or nearly viable in their own right from other sources (such as environmental plantings driven by the carbon market) will seek to attract a premium for nature repair benefits. It seems unlikely that many reforestation projects will be viable based solely on sale of Biodiversity Certificates into a purely voluntary market.

We are also seeing markets for new products from forests, driven by the need for a circular economy and sustainable production and consumption of renewable resources. These products include engineered wood products, biochar, biofuels, bio-chemicals and biopharmaceuticals. Markets for these goods will improve the profitability of new forests over time. Currently, however, the biggest new source of financial returns is ACCUs.

It is important to understand the time course of sequestration of atmospheric carbon in newly established forests to see how the financial benefit of carbon crediting accrues. The growth of a new forest on cleared land follows a sigmoidal (s-shaped) pattern over time, with biomass and carbon accumulation[60]starting slowly as seedlings grow to occupy the planting site. Growth accelerates as the trees dominate the site but then slows again as the trees compete for light and on-site resources. Eventually, in the absence of disturbance, annual carbon accumulation approaches zero as site resources become fully utilised and respiration and decay balance photosynthesis and growth.

[60] Dry biomass is approximately 50% by weight carbon, that has been absorbed from the atmosphere in the process of photosynthesis.

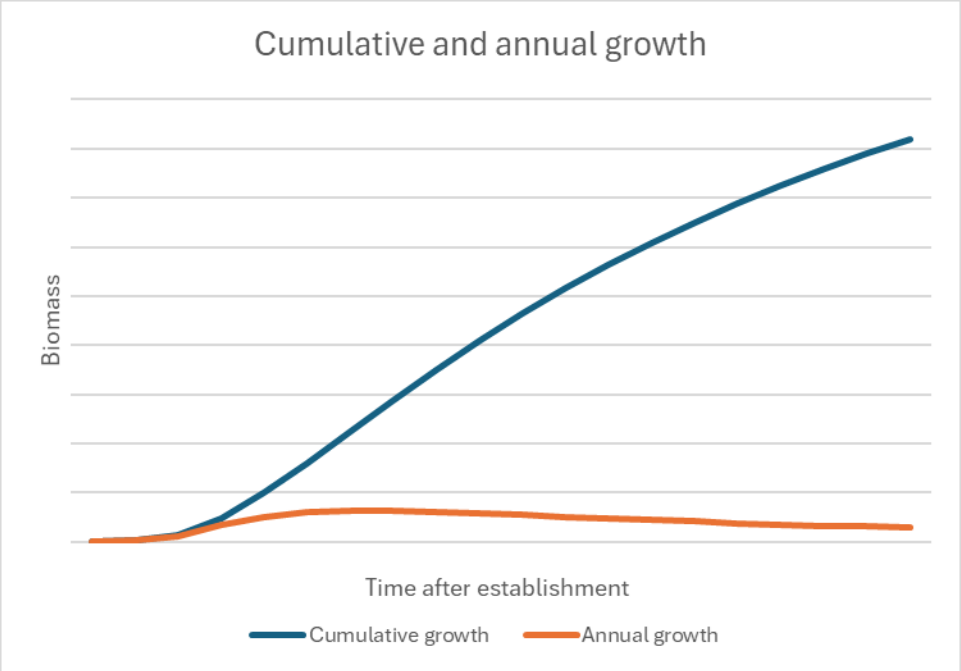

Chart 14. Cumulative and annual carbon/biomass increment in newly established forest

This pattern of annual biomass growth and carbon sequestration will be reflected in the pattern of entitlements to credits and therefore financial returns from carbon in newly established forests. This means than annual returns from carbon will be negligible in the first few years of forest growth, accelerate and peak with maximum annual sequestration rates, which in most species is between 10 and 14years. This means that carbon prices before and around this time will have the greatest effect on discounted cash flows, while the price of carbon at the time of forest establishment is of limited interest. It is also worth noting that carbon accumulation continues at lower levels up to and including century timeframes.

The peak in annual carbon increment, when most income can be expected from carbon markets, is well in advance of significant returns from harvest in plantations managed for sawlog production, and the effect of these returns is to help overcome the effect of compound interest and discount rates in the time before returns from harvests.

Different timber production regimes will attract different levels of returns from carbon. ACCUs are usually issued only up to the point at which the average carbon stocks (generally modelled over 100 years) in the eligible planted area are reached (less applicable discounts for risk management and the 25 year permanence period discount).

Therefore, short rotation clearfell regimes for the pulp market will benefit less from carbon income, and for shorter periods, than long rotation sawlog regimes where average biomass and carbon stocks over a rotation are higher, and/or where there is more carbon stored in timber products. Establishment of permanent forests for sustained timber production, without stand level clearfelling, will benefit more again from sale of ACCUs. Environmental plantings, where harvest or silvicultural thinning is not intended, will benefit most, in the absence of crediting storage in timber products. The last two of these project types may also be able to generate valuable Biodiversity Certificates.

It is important to consider, given the foregoing, that it is not possible to maximise income from all possible sources, but it is both possible and economically efficient to optimise between them.

It is also worth underlining that under carbon accounting approaches adopted by Australia, carbon sequestration payments are a once-off opportunity that is linked to the creation of a forest (or other higher biomass vegetation system) on previously cleared land (or other lower biomass system). Under this accounting approach sustainably produced timber is a greenhouse neutral material which stores carbon while in use and well beyond if buried in landfill at the end of its service life. However, crediting the carbon stored in a forest also creates a contingent liability that will be realised if that credited carbon storage is not maintained. It is for this reason that only sustainably stored carbon should be credited, and that risk management for sequestered carbon is of great importance, including for investors.

Carbon prices in the future

As noted, new investment in growing trees will experience a significant time lag before substantial returns from ACCUs. Apart from the time taken to plan a project, obtain investment sign-off and register a project with the Regulator, the pattern of tree growth means substantial sequestration and therefore issue of ACCUs will occur several years in the future. A few reputable sources have published commentary about possible future price trajectories.

SJT Consulting and RepuTex Energy (2023)

In 2023 SJT Consulting and RepuTex Energy compiled a report (SJT Consulting and RepuTex, 2023)[61] for the Australian Climate Change Authority, to look at the effect of differing levels of additional deductions, beyond the present 5% for risk management and 20% for 25 year permanence projects, from ACCUs issued to projects[62]. They modelled the effects on future carbon prices, projects and ACCUs issued.

To do so they first documented outputs from their modelling of the future trajectory of carbon prices under scenarios of low, medium and high levels of emissions that could result from differing levels of pressure on industry to directly reduce their emissions through the Safeguard Mechanism. Where industries decarbonise rapidly, for example through energy efficiency measures or less emission intensive production processes, demand for ACCUs is lower, whereas if industry decarbonisation is slow, industrial emissions and demand for ACCUs are higher.

Under their medium scenario prices for nature-based ACCUs were predicted to average $A65 between 2023 and 2035, with a price in 2030 of $A73 per ACCU. The low emissions scenario (with a low demand for offsets) is modelled to predict an average 2023 – 2035 price of $A55, while the high emissions and high demand for offsets scenario has a modelled average 2023-2035 price of $A73.

There are more current predictions available on a subscription basis from RepuTex, one of the firms that prepared the report for the CCA. It should also be noted that the modelling responds to the Commonwealth government's current targets to reduce emissions by 43% on 2005 levels

[61] ACCU Market Analysis - Final Report For Publication.pdf

[62] The Independent Review of Australian Carbon Credit Units (Chubb Review) suggested the Climate Change Authority provide advice about deducting a further buffer of credits at the scheme level to provide further assurance of additionality and conservativeness.

by 2030, and to achieve net-zero emissions by 2050. These targets may or may not have bipartisan commitment in the future and could change with a change of government.

These possible prices are noted here, however, as indicative of a rising market price for ACCUs in the future. This seems likely to the extent that the underlying drivers remain unchanged. These are human-induced climate change, the projected increase in the frequency of unusual and unfavourable climatic and weather events and impacts, and public demands through voting patterns and otherwise for an effective response.

EY Net Zero Centre (2023)

A report[63] published in 2023 for the EY Net Zero Centre has commentary on the state of the Australian carbon market, and possible future ACCU prices, following changes to the Safeguard Mechanism. (EY Net Zero Centre, 2023) The changes had the effect that Australia's largest emitters would be obliged to decarbonise more rapidly, creating significant extra demand for ACCUs. EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. The report is copyright to Ernst and Young Australia.

The report underlines that *"The information in this report does not constitute financial product advice, and consumers should contemplate procuring independent advice prior to making any financial decisions."*

The report says that the changes to the Safeguard Mechanism will put Australia's heavy emitters on a path to net zero. This will cause them to take some significant opportunities to implement available low-cost measures to reduce their direct emission, as well as relying more or less heavily on the supply of ACCUs from CFI projects. They project that heavy industry will directly abate around 50% of the total emission reductions required by the Safeguard Mechanism by 2035, with the oil, gas and coal industries achieving around 90% of this abatement.

They use a number of scenarios to illustrate different possible emission reduction pathways forward to 2035 and beyond, including different scenarios for carbon prices. They predicted a modest downturn in ACCU prices in 2023, but under all scenarios ACCU prices rise to 2035, with the central estimate seeing an approximate doubling of 2023 prices to $A75 per ACCU (in real terms) in 2035. Following this they see (with low certainty) prices stabilising beyond that point.

Supply of ACCUs from Human Induced Regeneration and other low cost-base project types are projected to meet supply needs and keep costs low until the late 2020s when decreasing supplies could be insufficient to meet market demand. This could lead to reforestation credits, which have a higher cost base, meeting increased demand from Safeguard and voluntary buyers out to 2035 and beyond. The report projects that afforestation and reforestation projects could generate half of the new supply of ACCUs by 2035, depending on the ongoing level of supply from HIR.

Other investment barriers and incentives

While new flows of investment to forest establishment projects are likely if the returns on investment can be increased to acceptable levels by returns from sale of ACCUs and other

[63] ey-carbon-markets-outlook-thought-leadership-report-11-sept-2023.pdf

environmental market products, some negative perceptions affecting the social license for forestry, including all large-scale block plantings and in particular forest harvesting, need to be overcome. There are other investment incentives and barriers that could also affect outcomes. These include taxation regimes, location and nature of markets and timber industry infrastructure, the regulatory environment and plantation incentives and grant schemes. Some more or less brief comments on these topics follow.

Developing a strong social license for forestry

If returns on investment can be enhanced by the flow of carbon revenues, the next major impediment to attracting investment into new planted forests is to improve its social license. This is particularly the case with timber plantations.

Perceptions of timber plantations in the investment community, the general public, and in the farming community are currently mixed. Conflation of timber harvesting with deforestation, concern for charismatic animal species, unfavourable public commentary from environmental groups, most people's lack of personal experience of forests and forest management, and generalised but not particularly informed concern for the environment are common in the community. These attitudes and beliefs make it hard for messaging about sustainable forest management and the fundamentally environmentally friendly nature of wood as a product to cut through.

In the investment community, in addition to concerns about reputational risk from perceived environmental damage, the history of timber plantation investment in Australia is not encouraging. The recent history of the Managed Investment Schemes and the longer history of plantation development as a government and/or tax-driven activity give potential investors little comfort.

Large scale environmental plantings may also encounter hostility from some in farming communities due to concerns about reducing the area available for agriculture and grazing, and perceived lack of maintenance and control of fire, pests and weeds in the long term, where land is locked out of production. These concerns need to be taken seriously and addressed including as discussed earlier in this report.

Arguably, however, forestry for meeting human needs and in particular reforestation for both timber production and environmental repair are currently well positioned to gain their rightful place in the circular economy, and appropriate valuation by the public of the services that new forests and the industries based on them can provide.

On the one hand industrial timber plantations can most efficiently provide the wood to build the Australian homes we need, and over time replace the huge volume and value of imports currently required for this purpose. Creation of the new plantations required for this purpose will also sequester huge volumes of CO_2.

On the other hand, environmental plantings can address a range of habitat, species loss, catchment and land degradation issues. Between these two ecoforestry can serve a useful purpose similar to both of the other types while being able to achieve greater scale through its flexibility, multiple uses in farming landscapes and multiple income streams.

Recommendation 13: It is recommended that regional stakeholder organisations representing landcare, environmental, farming and timber industry interests should share a leadership role in promoting the benefits of large-scale reforestation for environmental

repair, sustainable agriculture and timber production, including hybrid or ecoforestry approaches, with a view to occupying and sharing the middle ground in the social discourse around trees and forests and their values.

Administrative issues

Responsibility for environmental management in Australia is highly disaggregated across the tiers of government, and in NSW, across many agencies with responsibilities for different industries, environmental protection, planning, regulation etc. While this is necessary and appropriate in most cases, communities and individuals can feel disempowered regarding decisions about important issues if consultative and participatory structures are not fully available.

There is a current opportunity to more fully empower community involvement in proactive strategies for environmental repair, along the lines of the Nature Positive and regional approaches discussed earlier. These will most likely focus on regional approaches, but the question arises, what regions?

Currently natural resource management and planning for environmental repair in NSW falls largely to NSW Local Land Services through its Regional NRM planning, resource management and extension responsibilities, funded by the Commonwealth and State governments. However, many other agencies have responsibilities for a range of other regulatory functions and programs, particularly those responsible for environment and heritage, planning, primary industries including forestry, agriculture etc.

Notwithstanding community advisory functions within Local Land Services, there are arguably not sufficient structured and durable mechanisms for community empowerment and leadership in natural resource management and environmental repair. It is suggested that filling this gap is important, and that in doing so a balance between administrative efficiency and localised geographic self-identity must be struck to optimise community empowerment and ownership.

As an example, the Northern Rivers, encompassing the Tweed, Richmond and Clarence major catchments would seem to be a logical management unit, with the Mid and Lower North Coast regions and the Northern Tablelands being other possible examples. This approach would allow for good community engagement but could be administratively cumbersome.

Currently community and stakeholder engagement on natural resource management issues for the whole North Coast of NSW is within the remit of North Coast Local Land Services, as the NSW North Coast is one of the 54 recognised Australian NRM regions. A system of catchment advisory bodies within a larger regional aggregation with regulatory or planning responsibilities could be one organisational model,

In any case, regeneration of the environment will work best with the broad support of communities and their stakeholder groups, and it is open to governments to put them in a leadership role, with governments at all levels, and their agencies, providing guidance, and support including funding and technical and scientific expertise.

In doing so it would be important to allow a balance of stakeholder groups with interests in natural resource management and forest issues. It is to be hoped that having a focus on environmental regeneration, creation of significant additional forest resources and ongoing

sustainable resource use and production can heal some past rifts and enable constructive engagement across all stakeholder groups to find a path forward.

Recommendation 14. It is recommended that consultation led jointly by appropriate Commonwealth and State agencies seek to identify appropriate regions and regional administrative and consultative mechanisms to enhance community participation and/or leadership in repair of nature and development of new forest resources, including in planning and resource allocation, and community and landholder engagement.

Regulatory issues

Carbon and Nature Repair Market regulatory issues have been considered elsewhere in this report. These issues are governed mainly by Commonwealth legislation. However, planting of trees at scale in NSW is also governed by the Plantations and Reafforestation Act 1999[64], and the Plantations and Reafforestation (Code) Regulation 2001. The Act requires plantations over 30 hectares to be authorised, and no planted forests may be harvested unless they are authorised. The Code provides standards for, and otherwise regulates, establishment and management of planted forests including harvesting operations on authorised plantations.

Many landholders choose to, and in certain circumstances may need to, have authorisation for smaller plantation areas. Plantations can be on private or public land and include a wide range of species including radiata pine, native hardwoods and mixed species environmental plantings, with a range of management objectives.

The Act provides security around the right to harvest where this is authorised, subject to measures in the Code for protection of environmental values and threatened species. Authorisation is also subject to inspection by Plantation Assessment Officers. Advantages of authorisation include being a single application, replacing the need for multiple licences and permits, pre-application inspections to resolve issues in advance of formal applications, and a streamlined assessment processes.

This regulatory framework is generally supportive of the development of new planted forests, although because it was developed with the need for new timber production forests in mind, there may be some anomalies that arise for developers of environmental or carbon forests. These include provisions stopping mechanised site preparation and planting activities close to streams and drainage lines, even when the trees being established are not for harvest.

Recommendation 15: It is recommended that further research and consultation with stakeholders be undertaken by the NE NSW Forestry Hub to determine if any changes to the Plantations and Reafforestation Act 1999 or the Plantations and Reafforestation (Code) Regulation 2001 are desirable to remove any unintended impediments to environmental and/or carbon plantings, or to optimising environmental, carbon and timber outcomes from planted forest developments.

There is at present a tendency of policy makers and regulators working to establish environmental markets to separate a biodiversity “silo” from a productive land use “silo”. This could result in foregone opportunities to support extensive productive land uses that could have significant biodiversity benefits. If this siloed approach results from a view that biodiversity conservation and regeneration outcomes can only be achieved by withdrawal of land from

[64] NSW Plantations and Reafforestation Act

productive uses and "locking it up", that view should be re-examined. Similarly, if projects have a credit stream for 25 years and are then left without further income opportunities for the following 75 years, perverse outcome may well occur and strategies to deal with this need to be considered.

Taxation considerations

Taxation issues in respect of any forestry investment or activity will depend on the specific circumstance in each case. The ATO has a mechanism to seek a private ruling, which is binding advice on how tax law applies in relation to any specific scheme or circumstance. A private ruling also binds the ATO if it applies to a party and they rely on it.

The following discussion is at the broadest level and for general information. Readers are referred to a report[65] prepared by Sylva Systems for the Green Triangle Forestry Industries Hub and published in July 2023 (Sylva Systems, 2023) for more detailed information. This provides a wide range of information on timber plantation investments, for farmers in particular. An information sheet from the ATO on *Forestry Operations – income and expenses* for primary producers can also be accessed here.

Taxation treatment of timber plantations is explained in detail in *Taxation Ruling TR 95/6 - Income tax: primary production and forestry*. The ruling applies generally to persons engaged in forestry operations, which are defined as:

- the planting or tending in a plantation or forest of trees intended for felling
- the felling of trees in a plantation or forest

This includes in some circumstances the transport or felled trees or part of them, and in all cases where these activities are carried on as a business. Importantly, a person engaged in forestry operations as a business will be regarded for tax purposes as a primary producer, and therefore eligible for the use of Farm Management Deposits (FMDs) and primary production income averaging for the income from tree farming activities.

Receipts that may be considered income include:

- proceeds from the sale of felled timber
- proceeds from the sale of standing timber
- royalties received from granting rights to other persons to fell and remove timber
- insurance recoveries
- reafforestation incentive grants or payments

Expenses that may be deductible against income include:

- purchase price paid to acquire a plantation or forest
- amount paid for the right to fell standing timber
- value of existing trees introduced into a new business
- costs of establishing a plantation or forest
- costs of tending a plantation or forest
- costs of felling and transporting timber
- costs of construction of an access road

[65] Access the report here.

There is a complex interplay of various elements of the taxation law and the effect of these appears to be different for the establishment of trees for harvest, or trees for the "primary and principal purpose of carbon sequestration" where harvest is not allowed. There is also complexity regarding these elements as they apply specifically to primary producers.

The general rules[66] relating to the taxation of ACCUs are set out in Division 420 of the Income Tax Assessment Act 1997 (ITAA 1997). These rules are different to the tax treatment for carbon credits generated and sold under an informal carbon credit scheme (non-registered units). Voluntary (non-registered) carbon units are not further considered in this report because the market for ACCUs is of overwhelmingly greater commercial significance.

Under Division 420:

- You can deduct certain costs of becoming the holder of an ACCU in the year you start to hold it.
- If the value of the ACCUs you hold at the end of an income year is more than the value of the ACCUs you held at the beginning of the year, you must include the increase in the value of the ACCUs in your assessable income.
- If the value of the ACCUs you hold at the end of an income year is less than the value of the ACCUs you held at the beginning of the year, you can claim a deduction equal to the decrease in value of the ACCUs.
- For the year you first become the holder of the ACCU, you take its value to be nil at the start of the income year.
- Any proceeds received from the disposal of an ACCU is assessable income. It is non-primary production income in the year of disposal. You can deduct costs you incur for ceasing to hold an ACCU in the year of disposal.

Deductions for expenditure incurred in establishment of forests "for the primary and principal purpose of carbon sequestration" is detailed in *SECTION 40-1005 Deduction for expenditure for establishing trees in carbon sink forests*. In general terms this provides that a taxpayer may be eligible for a deduction for certain establishment costs, as a capital item at 7% pa, where:

- You are carrying on a business.
- At the time, you hold the interest or rights in the land or trees that is most specific to the carbon sequestration activities.
- You use the land and the forest for the primary and principal purpose of carbon sequestration by the trees.
- Your purposes in using the land do not include felling the trees or using the trees for commercial horticulture.
- You or another entity incurred expenditure for establishing the trees in the income year or an earlier income year.
- You did not incur the expenditure under a managed investment scheme (MIS) or a forestry MIS.

[66] Deductions for carbon sink forest expenses | Australian Taxation Office

- The trees you are establishing in the carbon sink forest meet requisite forestry characteristics and adhere to certain environmental and natural resource management guidelines[67].

However, different provisions may apply to primary producers. An ATO information sheet[68] dated 5 July 2023 provides details, some of which are as follows:

"If you are an eligible individual primary producer you will receive concessional tax treatment for any:

- eligible ACCUs you start to hold on or after 1 July 2022 as a result of an eligible offsets project associated with your primary production business
- income attributable to eligible ACCUs you receive from a partnership or trust that carries on a primary production business
- eligible ACCUs or eligible income you received from a qualifying arrangement with a carbon service provider.

The concessions are available only to eligible individuals, and the conditions you need to meet depend on whether:

- you are carrying on a primary production business as a sole trader, or as a partnership
- you are the beneficiary of a trust that is carrying on a primary production business
- an arrangement with a carbon service provider (CSP) is involved.

If you are an eligible individual primary producer you can access the following concessional tax treatment for your ACCUs:

- for the purposes of the Farm Management Deposit (FMD) Scheme and accessing the income tax averaging rules the proceeds from the sale of eligible ACCUs will be treated as primary production income
- related deductions for expenses you incur in becoming the holder, holding or disposing of eligible ACCUs will be treated as primary production deductions
- you are not assessed on the change in value of eligible ACCUs you started to hold on or after 1 July 2022 each year. You will only be assessed on the proceeds from the sale of these eligible ACCUs first held on or after 1 July 2022."

From the foregoing information about the tax treatment of CFI projects (whether or not these involve harvested forests) it would appear there is, prima facie, a supportive taxation regime to encourage forest carbon projects. The fact that "it all depends" on the circumstances of individual taxpayers, and that tax law and its interplay with a highly regulated but still evolving carbon market are complex, mean it is beyond the scope of this study to provide other than above general information.

Recommendation 16: It is recommended that the NE NSW Forestry Hub seek to contract, or join with others to contract, preparation of a more focused and detailed report on the

[67] The guidelines are in the form of a regulation signed into law by the Commonwealth Environment Minister Minister, and their effect includes to require consistency with regional NRM plans. The regulation can be viewed here.

[68] Taxation of Australian carbon credit units for primary producers | Australian Taxation Office

application of taxation laws to the various classes of possible investors in timber, carbon and environmental forestry.

Plantation grant schemes

The Commonwealth Government's Support Plantation Establishment program, administered by the Department of Agriculture, Fisheries and Forestry, is providing grant funding over four years (2023-27) to subsidise the establishment of new long-rotation softwood and hardwood plantation forests. Funding totalling $73.76 million is expected to help in establishing up to 36,000 hectares of new plantation across Australia.

Grants of up to $2,000 per hectare are available to qualifying private industry, First Nations businesses, farm foresters, and state and territory government forestry bodies. Applicants are required to provide a co-contribution, and plantations must have a minimum area of 20 hectares.

Project proponents wanting to participate in carbon forestry under the CFI and also benefit from these grants will need to register their project with the Clean Energy Regulator first, before applying for the Support Plantation Establishment funding. Project proponents should, of course, diligently familiarise themselves with all the requirements of both initiatives.

Future markets for wood and timber

Australia's wood and timber industries have already responded to changed market conditions, with increasing reliance on softwood plantations for construction timber, higher value adding and increasing reliance on engineered timber products like laminated veneer lumber, sheeting and other ply products, use of smaller diameter logs for roundwood applications including improved preservative techniques etc.

There are also significant new developments in the production of biofuels, biochar, feed additives, fertiliser products and bio-chemicals, including in the NE NSW Forestry Hub area. There may be potential to foster these developments by research, development and construction of more integrated timber processing facilities, including within industry hubs and clusters.

These possible developments are outside the scope of this report, but it is worth underlining that development of new large-scale resources of timber should proceed in tandem with existing and new markets for the forest produce. Timber is a renewable resource and should play an increased role over time in the circular economy, as long as the expanding forest estate (horse) is always in front of the expanding value-adding industries (cart).

This report aims to indicate how, by leveraging the new markets for carbon, biodiversity, and potentially other environmental services, and delivering them through appropriate strategic plans, this can be done.

The views of landholders in the region

The NE NSW Regional Forestry Hub commissioned research[69] (Cassidy & Palmer, 2024), undertaken through Southern Cross University, to examine landholders perceptions and attitudes to growing trees on farms for timber, and on the perceived barriers to and preferred

[69] Access the report here.

incentives for expanding their involvement. The research was undertaken through analysis of responses to a survey that received 284 viable responses. Analysis included separating the responses into primary categories comprising landholders who were, and were not, willing to produce timber on their properties.

Both willing and unwilling landholders were mainly interested in growing trees for environmental and amenity reasons and where the trees would be complementary to their agricultural production. Willing landholders were also motivated to grow trees for commercial timber production and carbon sequestration. Most landholders got their information about timber production on farms from peers, with government extension an important secondary source.

The main barrier stated (including 70% of the unwilling group) was that timber production would conflict with their existing farm operations and productive use(s). Landholders in the "willing" group cited cost, land use conflict, knowledge, and time as the most significant barriers.

Incentives favoured by landholders were a mix of information, financial and production support. Financial and market incentives were favoured to overcome the cost barrier. Provision of information and extension services were favoured to overcome the knowledge barrier. The more complex barriers of time and land use conflict were also seen to need a mixture of financial support, information provision and production support.

The report concluded that presenting timber production as complementary with, and supporting, existing farm production and income was vital. To access good quality land for timber growth, new incentives including economic, extension and educational supports will be required. Incentives should leverage the environmental and amenity concerns of land holders. As the report concluded, "*Combining new incentives with quality extension, highlighting successful examples of timber production in the landscape, and fostering positive peer to peer information sharing will increase the profile of timber plantations as a rural land use*."

How do we achieve economies of scale with limited land availability and small properties?

There are very large areas suitable for biodiversity conservation and environmental plantings, ecoforestry and commercially viable timber plantations in Australia's coastal and adjacent higher rainfall zones. However, these are areas where land prices are high and land parcels are relatively small. These factors provide challenges for new forest plantings at the scale required for effective reforestation strategies.

Because of the stringent requirements for participation in either the CFI or the Nature Repair Market, small scale projects can find it difficult to meet onerous scheme obligations around project registration, monitoring and reporting while remaining financially viable. They may also struggle to attract project financing where this is required.

The technically and administratively challenging nature of scheme requirement creates an opportunity, and in some cases a necessity, for service providers to assist landholders. These service providers can provide a range of technical, legal and administrative services to many clients under a range of business models. These options for accessing services may be more or less cost-effective for the many landholders who could otherwise find participation in the schemes challenging. This largely depends on project scale.

Some service provider business models are described in the section following. Service provider models featuring aggregation of projects may be particularly relevant where many small to medium projects need the same type of services.

In addition or alternatively to aggregation approaches, the Clean Energy Regulator has made simplified arrangements available to some small-scale projects, that minimise the level of ongoing audit, with project compliance monitoring largely undertaken by the Commonwealth through remote sensing, site visits and inspections.

The Carbon Credits (Carbon Farming Initiative) Rule 2015 and the Carbon Credits (Carbon Farming Initiative) (Audit Thresholds) Instrument 2025[70] allow the Clean Energy Regulator to reduce the required number of scheduled audits for low-risk projects. There are currently 3 project types eligible for this alternative assurance. These are:

- Low-risk plantation forestry projects, limited to Schedule 1 projects (new plantations) and Schedule 2 projects (conversion of short rotation plantations to long rotation plantations). Only one scheduled audit (the initial audit) is generally required.
- Low-risk environmental planting (2014 methodology) projects will require zero scheduled audits. The environmental plantings 2014 method has closed but existing alternative assurance projects can continue as normal, and projects already registered under the 2014 method can apply for the alternative assurance arrangements.
- low-risk environmental planting (2024 methodology) projects. No scheduled audits are required.

A project proponent can apply for the alternative assurance arrangements where the total of Carbon Estimation Area(s) in the project is 200ha or less. There are also some restrictions regarding the type of planting arrangements, and the FullCAM modelling requirements for environmental plantings using these simplified arrangements.

Where applicable, the reduced audit requirements will result in a significantly reduced administrative burden and lower scheme participation costs. This will make participation by smaller scale forest growers easier, including through less reliance on service providers.

Environmental market service providers

Landholders who don't independently have the financial resources or the range of technical and administrative skills to conduct a carbon market project and meet regulatory requirements can participate in the market using service providers or work with project developers or aggregators. An extensive but not exhaustive list of services providers[71] is maintained by the Carbon Market Institute. Service providers operate under a range of business models including:

- Fee for service (and/or benefit sharing) arrangements under which landholders can access technical and scientific, financial, carbon broking and trading, advisory and consulting, risk management and insurance services.
- Joint venture arrangements where responsibilities for project implementation and meeting CFI requirements, and resultant ACCUs or the revenues from their sale, are shared between a project developer and a service provider. Joint ventures are usually

[70] Carbon Credits (Carbon Farming Initiative) (Audit Thresholds) Instrument 2025
[71] Organisations Archive - Carbon Market Institute

undertaken on the basis of a negotiated Project Development Agreement, and either the landowner or the service provider could be the Project Proponent.

- Project aggregation where services are provided across many projects, and the aggregator is the project proponent with responsibility for meeting scheme obligations for each project, and the party that is issued the ACCUs. This is a type of joint venture and will usually be the subject of a Project Development Agreement, with or without the rights of the Parties to it registered on title(s) to the land as Carbon Rights and/or associated covenants.
- Collective or cooperative approaches where landowners collaborate on all or some of the activities necessary to operate projects, accessing external expertise where required. This would be a form of aggregation if they create a legal entity that acts as project proponent. This type of enterprise could have the benefit of returning more overall revenue to landholders.

A fundamental consideration in all these arrangements is to determine who is the project proponent. Under the CFI a project proponent is the entity with whom the Clean Energy Regulator has a relationship, the entity that is responsible for fulfilling scheme obligations, and the entity to whom ACCUs will be issued when all obligations are met.

In all the above models landowners can retain ownership of the land, with flexibility in arrangements with service providers, project developers or aggregators enabled by contracts or Carbon Rights agreements. Another possibility is that if new plantings are sufficiently profitable, investors could buy or lease land on which to conduct projects, potentially taking land currently used for other purposes out of production.

However, from an investment point of view it may be a significant advantage that through contractual or Carbon Rights Agreements, high value land can be accessed for reforestation project purposes without requiring purchase of increasingly expensive land. In this case, environmental services market returns only need to be better than the next most profitable landuse, e.g. grazing, rather than having to include the cost of the land in calculating returns.

Carbon investments could cause significant or profound impacts on the social and economic character of affected areas, including the resource base and infrastructure for other industries like grazing. This underlines why regional planning processes are so important, and also why so much weight must be placed on carbon storage that is sustainable in the long term.

Aggregation

Aggregation can make smaller projects easier to operate and more financially viable, because specialised skills can be more efficiently provided across many projects, and larger ACCU parcels may be more attractive to buyers. Aggregation can also be structured to efficiently and effectively manage risk in ways that are not available to individual landholders.

The Clean Energy Regulator recognises two types of aggregation:

- Project aggregation where activities using the same method are grouped into a single project.
- Contract aggregation - projects are grouped or ‘bundled’ into a single carbon abatement contract. An aggregated contract can include projects using different methods.

Experienced commercial aggregators can usually provide or access the full range of skills required to operate emission reduction projects and have ACCUs issued. They are generally private businesses seeking to make a profit.

A legal agreement, usually prepared by the aggregator, would grant the aggregator a legal right to carry out the project, and set out how the costs and benefits of the project are shared between the parties. Benefits of working with aggregators can include:

- Savings in project development, implementation, monitoring and reporting costs by sharing staff and expertise across many projects.
- Streamlining processes to participate by simplifying negotiations and administration.
- minimising business expenses and operational costs by sharing resources and expertise among multiple projects
- managing project performance risk by using strategies, collective experience and a range of skills to ensure projects meet targets and comply with scheme requirements

Recommendation 17. It is recommended that the NE NSW Forestry Hub consider organising, with other environmental market stakeholders in the region and within the next two years, an environmental services trade event to encourage and allow service providers, project developers, aggregators and others to interface directly with potential clients. This could perhaps be held in conjunction with a conference focused on the implementation of environmental markets in the coastal zone, which would further allow interface between landholders, service providers, project developers, policy makers, regulators and other government and private stakeholders and the dissemination of general information and industry best practices.

Summary of suggested actions

Following the discussion of issues in this document and documentation of the various recommendations, it remains to present the recommendations with regard to stakeholder responsibilities and timelines for the various actions, where possible. The table following provides a brief summary.

Actions for the Regional Forestry Hub			
Recommendation		Timing	Resources and collaborators
1	Support development of a new CFI methodology for ecoforestry plantations	As soon as practicable	Initial collaboration with already aligned organisations under the new method development process of the Emission Reduction Assurance Committee
2	Seminar on available forest mensuration tools etc	Within 12 months	Including DPI, Regional Landcare, SCU, Forestry Corp, LLS etc. Hub to convene, prepare brief and seek co-contributions to expenses.
3	Develop decision support tools to better enable optimising between timber, grazing, carbon and biodiversity revenue	Within 12 months	Initially research/review relevant existing work and complement and/or fill gaps in this work.
4	Enable analysis, including spatial analysis, of indicative returns from the range of reforestation investment opportunities	Within 12 months	Hub to write brief and contract appropriately qualified contractor(s), potentially with collaborators. NSW DPIRD is believed to already be carrying out similar or related work.
13	Promoting the benefits of large-scale reforestation for both environmental repair and timber production, including hybrid or ecoforestry approaches.	ASAP	With other environmental, local government and primary industry stakeholders. Undertake publication and promotion of this report. Distribute to the media and relevant regional stakeholders and networks. Forest industry stakeholders need to combat the perception that forest industries are not involved in environmental repair and developing new timber resources.
15	Determine if any changes to the Plantations and Reafforestation (Code) Regulation and the Act are desirable.	Within 4 months	Through informal consultation with regional networks, including as part of the proposed technical and methodologies seminar(s).
16	Report on the application of tax laws to the various classes of possible investors in carbon forestry	Within 2 years	Contract consultant to prepare a briefing note format document targeted at farmers and private investors.
17	Environmental services markets trade fair and conference	Within 24 months	Hub to facilitate the formation of a regional stakeholder consortium to organise and promote.
Actions for Commonwealth and NSW legislators and regulators			
6	Prioritise the National Environmental Standard for Nature Positive regional planning and support plan development.	ASAP	DCCEEW responsibility.
7	Make certified consistency with Nature Positive Regional plans a requirement for carbon and Nature Repair projects	ASAP	Clean Energy Regulator and Commonwealth legislators responsible.

10	Commission further research to quantify possible loss of landscape carbon in respect of which ACCUs have been issued over permanence periods,	ASAP	Climate Change Authority to undertake, building on existing CSIRO qualitative research.
12	Provide national leadership on best practice Carbon Rights (and other environmental outcome rights)	ASAP	Australian Government Solicitor has previously reported on these issues.
14	Commonwealth and State consult with stakeholders to determine appropriate regionalisation and community engagement and involvement in regional planning for Nature Repair and new forests.	ASAP	Commonwealth (DCCEEW?) and State (DOEH and DPIRD?) to consult and report to policy makers and regulators, as part of consultation on the Commonwealth's proposed new regional planning process under the Nature Positive Plan.
Actions for regional stakeholders			
5	Put the NSW North Coast forward as a pilot area for development of a Nature Positive regional plan	ASAP	Hub to initiate consultation process among regional stakeholders. Seek involvement of Regional Organisations of Councils and Regional Development Board(s).
8	Support the Carbon Market Institute and NRM Regions Australia in their efforts to harmonise the carbon and Nature Repair Markets in Australia	ASAP	Responsibility of forest and agriculture industry associations and other relevant stakeholders in the region.
9	Initiate discussions to see if a Nature Repair Market methodology could be developed for ecoforestry	Within 12 months	Seek endorsement and support from regional and other stakeholders, if current approaches to develop a CFI methodology are successful.
11	Stakeholders to engage on policy discussions around "permanence" and management of risks	As appropriate	Policy discussion likely to be led by the Climate Change Authority. Possible role for community consultation on this issue.

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