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Resilience and Opportunity: Regions and the Roll-out of Australia's Greenhouse Gas Abatement Programs

A Manual for Queensland's NRM Regions

1st Edition

Preece, N., van Oosterzee, P., Dale, A., Eberhard, R., Armstrong, G., Vella, K. and Sweatman, C.

Australian Government
Department of the Environment

Reef & Rainforest RESEARCH CENTRE

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A Manual for Queensland's NRM Regions

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Glossary

Abatement: Actions that reduce or eliminate greenhouse gas pollution.

Additionality: Abatement activities that would not have occurred without a formal Greenhouse Gas Abatement scheme.

Afforestation: The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources (IPCC 2003a).

Assigned Amount: Australia's target under the Kyoto Protocol is 108% of the base year (1990) emissions. In 1990, Australian emissions were calculated to be 547.7 Mt CO_2e. Australia's Assigned Amount is 108% of that; 592 Mt CO_2e a year for each year of the first commitment period 2008-2012 under the Kyoto Protocol.

Australian Carbon Credit Unit (ACCU): Carbon credits under the Carbon Farming Initiative.

Carbon dioxide equivalent (CO_2-e): Different greenhouse gases have different warming effects expressed in terms of the amount of CO_2 that would have the same effect (e.g. CO_2 = 1, Methane (CH_4) = 21, Nitrous oxide (N_2O) = 310, etc.

Carbon offset: A carbon offset is a unit, usually measured in tonnes of carbon dioxide equivalent, that is reduced, avoided, or sequestered, measured from a business-as-usual baseline. They are changes in activities or behaviour deemed to deliver sequestration or abatement relative to a baseline. Carbon offsets are tradeable and can be used to compensate for emissions occurring elsewhere.

Carbon sequestration: Carbon sequestration has the same meaning as under the *Forestry Act 1959* and, for a tree or vegetation, includes the process by which the tree or vegetation absorbs carbon dioxide from the atmosphere.

Certified Emission Reductions (CER): Carbon credits generated under the global Clean Development Mechanism.

Crediting Period: The crediting period, defined in the Federal *Carbon Credits (Carbon Farming Initiative) Act* in relation to an eligible offsets project is:

(a) first crediting period for a project under CFI, worked out under section 69; or
(b) a subsequent crediting period for the project, determined under section 74.

First Crediting Period (Section 69): Under the *Carbon Credits (Carbon Farming Initiative) Act*, the first crediting period for an eligible offsets project is:

(i) if the project is a native forest protection project the period of 20 years, or, if another period is specified in the regulations - that other period that began when the declaration of the project under section 27 took effect or;
(ii) if the project is not a native forest protection project the period of 7 years, or, if another period is specified in the regulations.

Crown Cover: Crown cover is the area of ground covered by the outermost boundary of the foliage of the trees as viewed from above, expressed as a percentage. For the Australian definition of the minimum of a stand of trees to qualify as a forest, a 20% crown cover is the equivalent of tree crowns separated from each other by on average one tree crown (National Committee on Soil and Terrain 2009).

Forest: Forest is an area of land with the potential to reach a tree crown cover of at least 20% and minimum tree height of 2 metres.

FullCAM: The Full Carbon Accounting Model developed within the National Carbon Accounting System to model carbon sequestration and mitigation through agricultural and forestry practices.

Greenhouse Gases: Usually refers to those major greenhouse gases counted under the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (HFCs), hydrofluorocarbons (HFCs) & sulphur hexafluoride (SF_6).

Kyoto Protocol: The Kyoto Protocol is a protocol of the United Nations Framework Convention on Climate Change (UNFCCC). It aims to stabilise greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system. The UNFCCC is a global treaty signed in 1992. The Protocol, adopted in 1997 in Kyoto, crystallised the commitment of the UNFCCC and set legally binding obligations for Annex 1 (developed) countries to reduce their greenhouse gas emissions starting with a first commitment period of 2008-2012.

Landholder: Person or persons holding legal title to the land.

Mitigation: Human intervention that reduces sources and enhances sinks of greenhouse gases.

Natural Resource Product: Has the same meaning as under the *Forestry Act 1959* and includes all parts of a tree or vegetation, alive or dead, including below the ground, carbon stored in a tree or vegetation and carbon sequestered.

Over-the-counter (OTC) Transactions: An exchange that occurs directly between two parties and not facilitated through an exchange.

Profit a Prendre: A non-possessory interest in land (like an easement) which gives the holder the right to take natural resources (in this case carbon).It has the same meaning as under the *Land Title Act 1994* and the *Forestry Act 1959* as amended.

Project: Project is used in the *Carbon Farming Initiative Act 2011* in a number of ways. It can mean anything from a single activity such as a forest stand for carbon sequestration through to a regional aggregation project.

Project Developer: A project developer is anyone or an organisation, such as a carbon trading business, that develops a carbon sequestration or mitigation project.

Property Project: Activities undertaken, such as forest establishment, protection and management on a property, as described in the explanatory note or plan attached to the *profit a prendre*, and approved by the Qld Registrar of Titles and lodged with the Queensland Land Registry on the title file.

REDD++/REDD-plus: Reducing emissions from deforestation and forest degradation in developing countries, referred to as REDD, and in the role of conservation, sustainable management of forests and enhancement of carbon stocks in developing countries, signalled by the addition of "++".

Reforestation: Under the Kyoto protocol reforestation is "Direct human-induced conversion of non-forested land to forest through planting, seeding and/or the human-induced promotion of natural seed, on land that was forested but that has been converted to non-forested land". For

the first Kyoto commitment period, reforestation activities are limited to reforestation occurring on those lands without forest on 31 December 1989 (IPCC 2003a). Under the Carbon Farming Initiative, reforestation is restricted to mean "the direct human-induced conversion of non-forested land to forest by planting or by seeding, if the land on which the conversion occurs was not forest on 31 December 1989."

Regrowth: Regrowth of forest or woodland after clearing of the original vegetation, either assisted directly by human intervention, or without intervention by natural means, and not afforestation and reforestation as defined.

Retirement: In the voluntary carbon market, retiring a credit so that it cannot enter the marketplace completes the goal of offsetting another GHG emission. Retiring allowances from emissions trading schemes permanently removes them, theoretically increasing the price of allowances and providing an incentive for industries to reduce their emissions.

Revegetation: Revegetation was defined in the Marrakesh Accords as 'direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum of 0.05 hectares and does not meet the definition of afforestation and reforestation' (IPCC 2003a, b).

Sequestration: The process of increasing the carbon content of a carbon pool other than the atmosphere. It is preferred to use the term 'sink' (IPCC 2003a).

Sink: Any process, activity or mechanism which removes a greenhouse gas, an aerosol, or a precursor of a greenhouse gas from the atmosphere. Notation in the final stages of reporting is the negative (-) sign (IPCC 2003a).

Site: The individual areas and patches of tree vegetation which have been set aside for a carbon sequestration Project.

Introduction

Voluntary and compliance markets for forest carbon and other (emission avoidance and bio-sequestration) activities are growing internationally and across Australia. Queensland and its Natural Resource Management (NRM) regions have an opportunity to take a variety of actions to help guide these markets to secure multiple landscape benefits and to build landscape resilience in the face of climate change. As the national arrangements for offsets within Australia's Clean Energy Package (CEP) and emissions trading environment emerge, Queensland's regions can prepare themselves and their landholding communities to take advantage of these opportunities to deliver improved climate resilience in their regional landscapes.

To do this Queensland will need to:

- Establish common awareness of and guidelines to assist Regional NRM Bodies to engage with these terrestrial Greenhouse Gas Abatement (GGA) opportunities (and particularly those associated with forest activities);
- Establish common approaches to targeting priority areas within the regional landscape for terrestrial GGA (including biosequestration) that deliver on regional NRM's biodiversity, water quality and sustainable agriculture targets;
- Build upon the capacity of Regional Bodies to effectively engage with and support the emerging terrestrial GGA market opportunities; and
- Build upon the capacity of landholders to engage in unfolding markets.

This manual facilitates these processes by:

- Outlining international and national approaches to the regional aggregation of forest-related and other GGA products;
- Providing clear definitions and explanations of GGA trading with particular reference to the design of the Carbon Farming Initiative (CFI);
- Discussing land use activities which are eligible to generate credits under a national GGA market, with a focus on forest-related products; and
- Overviewing systems and methods required to prepare regions to take advantage of these emerging arrangements, including the aggregation of regional products that meet the required compliance standards.

We particularly aim to achieve three things in this regard:

- Ensure that Regional NRM Bodies are aware of the unfolding policy and implementation arrangements concerning GGA programs;
- Work with regions to explore what can be done to improve landscape resilience through these arrangements; and
- Explore what Regional NRM Bodies can do to enhance those arrangements so that they deliver the best outcomes for regional landscapes/communities.

The manual adopts the delivery structure outlined in Figure 1 to ensure both the broad context and finer details are available to regions. Each section both provides the background knowledge required as well as specifically looking at the role that Regional NRM Bodies have in making the GGA market deliver landscape outcomes. This longer-version manual is also supported by a summary-based power-point delivery tool. The manual is itself also intended to be regularly adapted and updated as the policy environment associated with GGA in the landscape unfolds over time.

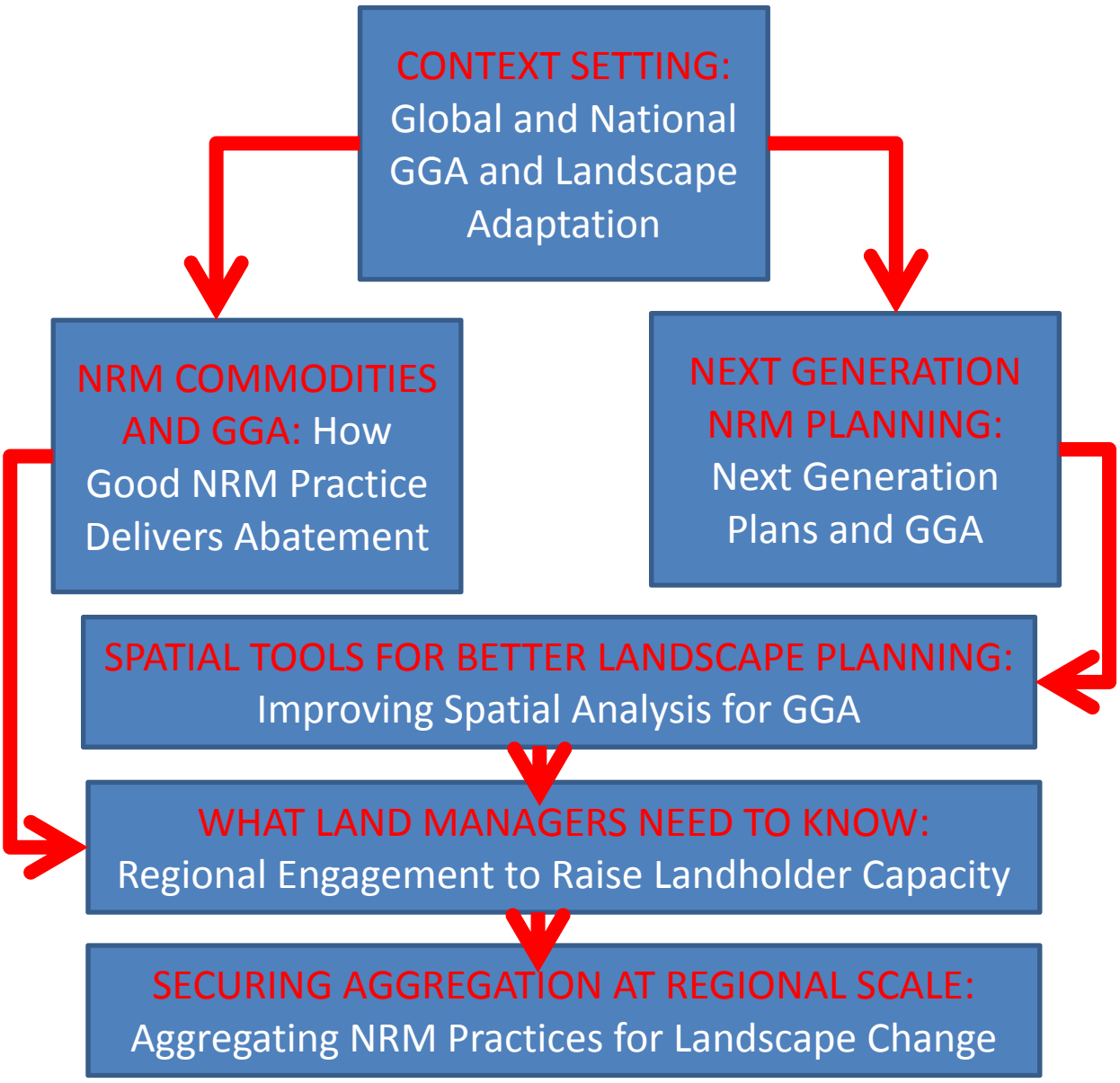

Figure 1: Core delivery components in this manual.

NEW GGA COMMODITIES FROM BETTER NRM PRACTICES

The Link Between GGA and Better Land Management Practices

Rural areas provide the bulk of the ecosystem services required for increasingly urbanised communities across the globe (IUCN 2006, Daily *et al.* 2009). These services include productive soils, forests and pastures, quality water, bio-energy, temperature control and shade, storm and wave attenuation and faunal and floral biodiversity. Such ecosystem services provide the foundations for life and underpin our economy and our social and cultural wellbeing.

Integrated and sustainable management of the natural resources that supply these services at the regional and landscape scale helps to balance competing demands for them and could potentially also enhance the role of rural regions in the delivery of greenhouse gas abatement (World Bank 2009). Healthy and inter-related ecosystem services provide the best opportunities for regional landscapes and communities to adapt in the face of climate change (Thompkins and Adger 2004).

Conventional management practices in production-oriented systems, however, tend to be uni-dimensional; driven by the use of natural resources for short-term profits at the enterprise scale. This often comes at the expense of other common ecosystem services upon which the foundations of our society rest (United Nations 1997). Grazing pressures in certain pasture and soil types, for instance, are often aimed at securing maximum beef production in the short term at the expense of longer term soil health, productivity and other essential ecosystem services. In many places across the tropical world, water quality has declined or water has been allocated beyond the flows required for a healthy river system (UNEP 2008). Land has been over-cleared, threatening biodiversity and local climate and emitting considerable atmospheric carbon. Soil health (including organic carbon levels) has often declined, enhancing erosion, reducing longer term productivity and requiring an ever increasing dependency on energy-intensive cultivation and nutrients (Doran 2002).

Moving away from such a uni-dimensional approach to production can often both enhance longer-term productivity and enhance multiple ecosystem services across the landscape, including carbon biosequestration and reduced greenhouse gas emissions (CSIRO 2009). Taking grazed riparian zones out of pastoral production and providing incentives for reafforestation with native vegetation, for example, can sequester carbon, create new habitat for endemic biodiversity, increase connectivity between habitats, reduce heat stress in livestock and enhance water flows and quality, all without substantive productivity losses and with social and economic benefits at regional scale (Fleischner 1994). Meanwhile, more efficient fertiliser practices equally reduce the emission of greenhouse gases like nitrous oxides.

Optimising long term agricultural productivity and achieving food security will rely on better integrating multiple ecosystem service benefits in agricultural landscapes. Poorly integrated catchment and floodplain management (inclusive of both water quality and quantity issues) is increasing the risk of food security problems as well as exacerbating the impacts of extreme climatic events like droughts, floods and cyclones (Penning de Vries *et al.* 2003). The combined effects of soil production decline, water security declines and exaggerated impacts from natural disasters increasingly are risking political stability and food security in both the developing and developed world (Holden *et al.* 2005). How land is managed is central to achieving a balance between productive and other ecosystem services, locally, regionally, and in the case of greenhouse gas budgets, globally (Houghton 2007).

Importantly, many improved land management practices that deliver multiple ecosystem services also deliver GGA benefits. Some of these maybe be focussed on bio-sequestration or sucking carbon out of the atmosphere (see Table 1). Others may be focussed on avoiding the emission of greenhouse gases (see Table 2).

For this reason, international and national schemes focused on delivering GGA are now being structured to deliver abatement through investment in a very wide variety of improved land practices. Many of these practices are currently already being supported by Regional NRM Bodies across Queensland. While this makes sense at the paddock scale, added together, improved land management practices, scaled up through the application of GGA incentives, have the potential to transform landscapes, increasing their resilience to climate change along the way.

Table 1: Potential land management practices that enable bio-sequestration.

Practice	Abatement	Typical Viable Areas
Afforestation (tree plantations)	High	Small to Medium
Native reforestation (replanting native vegetation)	High	Small to Medium
Native regrowth (taking action to encourage native regrowth)	High	Small to Large
Improved fire management (reducing emissions via timing and intensity of burning)	Medium to Low	Large
Wetland redevelopment (replacing or creating wetland environments)	Medium	Small to Medium
Improved soil management (increasing soil organic carbon)	Medium to Low but large area	Medium to Large

Table 2: Potential land management practices that enable emission avoidance.

Practice	Abatement	Typical Viable Areas
Reducing nitrous oxide (reducing fertiliser losses below a benchmark)	High	Small to Medium
Avoided deforestation (not clearing land that could have been cleared)	High	Small to Medium
Improved forest management (reducing approved harvest rates in forestry)	Medium	Medium
Reducing methane from cattle/sheep (via improved herd/pasture management)	Medium	Medium to Large
Reducing methane from feral camels	Low	Large
Other	Various	Various

The Opportunity to Link GGA to Landscape Resilience

Van Oosterzee *et al.* (forthcoming) have recently completed a journal article outlining the international opportunities to link GGA to the building of landscape resilience in the face of climate change. The following broadly synthesises some of their key observations with respect to this opportunity.

The key international challenge facing the improved management of ecosystem services in the face of climate change includes the lack of regionally differentiated management approaches, since climate change causes regionally differentiated impacts (Steffen *et al.* 2009). Queensland's Wet Tropics, for example may be specifically facing climate change impacts through sea level rise, increased high frequency cyclones, decreased reef resilience and the loss of endemic species at high altitudes. The South West Queensland region, on the other hand, may face longer and deeper droughts and more intense rainfall events. The global response to climate change and food security will require regionally-specific adaptation solutions, management approaches and transaction costs (Robledo and Blaser 2008). Regions, in this instance, refer to agro-ecological regions (Williams *et al.* 2002), many of which are also closely aligned to recognisable socio-political communities and/or cultural landscapes. Many of the issues of agricultural sustainability and natural resource management, such as water quality and quantity, biodiversity and the sustainable use of soil and pasture resources, in technical terms, can be measured and addressed

best at a regional scale, closer to the local community (Holling & Meffe 1996). Regional approaches, however, need to be embedded in a polycentric governance framework (Walker *et al.* 2009), where organisations at a range of scales have considerable autonomy and subsidiarity (Marshall 2008).

Polycentric systems work best, however, where critical management tasks are decentralized to the lowest level of governance capable of dealing with them satisfactorily. Within polycentric governance systems, regional institutions are often best placed to provide the improved integration of politics and the administrative arrangements needed to balance the economic, social and ecological dimensions of development. In particular, integrated approaches to land management at the regional scale have been evolving across the globe for several decades and are seen increasingly to be appropriate for effective landscape-scale management of natural resources (Dale *et al.* 2008). Australia's and Queensland's system of devolved regionalism is of great significance in this sense and lends itself very well to the structured application of GGA markets at a landscape scale.

Hence, while the concepts of mitigation and adaptation are often treated as being separate, in agricultural landscapes they are linked. Both are pivotally linked to building resilience within the landscape. As mentioned above, preventing soil carbon emissions through improved agricultural practices, for example, both mitigates new emissions as well as making soil more resilient to water and nutrient loss and erosion risk (Doran *et al.* 1998). Rehabilitating water courses both sequesters new carbon and can help secure flows for consumptive use, and so on. It is mainly at regional scale, however, that together these practices may confer resilience on the landscape to cope with climate change.

The Global Framework For GGA in the Landscape

Hundreds of thousands of people attended the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, informally known as The Earth Summit, This was because of concern about the destruction of natural resources and the pollution of the planet (United Nations 2011). The adoption of both the UN Framework Convention on Climate Change (UNFCCC), crystallised in the 1997 Kyoto Protocol, and the UN Convention on Biological Diversity (at the Earth Summit) reflect this global concern. Although the two conventions are intrinsically linked, with ecosystems forming a central place in the wording of the UNFCCC, their integration remains formative (van Oosterzee *et al.* 2010).

The stated objective of the UNFCCC is to achieve "stabilisation of the greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved *within a time-frame sufficient to allow ecosystems to adapt naturally to climate change*, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner" (United Nations 1992).

The parties to the UNFCCC are those countries that have ratified it. They are known as the Conference of Parties (COP) and they have met annually since 1995. In 1997, at the third COP, they met in Kyoto, agreeding to the Kyoto Protocol, commiting the Annex 1 parties (the industrialized countries listed in Annex 1 of the UNFCCC) to an overall emissions reduction of 5.2% below 1990 levels. Under the Kyoto Protocol they committed to do this between 2008-2012. This was known as the first commitment period. The Kyoto Protocol came into force in 2005 and was eventually been ratified by 193 parties or countries. However, not every country who signed the UNFCCC ratified the Kyoto Protocol (e.g. the USA).

At the end of 2005, the parties to both the UNFCCC and its Kyoto Protocol met to decide on long-term issues beyond the 2008-2012 first commitment period. It was also at the 2005 meeting that PNG and Costa Rica proposed a new concept on reducing emissions from

deforestation (RED). Many countries were interested in the concept and several workshops were held before the Bali COP 13 in 2007.

The elements of the long-term cooperative actions being planned were defined at COP 13 to be mitigation, adaptation, finance, technology and a shared future vision. The resultant "Bali Roadmap" was also agreed and it defined two negotiating tracks: those of the UNFCCC and those of the Kyoto Protocol. A decision was also made to stimulate action on reducing emissions from deforestation and forest degradation in developing countries, referred to as Reduced Emissions from Deforestation and Degradation (REDD), and in the role of conservation, sustainable management of forests and enhancement of carbon stocks in developing countries (signalled by the addition of "++" or REDD-plus). All of these elements were to be concluded in the negotiation processes in Copenhagen in 2009.

High hopes of a clear international plan for future greenhouse gas mitigation fell apart at COP 15 in Copenhagen, with debates over transparency and process. Under duress, a political agreement, the Copenhagen Accord, was drafted and noted. A process was then established for parties to indicate their support for the Accord and, during 2010, 140 countries did, with 85 of these also providing information on their national emission reduction targets. The Copenhagen Accord changed the emphasis of a global response to climate change from a focused international aim based on mitigation efforts of developed countries to an emphasis on national actions of the all countries, each according to their own abilities.

An important element of the Accord was the acceptance that global warming should be limited to no more than 2 Degrees Celsius. Both fast track (up to US$30 billion between 2010-2012 for developing country adaptation) and long-term financing goals (US $100 billion per year by 2020) were also agreed. Negotiations on REDD-plus made progress too, including progress on issues such as scope, guidance principles and a phased approach. The possible addition of other land use activities under the Clean Development Mechanism (CDM) and their potential contribution to mitigation was also discussed (Field Foundation 2011).

The 2010 Cancun agreements (COP 16) of December 2010 consolidated the Copenhagen Accord, initiating a new beginning for an international agreement based on pledges made by both developed and developing countries, potentially signalling the end of the Kyoto regime, and a shift to wider participation and action by all countries. Other elements of the Cancun agreements included funding to support developing countries' climate change responses, monitoring, reporting and verification rules for transparency. Much of the angst over the change in direction during the Copenhagen and Cancun meetings stems from the need for urgent international action through top down international agreement. Instead, approaches shifted from top down to a bottom up, with national and regional actions that, while more "messy" than an international approach (Garnaut 2011), still provided some solid building blocks for an international response to climate change.

The International Emergence of Landscape Carbon Projects

In 1989, the American electric power production firm AES Corp financed a forestry project in Guatemala to plant 50 million trees to offset the emissions of a new power plant in Connecticut (Bellassen & Leguet 2007). This appears to be the first documented landscape carbon offset project. It came eight years before Kyoto, and coincides with the growing global concern for the environment culminating in the Earth Summit of 1992. It was not until after the signing of Kyoto, however, that specialized offset service providers emerged and not until 2005 that retail companies became established, coinciding with the establishment of a European Union Emissions Trading Scheme or ETS (Bellassen & Leguet 2007).

The central idea of carbon offsetting or emissions abatement in the landscape is that an offset is used to compensate for emissions occurring elsewhere. Companies and individuals can do a

number of things to reduce their emissions focused on energy and reducing waste. Offsetting allows cheaper options for emission reduction beyond these actions where it can be difficult or costly to otherwise reduce emissions.

Offsets can also be a means to benefit biodiversity, water quality and social aspirations at the same time. They can be traded in either compliance or voluntary markets. Globally, the compliance market is dominated by obligations established under the European Union Emissions Trading Scheme which does not allow forest-based offsets, and those established under Kyoto Protocol for Annex 1 (industrialized) countries, which allows mechanisms such as the CDM. The CDM allows governments and companies with binding emissions reduction objectives to use offsets to meet part of their obligations. The international compliance carbon markets transacted 6,692 MtCO2e valued at $128 billion in 2010 (Peters-Stanley 2011). Forest-based offsets were restricted to 61 CDM projects generating 4.6 M CERs from a total of 860.6 M CERs (UNEP Riso Centre 2011).

In 2011, the voluntary market comprised 0.02% of the volume of the international carbon market, and less than 0.01% of the value. It is comparatively tiny at 131 $MtCO_2e$ (Peters-Stanley *et al.* 2011) transacted in 2011 (which nevertheless grew by 34% since 2009). This mainly over-the-counter (OTC) market is dominated by corporate social responsibility programs; individuals and corporations who voluntarily mitigate their emissions from air travel, electricity use and other sources, and pre-compliance buyers who purchase credits at a low price so that they might be able to use them for future compliance. The value of the voluntary carbon markets in 2010 was at least $424 M with average prices of $6/$tCO_2e$ (Peters-Stanley *et al.* 2011).

Because of its small size, the voluntary market is influenced by a few large low-priced transactions, and this can distort the price. Australia barely features in this market. A carbon credit in the voluntary market achieves its goal once it is retired so it cannot enter the marketplace elsewhere. In 2010 it is estimated that about 47% of OTC credits were destined for retirement (Peters-Stanley *et al.* 2011). In 2010, REDD was the top market project with 17.8$MtCO_2e$ transacted (see Table 3).

In the voluntary market, there are three main buyers, all of whom are for-profit:

- business-for-profit buyers who aim to retire their credits;
- business-for-profit buyers who aim to resell their purchases; and
- pre-compliance purchasers.

Nearly half of the credits bought were retired by either companies or individuals (Peters-Stanley *et al.* 2011). Currently, the global market share in Australia is miniscule, reflecting the policy uncertainty to date. Regardless of the units traded, whether voluntary or under trading schemes, international and Australian accounting is tightly woven around the Kyoto framework. Before the commencement of the Australian Government's CFI, transaction costs in the Australian context varied between 20%-40% under the CDM (Bellassen & Leguet 2007).

Table 3: Transaction volume by Agriculture, Forestry and Land Use (AFLOU) project type within the OTC market 2010.

Project Type	Amount (%)
REDD	27
Afforestation/Reforestation	6
Improved Forest Management	5
Agricultural Soil	3
Livestock Methane	2
Forestry (general)	2
Total	45%

Note: The remaining projects were mainly landfill methane and renewable energy. Adapted from Stanley-Peters et al. (2010).

The Emergence of Emission Trading in Australia

Scientists have been regularly measuring the atmosphere's CO_2 since about 1960. In the 1980s, the World Meteorological Organisation and the UN Environment Program established an international panel of government representatives to examine the increasing scientific evidence for climate change. The resulting Intergovernmental Panel on Climate Change (IPCC) is the source of much of the science underpinning discussions on climate change.

Climate change emerged as a real issue in Australia over 20 years ago, with the Australian Government embracing the emerging UNFCCC processes and advocating mandatory emission reduction targets. Australia was the eighth country to ratify the UNFCCC, adopting an ambitious climate policy aimed at stabilising emissions at 1988 levels by the year 2000, and then reducing them a further 20% by 2005 (Wilder & Fitzgerald 2008). The 1992 National Greenhouse Response Strategy set out a range of cost neutral measures to achieve emission reduction targets (Commonwealth of Australia 1998).

The National Greenhouse Response Strategy, however, failed to achieve its targets. In 1996, the Australian Government shifted away from leading an international approach to climate change to focus instead on protecting the national interest (Wilder and Fitzgerald 2008). While the UNFCCC encourages countries to stabilize their emissions, it is the Kyoto Protocol that binds industrialized countries to specific targets during a first commitment period 2008-2012. Australia, threatening to defect from the multi-lateral approach altogether during Kyoto Protocol talks, negotiated a comparatively lenient target of 108% of 1990 emissions (the base year chosen for comparisons) by the end of the first commitment period in 2012. It became one of the few countries to increase its emissions over the baseline year. It also extracted a concession for countries where deforestation was a net source of emissions in1990 to add these emissions to their initial assigned amount. This eased the burden on Australia meeting its first commitment period goal (Wilder & Fitzgerald 2008).

Australia's consequent target under the Kyoto Protocol is 108% of the base year of 1990, which for Australia was 547.7 Mt CO_2e. Australia's target was therefore 592 $MtCO_2e$ for each year of the first commitment period of the Kyoto Protocol. The Australian Government is required to

report on its national greenhouse gas emissions under UNFCCC and track progress against its national target under the Kyoto Protocol of the UNFCCC (Department of Climate Change 2009).

At the time, Australia decided not to ratify the Kyoto Protocol, but to meet its Kyoto target, it embarked on the detailed design of an emissions trading scheme via the then Australian Greenhouse Office. Cabinet repeatedly rejected the concept and a plethora of alternative policies emerged instead, including the NSW Greenhouse Gas Abatement Scheme, the first mandatory greenhouse gas emissions trading scheme in the world, and the voluntary Greenhouse Friendly program based on corporate social responsibility.

Public and political pressure mounted from 2004 to 2006, reflecting an increasing awareness of climate change. With an election less than a year away, the then Prime Minister John Howard announced as part of a "new" Kyoto, that he would now investigate emissions trading (BCA 2006, Wilder & Fitzgerald 2008). By April 2007, the Labour opposition under Kevin Rudd had commissioned Professor Ross Garnaut to report on the impacts of climate change on the Australian economy and to recommend future policies (Garnaut 2008). Shortly after becoming Prime Minister in November, Rudd ratified Kyoto in December 2007.

In mid 2008, the Garnaut Review recommended an emissions trading scheme and this was adopted by the new Government. The subsequent Carbon Pollution Reduction Scheme Bill (2009) introduced a cap and trade scheme (the CPRS), which mainly included entities that emitted 25,000 tonnes or more of CO_2e. Agriculture and deforestation emissions were not initially covered, which allowed only offset development for afforestation and reforestation, mirroring the Kyoto Protocol. This original scheme only envisaged some potential for carbon offsetting through forestry and revegetation-based activities in the landscape.

Under threat of the Bill not being passed, subsequent negotiations with the Federal Opposition resulted in agreed changes dated 24 November 2009. These excluded agricultural emissions indefinitely from the CPRS and importantly included offsets from a much wider suite of agricultural emissions. It is worthwhile detailing these since they form the basis of the Carbon Farm Initiative discussed below. The Details of the Proposed CPRS changes split offsets into two categories; those that were counted toward Australia's international commitments and those that were not counted, both subject to the development of robust methodologies.

Those abatement activities that were to be counted were:

- Forestry and reafforestation;
- Livestock emissions;
- Manure management;
- Fertilizer-based emissions;
- Burning of savannas;
- Burning of agricultural residues;
- Rice cultivation;
- Avoided deforestation;
- Legacy waste;
- Emissions from closed landfill facilities

Those abatement activities not counted included:

- Agricultural soils (grazing and crop land management), including biosequestration through soil carbon and biochar;
- Enhanced forest management; and
- Non-forest revegetation and vegetation management.

Other important changes that would enhance the environmental outcomes envisaged from the revised CPRS included:

- The provision of credits for regrowth forests on deforested land (defined as that legally cleared between 1990 and 31 December 2008);
- The provision for soil carbon on deforested land from 2013;
- Conditions for earning forest credits to have adequate water entitlements and planning approvals; and
- A requirement that offset projects do not involve, or include material obtained as a result of, clearing or harvesting of native forests.

Those activities counted towards Australia's international commitments were to be given CPRS permits and those not counted were to be implemented outside the CPRS legislation through implementation of the National Carbon Offset Standard.

On 27th of April 2010, Prime Minister Rudd announced a delay in the introduction of the CPRS until 2012, after it was twice rejected in the Senate. Working with a wide range of national stakeholders, Regional NRM Bodies continued to hold the view that the foundations set in the amended CPRS could initially be established wholly within the context of a national voluntary scheme, and that such a scheme could at a later stage, become fully integrated into consequent Emissions Trading Scheme, consistent with the CPRS amendments. This concept was adopted by the Australian Government in the lead up to the 2010 election, giving rise to the proposed CFI announced during the election campaign. Since then, the Australian Government has actively developed and implemented its wider Clean Energy Package and its Land Sector Package, inclusive of the CFI.

BUILDING REGIONAL RESILIENCE: REALISING GGA COMMODITIES IN THE REGIONAL LANDSCAPE

The Potential for GGA in Queensland Landscapes

Globally, it is not possible to avoid dangerous climate change without taking into account the natural and agricultural ecosystems of the planet: tropical forests draw down about 15% of global emissions each year (Trumper *et al.* 2009) and agriculture could offset a further 5%-14% (Smith *et al.* 2008). In Australia, recent figures indicate that agriculture will contribute and average of some 15% of annual emissions over the Kyoto period (2008-2012) and deforestation 8.5% or 49 Mt CO_2e (DCCEE 2010). It is considered that these estimates will remain unchanged through to 2020. Forestry (new forests established by direct human action on land not forested in 1990) is predicted to offset 3.6% (21 Mt CO_2e) of Australia's emissions during the Kyoto period and 1.2% of our 2020 emissions (DCCEE 2010). The use of carbon plantings to help offset national emissions is a longer-term project than this because of the short period of time left to meet 2020 targets (Polglase *et al.* 2011).

A CSIRO study which assessed GHG abatement potential through change in rural land use (Eady *et al.* 2009), demonstrated for Queensland that the overall attainable GHG abatement was potentially 140 Mt CO_2e/y, of which 105 Mt CO_2e/y could be attributed to forestry. Table 4 below further breaks down this figure.

Table 4: Forestry carbon sequestration options for Qld based on Eady (2009).

Forestry Opportunities	Mt CO_2e/yr
Change of landuse to carbon forestry (primary goal is carbon sequestration)	77
Environmental plantings (subset of carbon forestry)	28
Increase carbon banks in pre-1990 forests	21
Regrowth and avoided deforestation	7
Total	105

More recently, a study assessing opportunities based only on environmental plantings (Polglase *et al.* 2011) broadly confirmed these figures but warned that projected opportunities are based on the assumptions behind the models. For instance at high discount rates (10%) and establishment costs of $3000/ha, no areas were profitable until a carbon price of $40/t CO_2e was reached. At a discount rate of 1.5%, potentially large areas of land are profitable. As costs for water licenses decreased, the calculated areas of opportunity increased (Polglase *et al.* 2011).

All economic analyses are highly dependent on the particular model construct and assumptions, particularly carbon price (Polglaise *et al.* 2011). ABARE (Lawson *et al.* 2008) carried out some modelling based on different prices per tonne of CO_2e. At a price of just under $21/t CO_2e, ABARE projected an increase of land economically suitable for afforestation to around 5.8 million ha by 2050. Of this, some 3 million hectares were projected to be timber plantations and 2.7 million hectares projected to be environmental plantings. The potential volume of carbon sequestered was projected to be 1095 Mt CO_2e over a period 2007-2050, averaging 25.5 Mt CO_2e per year.

At a price of $29/t CO_2e the area of land agricultural land economically suitable for afforestation was projected to be 26 million hectares with about 22 million hectares being for environmental plantings. The potential volume of carbon sequestered was projected to be 3268 Mt CO_2e from 2007-2050, or about 76 Mt CO_2e/year. This is broadly consistent with Table 2 above, taking into account only carbon forestry. ABARE, however, has estimated a higher proportion of environmental plantings.

More recently, Treasury figures (Australian Government 2011) have provided estimates which are considerably lower and presented below in Table 5.

Table 5: Abatement from the CFI (from Australian Government 2011).

	Medium Global Action				Ambitious Global Action			
	2013	2020	2050	Cumulative	2013	2020	2050	Cumulative
Agriculture Abatement (Mt CO_2-e/year)	2	2	4	100	2	2	5	127
Land use change Abatement (Mt CO_2-e/year)	4	4	11	252	6	6	18	403
Forestry Sequestration (Mt CO_2-e/year)	<1	<1	6	72	1	9	41	865
Total abatement (Mt CO_2-e/year)	6	6	21	424	9	17	64	1395
Forestry Cumulative additional area ('000 Hectares)	1	9	345		78	625	4900	
Per cent of current agricultural land	<0.1	0.1			<0.1	0.2	1.3	

These figures are expressed in terms of degree of global action. Under the "medium global action" scenario, reforestation activities sequester 72 Mt CO_2e accumulatively by 2050, or just under 2 Mt CO_2e/y on average. Under the "ambitious global action" reforestation activities sequester 865 Mt CO_2e accumulatively or about 23.4 Mt CO_2e/y on average. The reasons for the lowered estimates relate to the fact that CFI credits trade in the global offset market which has considerably lower prices than if forestry credits were part of Australia's (proposed) ETS, and traded at the domestic price as was to be the case in the CPRS. Permanence restrictions, water interception and pricing, risk of reversal buffers and other restrictions add to the potentially limited role forestry has under the current CFI regime. Interestingly, avoided deforestation and managed regrowth provide a significant share of the potential abatement from the CFI, particularly under the "ambitious global action" scenario, representing a similar order of magnitude as that estimated by CSIRO (Eady *et al.* 2009).

Australia's Emerging Emissions Trading Scheme (ETS)

The overall aim of Australia's ETS is to reduce greenhouse gas emissions at the lowest possible cost. Australia's proposed ETS rests on three pillars: renewable energy; energy efficiency; and action on the land. Before the ETS commences in 2015, there will be a fixed price on emissions from 1 July 2012 @ \$23 tCO_2e rising 2.5% each year (\$24.15 in 2013-14, and \$25.40 in 2014-15). At that point, the price was to be set by the market but a floor price was to be set. In both the fixed and flexible period, large polluters were to buy and surrender a carbon permit for every

tonne of carbon pollution they produce. In the flexible period, the number of permits issued by government was to be capped, and the market would determine the price of permits. From the start of the flexible period businesses were to have access to international carbon markets (particularly in developing countries to buy permits).

The net impact of deforestation, reforestation and afforestation contributes 3% of Australia's total carbon pollution. Agriculture contributes 15% of our emissions. By 2020 deforestation and forestry are projected to contribute 13% (nearly as much as transport) and agriculture some 6% (together more than transport). Five hundred of the biggest polluters would have liability under ETS; certain landfill activities, retailers of natural gas, fuels in domestic aviation, marine and rail transport. Farming and land-based activities will not be covered and the CFI is planned to drive emissions reductions in agriculture and forestry. In the fixed price period, liable parties would be able meet up to 5% of their obligations using the Kyoto compliant CFI units. In the flexible period, there was to be no limit on the surrender of Australian Carbon Credit Units (ACCUs). During the flexible period and up till 2020, businesses were to have to meet half of their annual obligations by buying Australian permits or CFI units. CFI units could be exported under both the fixed price and flexible price period.

This changed in 2012 in that the Australian Government decided to accelerate linking of the Australian carbon market to the EU ETS. From 2015, Australian emitters were to be able to buy EU permits at the EU price for use in Australia. From 2018, permit trading could also go the other way, creating a combined market with a common price. Australian emitters will now be able to cover up to 12.5% of their total emissions using CDM credits, down from the 50% under the previous arrangement with the price floor. The 12.5% limit would prevent the CDM from setting the Australian price. Yet it would likely allow Australian emitters to fulfil part of their carbon bill using cheap CDM credits (see http://theconversation.com/carbon-price-floor-axed-but-eu-market-links-a-good-substitute-8777). The Clean Energy regulator was to administer key elements of the carbon pricing mechanism and the CFI.

The September 2012 decision for Australia to establish a link to Europe's climate change arrangements, however, was a move that could have substantive but unpredictable consequences for the domestic carbon scheme. This (and the dumping of the floor price on permits) means Australia will now be part of a large, entrenched and relatively stable carbon price mechanism which covers around half a billion people. The move also potentially meant the cost for Australia to reduce emissions would come down (at least in the medium term of 3-6 years). Costs could have, however, also gone up depending on price (see http://www.crikey.com.au/2012/08/28/euro-vision-australias-new-carbon-regime-explained).

The original plan was that, once Australia's $23-per-tonne carbon tax switched to an ETS in 2015, businesses could meet their obligations in large part by buying up cheap international permits from countries such as China, Indonesia and PNG (potentially around $4/tonne). Government concern, however, that the ETS would be flooded with these cheap permits led to its proposed setting of the (temporary) $15 floor price planned to start in 2015. As this was a somewhat arbitrary price, the Government scrapped the floor price and the linking of the scheme to Europe's ETS meaning that in 2015, Australia's floor price would effectively be Europe's permit price (currently about A$9.50). If the European ETS price was to go below $15 in 2015, then compliance would be cheaper, but if it rose above $15, then the costs here would go up. If Australia's new scheme keeps a long-term cap on the use of cheap permits from China, etc., then costs could be much higher by 2020 (see http://www.crikey.com.au/2012/08/28/euro-vision-australias-new-carbon-regime-explained).

The decision may also have heralded changes to the design of Australia's carbon scheme as the two schemes would eventually have to be roughly aligned. While the CFI allows AFOLU (agriculture, forestry and other land use) activities, Europe currently doesn't, so either the CFI or

the Australian Government would have to negotiate greater recognition of AFOLU products in the European scheme.
The Australian Government until recently predicted the price of carbon would go to about $29/tonne in a couple of years from 2015. While NZ, however, also predicted high prices (which they had for a while), they artificially held the price high. When New Zealand's policy changes allowed local greenhouse gas emissions to be offset by unlimited foreign-sourced carbon credits, the price of New Zealand Units (NZUs) dropped back below NZ$3, coinciding with a glut of European carbon credits. By late 2012, the European Union's ETS remained mired in over-supply of credits, which has seen carbon prices plummet with the release of a new tranche of Ukrainian forest-based credits. If continued, such prices and market volatility would render useful landscape-scale products under the CFI unviable. Australia might have been able to keep carbon prices artificially high for while by restricting EU permits to12.5%, but sooner or later, the market price would likely to come into parity with world prices.

Alternatively, opening Australian credits up to the international market and linking our scheme to Europe (if AFOLU products are to be accepted in the European scheme) potentially could awaken a trading giant that has traditionally shunned AFOLU products. Under such circumstances, supply limits may have eventually forced up Australian prices.

Australia's Voluntary Carbon Arrangements

Voluntary action under the CFI was intended to be treated as additional when accounting for Australia's post-2012 targets. ACCUs would be able to be voluntarily cancelled at any time as soon as the Registry is in operation. A Pledge Fund would enable individuals to voluntarily cancel ACCUs, Australian carbon permits and eligible international units, beginning at the commencement of the fixed price period (2012).

The Carbon Farming Initiative

As there are now substantive information products and guides concerning the Carbon Farming Initiative, this part of the manual does not seek to replace this widely available information, and it may soon to subject to substantive change. It does, however, seek to draw out those elements of the CFI's current design of most importance to Regional NRM Bodies in the pursuit of more resilient landscapes. The most substantive current CFI background can be found at the Office of Climate Change's Clean Energy Futures web-site:

http://www.cleanenergyfuture.gov.au/carbon-farming-initiative/

This section only broadly summarizes the information contained in these resources and the associated legislation guides. For additional background, some of the key web-based resources of importance on the site include:

- The CFI Handbook;
- CFI Frequently Asked Questions; and
- CFI Factsheets.

The objectives of the CFI are to help Australia meet its international obligations under the UNFCCC and Kyoto Protocol; to create incentives for land sector abatement in a manner that is consistent with environmental objectives such as improving water quality, biodiversity and agricultural soil health.

The CFI is a stand-alone scheme trading credits in the voluntary GGA market. This is an important differentiation from the offset provisions of the 24th of November (2009) CPRS, where only the non-Kyoto compliant activities would trade in the voluntary market (while provision was made for them to fold into the CRPS Bill as they became recognised in Australia's

international commitments). Under the post-November 2009 CPRS, reforestation was able to relatively simply opt-in and other Kyoto compliant offsets were also to be given CPRS credits.

The CFI will now enable crediting of land sector abatement whether or not it is recognised under our Kyoto Protocol targets. Different types of abatement projects will be eligible for Australian Carbon Credit Units (ACCUs), as CFI credits are called. Kyoto and non-Kyoto abatement projects will be separately identified to assist buyers who may prefer Kyoto compliant credits. The CFI separately identifies sequestration projects, native forest protection projects and emission avoidance projects. Native forest protection projects are narrowly defined sequestration projects involving forest protection from clearing. These will receive credits over a 20-year crediting period.

The carbon sequestered in vegetation and soils remains in the vegetation and soils, and it is the rights to the sequestered carbon which are translated into a credit and traded. Under the *Carbon Credits (Carbon Farming Initiative) Act 2012*, carbon sequestration rights are defined as the rights to sequestered carbon which belong to a person, including corporations, as a result of holding the estate or interest in land, or where a person has the exclusive legal rights to obtain the benefits of the carbon.

Section 43 of the *Carbon Farming Initiative Act 2011* defines those rights in more precise detail. Carbon emissions mitigation is the reduction in carbon dioxide, methane and nitrous oxide emissions from farming and grazing activities. Examples include reduced fertilizer use which reduces nitrous oxide emissions, cattle feed management to reduce methane emissions from burping and flatulence and other verifiable activities. There is no attachment of the reduced emissions to the land, but rather a tradable reduction of emissions based on changes of land management.

The CFI has rigorous requirements to guarantee genuine abatement including proving **additionality** for all activities (which was not required under the opt-in provisions of the CPRS Bill) and **permanence** for sequestration projects (which is defined as 100 years). Both positive and negative lists will be created with the positive list automatically recognising projects that are additional and the negative list excluding activities because they pose a significant risk or perverse outcomes.

The scheme processes are summarised in Figure 2 below. Key elements of importance to regions include:

- **Methodologies:** These are the methods that need to be applied to determine the GGA benefit of key practices (e.g. revegetation, avoided deforestation, savannah burning, etc.). Following national consultation, methodologies need to be approved by the independent Domestic Offsets Integrity Committee (DOIC) before actual projects can be established and approved;
- **Projects:** Carbon credits are developed for the market through "Projects" that need to apply approved methodologies. Projects might deliver seem-less product that incorporates a number of management practices across, at anything from property to, district to regional, cross-regional or national scale. Projects must be approved/monitored by the Clean Energy Regulator; and
- **Operating and Compliance Audits:** Projects are subject to ongoing operational and (if required by the Regulator) Compliance Audits.

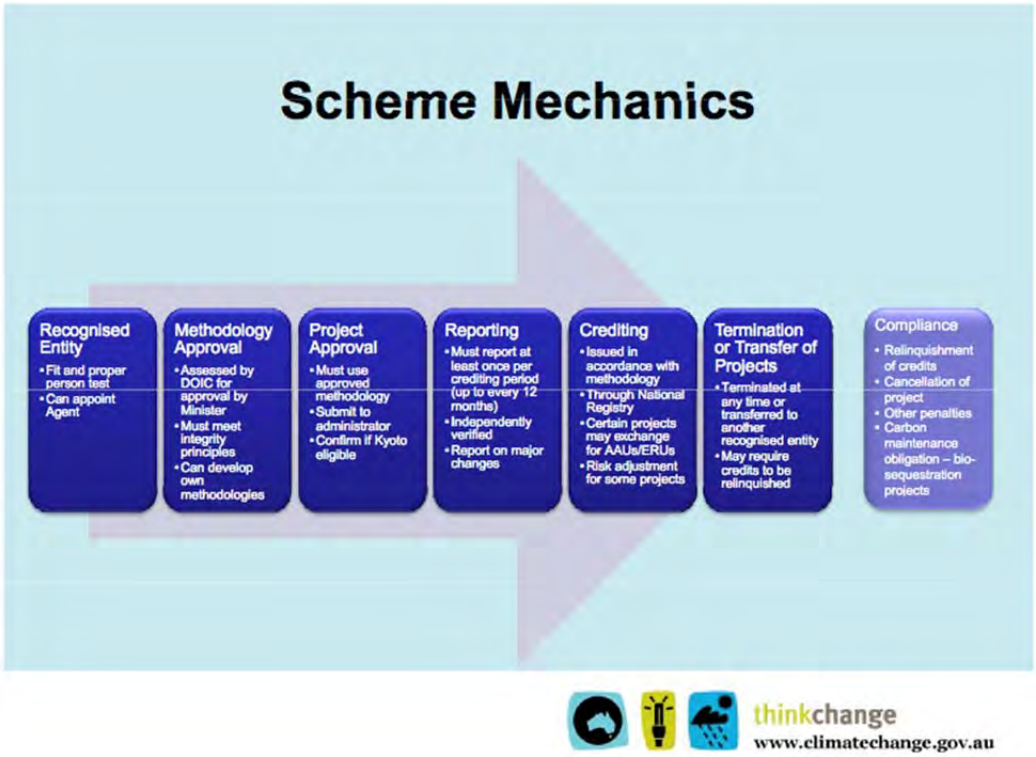

Figure 2: The CFI scheme processes.
(Source: Department of Climate Change and Energy Efficiency 2011).

Approved methodologies can be developed or proposed by private proponents or government agencies. The DOIC assesses proposed methodologies and makes recommendations to the Minister for Climate Change and Energy Efficiency. Offset projects must comply with all Commonwealth, state and local water, planning and environment requirements and also take account of regional NRM plans. A co-benefits index is to be created to allow projects to be recognised for environmental and community co-benefits. Proposed updates to the Guidelines for Submitting Methodologies and the Template for Submitting Methodologies were released for public comment in late 2012. The Guidelines provide information on how to prepare a draft CFI methodology for assessment by the DOIC. The Template prescribes the format that methodology proposals must take and the supporting evidence that must be submitted to the DOIC.

Project proponents must be a *recognized offset entity* and obtain an Australian National Registry Account. Projects must follow an approved methodology and the proponent must report on the project to the Administrator, who issues Australian Carbon Credit Units (ACCUs) into the proponent's Australian National Registry account. ACCUs are financial instruments and a proponent (aggregator, trader or broker) must hold an Australian Financial Services Licence to trade. These are issued by the Australian Security and Investment Commission and involve working within the *Corporations Act* and other relevant legislation.

A robust reporting framework begins when an offsets project is declared eligible by the Administrator. Reporting periods can be chosen by the proponent but must not be shorter than 12 months nor longer than 5 years. These can change during the project. An end date for the reporting period is nominated and an offsets report must be submitted within 3 months of the nominated end date. Unless exempted by the regulations, an offsets report must contain an audit report by a registered greenhouse gas and energy auditor and information specific to the relevant methodology. The Administrator issues ACCUs to a person who has applied and been issued a certificate of entitlement that details the number of ACCUs (which are designated

Kyoto or non-Kyoto) and a registry account. If the reporting period finishes after the Kyoto abatement deadline, then only non-Kyoto ACCUs are issued.

The crediting period is defined as the period during which the methodology and risk of reversal buffer cannot be changed without the consent of the proponent. This includes any regulations, new data or changes in risk reversal buffers that affect the original methodology or original risk of reversal buffer. The default crediting period for offset projects is 7 years. For reforestation, a 15-year crediting period exists because the estimation methods are better established and reforestation is a long term investment. Subsequent crediting periods would also be of 15 years but will be subject to adjustments in methodology, integrity standards and risk.

ACCUs for a native forest protection projects will paid out over 20 years. Kyoto ACCUs can be exchanged for assigned amount units (those units Australia has received under the Kyoto Protocol) or removal units under Article 3.3 of the Kyoto Protocol (from afforestation, reforestation and deforestation). These can be exported. ACCUs may be voluntarily cancelled, allowing individuals to achieve stronger mitigation by reducing the supply of eligible emission units. An overall summary of eligibility of trading units from the CFI is provided in Table 6.

Table 6: Eligibility of units from the Carbon Farming Initiative (CFI).

Feature	Policy
Eligible Carbon Farming Initiative (CFI) Units	Australian Carbon Credit Units (ACCUs) issued under the CFI will be eligible for compliance under the carbon pricing mechanism if they are: • Kyoto compliant Australian carbon credit units (Kyoto ACCUs); • Non-Kyoto compliant Australian carbon credit units (non-Kyoto ACCUs) derived from sources/sinks that would have been credited with a Kyoto ACCU if the abatement had occurred before the end of the relevant accounting period for the Kyoto Protocol first commitment period (31 Dec 2012 for reforestation and avoided deforestation activities, or 30 June 2012 for all other activities); or • Any other type of ACCU prescribed in regulations.
Quantitative Limits	In the fixed price period, liable entities may surrender eligible ACCUs totalling no more than 5 per cent of their obligation. In the flexible price period, there will be no limit on the surrender of ACCUs.
Banking CFI Units.	CFI units will be bankable for future use.
Exporting CFI Units	CFI units will be able to be exported during both during the fixed price period and the flexible price period.

The Positive and Negative Lists and Common Practice

An important innovation of the CFI is that it potentially can accept a wide range of emission sequestering or avoidance activities as long as an approved methodology is in place. The provision of additionality, however, is a critical consideration in the development and approval of these methodologies. The approach adopted is outlined through the Australian Government's Positive List (see DCCEE 2012). This means that ACCUs will only be available for additional abatement, and not for:

- Projects that are required by law (regulatory additionality);
- Activities that are common practice and already widely adopted.

Activities that go beyond common practice will be listed on the Positive list, while regulatory additionality will be assessed for individual projects. The Minister can recommend activities be

added to the positive list following stakeholder consultation and (publically available) advice from DOIC. The Australian Government will review the list periodically.

As all CFI projects must set out an approved baseline against which abatement is measured (what would have happened in the absence of the project), an assessment of what constitutes additionality must emerge from demonstration that a practice is beyond common practice and delivers measurable GGA benefits. DCCEE (2012) outlines how this can be assessed by defining the "take-off" point in a classic graphical representation of adoption over time. The "take-off" rate is considered to be between 5% and 20% practice adoption. The Government's Clean Energy Future Plan includes funding from DAFF to Commission ABS to undertake biennial surveys of agricultural land management practices for the purpose of under-pinning common practice assessments. The data arising from this will begin to be delivered from 2013 and will be used to determine the current take-up rates and take off points for proposed activities. Where data is unavailable, expert input will be sought to advise whether appropriate proxies exist, or modelling can be done to indicate where the take-off point is likely to be. Once the take-off rate has been reached, a practice is considered to be common and will not be added to the positive list. If adoption of the practice is below 5% (invention, innovation and early adoption), then the activity will be considered uncommon and no further assessment will be required.

The Positive list concept has important implications for Regional Bodies in that:

- Next generation NRM plans can help guide market buyers and suppliers (and aggregators and brokers) to easily identify regionally focussed and relevant definitions of existing, known and accepted uncommon and common practice;
- Regional NRM Bodies can support market buyers and suppliers (and aggregators and brokers) to identify potential new uncommon practices that could be progressed via inclusion in the positive list and consequent methodological assessments as a basis for project development; and
- Regional NRM Bodies could supply regionally specific input into DOIC assessments of uncommon and common practice and ensure continuous improvement and regionalised reporting of ABS surveying of these practices.

The Land Sector and the CFI

CFI Kyoto-compliant credits can be sold to firms with carbon liabilities (up to 5% in first fixed-price period) and this will drive much investment in the sector. The voluntary market may be less important, but remains of interest to regions that might be able to develop high profile and boutique products with specialist demand.

It is important, however, for region's to understand the wide Land Sector Package under the CEF includes several complimentary mechanisms that will assist regions to deliver region-wide landscape outcomes against their NRM plan aspirations/goals (Table 7). Some of the complimentary Land Sector Package components include:

- A non-Kyoto carbon fund of $250 M over years ($40 M/annum), which potentially buys 1.7 M tCO_2e if it buys abatement. This will be administered by the Department of Climate Change and Energy Efficiency (DCCEE);
- A Biodiversity fund of $946 million over the first 6 years ($160 M/annum) to establish, restore, protect or manage biodiverse carbon stores including in high conservation land and land that is not able to benefit by CFI Kyoto credits. An outstanding question concerning the Fund is whether it will be seen to compromise additionality for non-Kyoto projects such as improved forest management. The program is being administered by the Department of Sustainbility, Environment, Water, Population and Communities (SEWPaC);
- The Carbon Farming Futures Fund of $201 over 6 years ($33 M/annum). The focus will be methodology-oriented research into agricultural innovation (e.g. soil carbon, biochar,

biofuels, new crop and grazing species and integrating carbon farming into normal farm business. The Fund will be administered by the Department of Agriculture, Fisheries and Forestry (DAFF);
- Some $20M over 6 years ($3.33M/annum) to convert research into practical methodologies (DAFF);
- Some $99 million over 6 years ($33 M/annum) for on-ground action (e.g. soil carbon (DAFF);
- Some $44 million as a refundable tax offset over 3 years for uptake of conservation tillage farming techniques; and
- Some $64 million over 6 years ($10 million / annum) to go towards for and outreach, similar to the FarmReady Program.

Another $44 million over five years ($9 M/annum) will go to the revision of Regional NRM Plans to guide where carbon farming projects should be located in the landscape and to develop scenarios on regional climate change impacts.

The Land Sector Carbon and Biodiversity Advisory Board was intended to oversee this wide range of Land Sector Package initiatives, provide advice on Package effectiveness and coordinate research to minimize duplication.

Table 7: Land Sector Package complimentary measures summary.

Program	Description	Funding
Carbon Farming Initiative (CFI) Non-Kyoto Carbon Fund	The Government will purchase non-Kyoto compliant CFI credits which cannot be purchased by liable entities under the carbon pricing mechanism. The ongoing CFI non-Kyoto Carbon Fund will increase incentives for activities that are not counted towards Australia's emissions target under current international carbon accounting rules. These include soil carbon, revegetation and cessation of logging in native forests.	$250 million over six years from 2012-13
Carbon Farming Futures	The ongoing Carbon Farming Futures Fund will help landholders benefit from carbon farming. The measure will comprise four components: • Filling the Research Gap: funding for research into abatement technologies and practices; • Developing estimation methodologies: funding to convert research from Filling the Research Gap into carbon estimation methodologies; • Action on the Ground: funding for on-farm abatement, including support for farmers to adopt more sustainable, conservation tillage equipment; • Primary producers will be able to claim a 15 per cent refundable tax offset for new eligible conservation tillage equipment installed and ready for use between 1 July 2012 and 30 June 2015, provided they participate in soil carbon research. • Extension and outreach: new extension officers to help farmers benefit from carbon farming. The Land Sector Carbon and Biodiversity Advisory Board will advise on implementation of these measures.	$429 million over six years from 2011-12
Biodiversity Fund	The ongoing Biodiversity Fund will support the restoration and protection of biodiverse carbon stores. Funding will be provided to: • Establish biodiverse carbon plantings in areas of high conservation value such as wildlife corridors, riparian zones and wetlands; • Prevent the spread of invasive species across connected landscapes; and • Manage existing biodiverse carbon stores, including on land already under conservation covenants or subject to land clearing restrictions, and publicly owned native forests. The Land Sector Carbon and Biodiversity Advisory Board will advise on implementation of these measures.	$946 million over six years from 2011-12
Regional Natural Resources Management (NRM) Planning and Climate Change Fund	The Regional NRM Planning and Climate Change Fund will help regional communities plan for the impacts of climate change, and maximise the benefits from carbon farming projects. Funding will be provided for: • Regional NRM organisations to plan for climate change; • Production of NRM plans to a highly professional, nationally consistent standard; and • Development of scenarios on regional climate change impacts.	$44 million over five years from 2011-12
Indigenous Carbon Farming	The ongoing Indigenous Carbon Farming Fund will provide support for Indigenous Australians to implement carbon	$22 million over five years from 2012-13

	farming projects. Funding will be provided for: • Specialists to work with Indigenous communities to develop carbon farming projects; and • Development of low-cost estimation and reporting tools for abatement activities likely to have high Indigenous participation, such as savanna fire management.	
Carbon Farming Skills	The ongoing Carbon Farming Skills initiative will ensure that landholders have access to credible, high quality advice and carbon services. This measure will fund: • Development of a new nationally accredited qualification for carbon service providers; • Accreditation of carbon brokers and aggregators operating in the Carbon Farming Initiative; and • Information workshops for farm extension officers, catchment authorities and rural service providers about carbon farming.	$4 million over five years from 2011-12
Land Sector Carbon and Biodiversity Board	The independent Land Sector Carbon and Biodiversity Board will provide advice on the implementation of land sector measures. The Land Sector Carbon and Biodiversity Board will: • Report annually to Parliament about progress of land sector and biodiversity measures; • Advise the relevant Minister(s) on the implementation of the land sector measures; • Advise on the coordination of research to reduce duplication across the research community, target gaps and enhance the independence of research advice to government; and • Advise on key performance indicators for land sector measures. The Board will advise on the guidelines for the priorities, streaming of funding and criteria for funding the Biodiversity Fund. The Government will table these guidelines in Parliament and respond to any issues raised by the Board in the formulation of the guidelines. It will play a key oversight and review role in ensuring the Biodiversity Fund is well targeted and maximises the opportunities available. Individual funding decisions will take into account the advice on the merits of each proposal and consistency with funding guidelines from the board and any relevant technical committees which the Board establishes. The Board will be established permanently under legislation through statutory appointments.	$4 million over six years from 2011-12
Native Forest Wood Waste under the Renewable Energy Target	The Renewable Energy Target regulations will be amended to exclude biomass from native forest as an eligible renewable energy resource. This includes products, by-products and waste associated with or produced from clearing or harvesting of native forests, subject to appropriate transitional arrangements for existing accredited power stations.	Nil

Potential Contributions to Building Landscape Resilience

Property scale management practices simply will often not have sufficient critical mass to trade in the emerging carbon market. That is why **aggregation** of single practices across many

properties, as well as the aggregation of many practices across many properties, offers real opportunity for securing landscape change.

Apart from activities under the now defunct Chicago Climate Exchange (CCX), there are few landscape scale approaches to the aggregation of carbon based on landholder activities. Prior to the establishment of the CFI, voluntary CCX projects allowed for incentives for farmers to undertake projects focused on soil carbon and agricultural methane by changing farm practice such as adopting no-till for a certain area. The prices offered for changing practices were so low, ranging from 0.12c to 0.52 CO_2e/yr for one acre, that the CCX encouraged aggregators to be used for projects less than 10,000 tCO_2e: the vast majority of farmers (Acil Tasman 2010). The CCX is now closed due to the inability of the US Government to reach a climate solution (Peters-Stanley *et al.* 2011) the low price of offsets and the lack of mandatory caps for industries opting into the scheme (Acil Tasman 2010).

Internationally, the Programme of Activities (PoAs) and other recognised project grouping tools have only recently been developed to allow for aggregation of similar projects under a single registered programme. These PoAs have mainly focused on community-based micro-scale schemes such as household activities, installing efficient light-bulbs and cook stove distribution. The Voluntary Carbon Standard (VCS) Grouped Project Guidelines were formally issued in March 2011.

In Australia, where risks associated with rule-of-law are largely resolved, some key issues still remain problematic in the successful role out of landscape scale market-based schemes like the Land Sector Package and its constituent CFI. Conceptually, the attraction to offsetting was that it was low cost and could provide other co-benefits such as improved productivity, biodiversity and water quality outcomes. In reality, the high transaction costs of offsets have resulted in little uptake globally. In Australian agriculture, the family farm is the predominant basic business unit, resulting in a fragmented production base (Acil Tasman 2010). This has implications for accessing offset opportunities including high transaction and monitoring costs. Aggregating the activities of landholders across the landscape (and regionally, cross-regionally or nationally) provides one of the potential solutions.

The consequent benefits of regional-scale aggregation include:

- Risk management is spread across the landscape;
- Risk is spread temporally over extended timeframes;
- Development of a portfolio of risks is possible that allows investment in diversity while reducing volatility;
- Transaction costs associated with scientific, technical, measurement, legal and administrative support are spread more evenly;
- Payment per farmer is potentially increased by reduced transaction costs;
- A better ability to meet the needs of buyers in providing a portfolio of products;
- The aggregator can monitor outcomes to feed back into policy;
- A stronger strategic research and development focus can emerge; and
- Behavioural change that delivers real abatement can be driven.

Major impediments to emerging markets making a real landscape scale impact (either in Australia or internationally) include the shifting policy framework and lack of certainty in the market place, high transaction costs and a low price for carbon. The CFI does present some real opportunities to attract significant regional investment into landscape scale aggregation projects with consequent multiple benefits. The system, however, is only just commencing and still likely to change and evolve. NRM regions need to be aware that many barriers will still stand in the way of the emergence of an effective market.

The Role of Regional NRM Bodies in Making the System Work

With the above understandings about the international and national context and the specific intent of the Australian Government's Land Sector Package and CFI, it is clear that there still may be many years of improvement and reform needed to secure an effective market that delivers landscape resilience. It is important though to recognise that these arrangements are in their infancy, and it remains inevitable that a stronger framework for delivering market-based and government investment into GGA-based and other ecosystem services will eventually emerge.

With this in mind, it is imperative to recognise that all Regional NRM Bodies across the nation, and specifically those in Queensland, have several very important roles in ushering in the successful emergence of such arrangements and their consequent benefits in both the short and the longer term. These at the very least include:

- Capacity building across the system to enable effective frameworks for government and market investment in GGA-based ecosystem services;
- Developing strong and lasting partnerships between land managers, Local, State and Australian Government agencies, researchers, catchment and landcare groups, industry associations, auditors and service providers;
- Encouraging research and development partnerships and brokerage arrangements that build the foundations for sound methodologies, projects and verification/ monitoring systems;
- Facilitating high value regional, landscape and property scale planning and spatial analysis and its integration with regional NRM planning;
- Creating effective linkages between the regional NRM planning system and regional-scale regulatory and regional development planning systems;
- Enhancing regional-scale partnering among potential brokers, aggregators and suppliers; and
- Advocating continuous policy and operational improvements in the system.

The balance of this manual is firmly focused on supporting regions to carry out these roles to the best of their abilities, with a particular focus on planning and supporting effective regional partnerships that can encourage effective aggregation.

All of these roles are public good roles that can be resourced from government, philanthropic and non-market-based investment in Regional NRM Bodies, and many regions should be explicitly looking at how best to access Land Sector Programs and other revenue streams to enable them to effectively carry out such roles.

Regional NRM Bodies are considering supporting the development of a nationally-focussed entity that might participate in the market with the specific view of creating a not-for-profit entity focussed on delivering regional landscape and community outcomes. Such an entity would be fire-walled against the well-defined public good role of regions outlined above. This manual does not deal with the role of this entity.

HOW NEXT GENERATION NRM PLANS CAN GUIDE THE GGA MARKET

What Regional NRM Bodies Need to Know?

While we understand the importance of regional-scale NRM, there is little written about how regional NRM governance (including planning and management arrangements) can be used to shape climate change adaptation at landscape scale. More particularly, there is little written with respect to the capacity of the regional NRM system to guide potentially substantive markets and

investment emerging from GGA programs (see van Oosterzee *et al.* 2011). This may simply result from the fact that extensive, landscape-scale GGA is an entirely new field of endeavour.

Dale *et al.* (2013) have recently completed a journal article concerning outlining the emerging link between the next generation of regional NRM planning and the need to guide the emerging carbon and GGA market in ways that build landscape resilience in the face of climate change. The following broadly synthesises some of their key observations with respect to this opportunity.

Australia's collaborative regional NRM planning and management arrangements, however, have increasingly been recognised as flexible mechanisms from which to build landscape-scale resilience (Broderick 2008). Within a strong continuous improvement framework, these arrangements have real potential to mediate the landscape-scale changes required in the face of the multiple and regionally diverse pressures in the Australian landscape.

It is this capacity for regional NRM planning to guide efforts towards landscape resilience that makes it a tool with high potential for supporting landscape-scale approaches to climate change adaptation. Regional NRM planning has a strong focus on reaching collective agreement about the efforts required to preserve and restore landscapes, manage natural assets and undertake resource condition monitoring. This focus is fortuitously also the key to building landscape and community resilience in the face of climate change. Additionally, regional NRM plans can spatially identify those parts of the landscape where market-based sequestration and abatement activities should be targeted to deliver the most effective multiple benefits in the landscape; further building landscape resilience through critical practice improvements sponsored under market based incentive mechanisms.

The need now exists for Regional NRM Bodies to urgently progress next generation NRM plans and other mechanisms that respond to the issues and impacts associated with climate change and other pressures faced at regional scale. While past plans have been driven by water quality, salinity and biodiversity loss and other national drivers, GGA in the land sector now has become an increasingly important driver; both as an opportunity for investment and because of the need to avoid potentially perverse outcomes from abatement schemes.

To progress discussions with the Australian Government early in 2011, the National NRM Chairs Working Group approved the formation of a NRM Planning Working Group to work to proposed new approaches to the next generation of regional NRM planning activities across the nation. The Australian Government has now (and will likely remain) committed to using these plans to support the implementation of a range of Government-based (Land Sector Package) landscape-scale biodiversity investments, even establishing a specific investment program to enhance next generation NRM planning:

> *The $44 million Regional NRM Planning for Climate Change Fund will build on the expertise and network of regional natural resource management organisations to help plan for climate change and to maximise the social, economic and environmental benefits of carbon farming projects. NRM organisations will develop plans in each region to guide where carbon farming projects should be located in the landscape. These measures will ensure the protection of Australia's ecosystems and increase the land sector's resilience to the impacts of climate change"* (http://www.cleanenergyfuture.gov.au/).

The Land Sector Package's regional planning activities are intended to be influential across a range of key parts of the wider CEF (Clean Energy Future) package. In particular, it is intended to guide the strategic location of carbon farming projects designed to "provide new economic opportunities for farmers, forest growers and landholders and to help the environment by reducing carbon pollution" and delivery of other land-sector related government programs. The Fund is designed "to help build connectivity, and resilience in the landscape by promoting

biodiverse carbon plantings and revegetation, management of existing biodiverse carbon stores and managing pests in a connected landscape".

While the above outlines the intended direction by the Australian Government, the current state and general direction of regional NRM planning does vary across all States and Territories (see Dale *et al.* 2013). The Australian Government has, however, articulated a clear set of principles for the role out of the next generation of NRM planning. These can be found at:

http://www.environment.gov.au/cleanenergyfuture/regional-fund/publications/pubs/regional-fund-principles.pdf

These principles have been enhanced and fleshed out by the development of a draft complimentary set of State-based principles and design standards by the Queensland Regional Groups Collective (RGC 2012). These Australian Government (and subsequent State-based principles) have been developed as there is wide acceptance that existing regional NRM plans are in varying stages of "climate change readiness". The Australian Government recognises there is also varying capacity for each of the regional NRM organisations to plan for the uncertainties of climatic conditions, access suitable planning resources, including spatial information and identify those parts of the landscape suitable for biodiverse carbon plantings.

As part of the overall Clean Energy Future Package, the Australian Government will provide funding support to assist with enhancement of existing NRM plans. The Australian Government Principles have been developed to guide the process of updating the existing regional NRM plans. Updated regional NRM plans will be considered in consultation with the Land Sector Carbon and Biodiversity Board (LSCBB). Final plans will be recognised by the Australian Government for use on other Australian Government priorities including the Biodiversity Fund.

The next generation of regional NRM plans will be required to guide the CFI and Biodiversity Fund, as CFI and Biodiversity Fund participants will need to specify consistency with regional NRM plans. The Australian Government recognises that these processes for updating plans are continuous. Updated regional NRM plans will guide where carbon bio-sequestration opportunities occur in the landscape. Carbon bio-sequestration opportunities should consider maximising environmental co-benefits and avoid unintended negative consequences on biodiversity, water and agricultural production systems. An adaptive management approach and continued improved strategic planning will ensure development of NRM co-benefits such as landscape connectivity, resilience and wildlife corridors.

The Australian Government and Queensland principles both aim to ensure that regional NRM plans guide decisions relating to the location and nature of carbon abatement projects across the landscape. The principles acknowledge that high quality systems and processes are essential to make good land use decisions for best possible outcomes. They also emphasise that planning processes should engage stakeholders when considering the potential environmental, NRM and community impacts of a growing carbon market (see Table 8).

The Regional Natural Resource Management (NRM) Planning for Climate Change measure of the Land Sector Package secures and provides critical Australian Government investment in next generation planning. This secures a central role for regional NRM bodies in the roll out of emerging GGA markets. The measure will support regional NRM bodies to incorporate climate change mitigation and adaptation into existing regional NRM plans. It has two streams: (1) funding for regional NRM organisations to plan for climate change impacts by building landscape resilience; and (2) coordination of research to produce regional-level climate change information in the form of scenarios, to support medium term regional NRM and land use planning. The Principles for the Regional NRM Planning for Climate Change Fund (discussed above) refers to Stream 1 investment, with Regional NRM Body bids to be complete by February 2013.

Table 8: Australian Government principles for the development of next generation regional NRM planning for climate change (Stream 1).

Principle	Attribute
1. Plans identify priority landscapes for carbon plantings and strategies to build landscape integrity and guide adaptation and mitigation actions to address climate change impacts on natural ecosystems	a) Planning processes identify opportunities and management strategies to maximise environmental benefits and landscape resilience, including biodiverse plantings, wildlife corridors, landscape connectivity and protection of remnant vegetation. b) Planning processes recognise, provide guidance to avoid and mitigate potential risks and adverse impacts associated with carbon sequestration in the landscape, including impacts to biodiversity, water resources and production systems. c) Planning processes identify priority landscapes for potential carbon sequestration opportunities, mitigation and adaptation in the context of improving landscape connectivity, resilience and wildlife corridors.
2. Planning process is logical, comprehensive, and transparent	a) Planning processes consider previous planning and are consistent with relevant jurisdiction specific planning requirements. b) Planning processes are informed by a clear understanding of the regional stakeholder and community aspirations and objectives. c) Planning processes demonstrate a clear understanding of the regional bodies' business, roles and responsibilities. d) Planning processes show evidence of cooperation for cross-regional climate change impacts and land use planning. e) Adaptive planning responds to new information and guide improvements as knowledge improves. f) Planning process use information at an appropriate scale to spatially identify priority areas in the landscape for carbon sequestration projects and environmental co-benefits. g) Planning process demonstrate adaptive planning that responds to current and anticipated climate change research and additional information.
3. Plans use best available information to develop actions and are based on collaboration with government, community and other stakeholders	a) Plans demonstrate strategic alignment with relevant State/ Commonwealth NRM policies (such as urban and regional planning, matters of National Environmental Significance, National Water Initiatives, National Wildlife Corridors Plan). b) Plans meaningfully engage community and stakeholders. c) Where relevant plans identify and agree roles and responsibilities for partners in the region. d) Plans integrate biophysical, socio-economic and climate change information to fine tune strategies for improving landscape connectivity, function and resilience.

Stream 2: Science Support for Next Generation Planning

The proposed approach to the delivery of NRM Fund Stream 2 involves the three key outputs: 1) online provision of climate projections for NRM planning; 2) facilitating the use of climate information in NRM planning; and 3) research and synthesis of climate information to support NRM planning. The allocation of program funding means that Output 1 - Online provision of climate projections for NRM planning has commenced in parallel with Outputs 2 and 3. This means Output 1 had already started before the primary mechanism for identifying and moderating the demand for climate information in NRM planning – the regional facilitators – was put in place. Subsequently, DCCEE convened a workshop in May 2012 with a range of stakeholders to test the proposed approach and to develop the aims and specifications of each output in more detail. A Technical Working Group (TWG) of NRM planners with knowledge and

experience of applying climate information in NRM planning was formed ahead of the facilitation function becoming available.

The delivery of Regional NRM Fund Planning for Climate Change Stream 2 has now been decided and will invest in improving the capacity of NRM organisations to plan for climate change by improving the availability and quality of the information and support to Regional Bodies and building the capability of groups to effectively utilise the information. Providing direct assistance or funding to all 56 NRM groups was beyond the scope and budget of this project. As such, to achieve national consistency where possible, and to benefit from efficiencies in the joint delivery of relevant information and opportunities for peer learning, a 'cluster' approach was proposed. 'Clusters' were formed from groups of NRM regions on the basis of climate change adaptation similarities. The eight 'clusters' are shown in Figure 3. The two key proposed outputs from Stream 2 are as follows:

Output 1 - *Online provision of climate projections for NRM planning:* Output 1 will fund the delivery of climate change projection information relevant to NRM planning via a user-friendly website. This output will enable:

- NRM planners to access the climate information they need to understand and effectively plan for the NRM implications of climate change; and
- Researchers and developers of information products and decision-making tools to access the climate information they need to support NRM planners to understand and address the NRM implications of climate change.

Output 2 - *Research and synthesis of climate information to support NRM planning:* This output will fund research partnerships (the Impacts and Adaptation Grant Program) to synthesise the applied research necessary to support the use of climate projections in NRM planning. A cluster-based approach is being used with a focus on potential impacts, adaptive responses, and implications of climate change for the management of carbon in the landscape. An overarching project will be supported that would monitor the cluster-based research projects and undertake national analysis, synthesis and coordination where appropriate (see Figure 3).

What Can Be Done to Maximise Landscape Resilience?

Based on the Australian Government and Queensland next generation NRM principles, below we explore new opportunities for the meaningful application of better regional planning for NRM in securing climate adaptation, particularly via GGA. We also propose possible new directions that the Commonwealth, State and Territory Governments and Regional NRM Bodies may consider over the coming two to three years. We also consider these possible new directions in the light of emerging Australian and Queensland Government and regional NRM body needs, current planning developments and the emerging practice literature.

A Focus on Landscape Resilience

The need to prepare for emerging new global pressures requires a higher order focus on building landscape resilience, particularly in the face of climate change (Gunderson *et al.* 2010). The focus of NRM planning over the last decade has been based on a more linear/rational target setting approaches, relying on the establishment of aspirational, resource condition and management action targets as proxies for managing the condition and trend of defined natural assets (e.g. biodiversity, water, soils, world heritage values, etc) (DSEWPC 2011). While this was appropriate in the first generation of regional NRM plans, this more linear, silo-based approach to NRM has limitations. These include that:

- Some of the climate change pressures facing our natural resources are so global and intense, that transformational change rather than incremental thinking is required (Ostrom *et al.* 1999);

- The dynamic interplay between natural assets (e.g. between water, biodiversity, carbon stocks and productive capacity) needs to be made more explicit if we are to secure greater resilience in our landscapes (Plummer & Armitage 2007); and
- A focus on understanding "thresholds of concern" in natural systems will be needed, whereas a more linear approach might result in managers fiddling around the edges of devastating changes in the health of our landscapes.

Importing resilience thinking as a foundation for next generation NRM planning enables a more robust, systems-based and scientifically informed debate about ecological thresholds and the transformational changes required to avoid them or to adapt to them if they occur (Cash & Moser 2000 and Vogel *et al.* 2007). There has already been a shift towards more resilience-based approaches in some regions, particularly the Catchment Action Plans in NSW. These approaches seek to understand NRM within and across landscapes in a more dynamic, integrated ways.

Adaptive Planning: Collaborative, Evidence-Based Continuous Improvement

One of the greatest promises of Australia's regional NRM planning system was that, as a bilaterally agreed planning framework, it seemed that a genuine, continuously improving and adaptive planning effort could begin with almost indefinite time horizons (Allan *et al.* 2008 and Lockwood and Davidson 2010). This promise was curtailed when the Australian Government retreated from their initial commitment to progressive regional NRM planning from 2008 onwards (Robins & Kanowski 2011). While regional NRM planning effort may have floundered as a result in the intervening years, most States and regional NRM bodies themselves continued progressing planning adaptively, but perhaps on a more ad hoc, inconsistent basis. Importantly, through review of the Caring for Our Country program and through introduction of the CFI, the Australian Government is now re-embracing genuinely adaptive and long term regional NRM planning (Clayton *et al.* 2011). This is an important opportunity, but one still yet to be fully scoped, agreed and collaboratively resourced across Australian, State, Territory, Local government and regional NRM body spheres of influence. Further, the opportunity to progress more adaptive planning approaches can and should be married with more resilience and transformation-based approaches to planning (Brunner and Lynch 2010).

Overtly Collaborative Decision Making and Monitoring

Earlier regional NRM plans did have strong community ownership and buy-in, including formal accreditation by two levels of government (Farrelly 2005). At the time of their development, however, the approach focused on temporal sign-off rather than explicit and durable commitment to ongoing collective action. Ongoing community and government legitimacy behind regional NRM plans has consequently declined in many cases (Robins and Kanowski 2011). Next generation plans need to revisit collaborative decision making about thresholds, transformative changes, outcome and management targets and implementation priorities. They also need to be more focused on securing ongoing commitment from all parties to the integrated alignment of effort, informed by resource condition monitoring against thresholds and targets (Pahl-Wostl *et al.* 2011 and Healy & Ascher 1995).

A Strong Evidence Base and Community/ Science Partnerships

First generation regional NRM plans did enhance the scientific evidence base for regional decision-making. The next generation of planning, however, would benefit from stronger and more durable science/ community partnerships. This means building a stronger and more integrated synthesis of scientific input (e.g. between social and biophysical sciences), best managed through well structured, durable relationships between the science community,

regional NRM bodies, their stakeholders and governments at regional scale (Ozawa 1991). The climate sciences need to be better integrated into next generation planning. Community acceptance of the emerging science is critical and new science developments need to be able to be easily adapted into decision making as it unfolds (Ozawa 1991).

Monitoring and Evaluation to Review Thresholds

First generation regional NRM plans were under-resourced with regard to monitoring, though many regional NRM bodies tried within these limitations to establish robust and adaptive monitoring frameworks (Eberhard *et al.* 2009 and Robinson *et al.* 2009). A stronger focus on establishing simple but collaborative and durable monitoring frameworks is required, ensuring key thresholds are avoided (Robinson *et al.* 2009).

Improved Spatial Analysis to Guide the Carbon Market

Not all first generation regional NRM plans were able to progress strong spatial analysis to identify particular parts of the landscape where:

- High value assets and/or spatial threats associated with those assets occur (e.g. high risks of salinity rising in water tables);
- Government, community and market-driven investments might deliver the most strategic and effective land use outcomes for the least cost; and
- Particular land uses/management practices need to be avoided/supported.

This problem was not fatal to NRM planning, but was a feature of maturation of the process. Some regions had much more historical spatial data and scientific analysis to draw upon (Robins & Dovers 2007). Indeed, regional NRM planning sparked an increase in cross-regional and cross-state data enhancement and sharing (Robinson *et al.* 2009). Improved spatial analysis is reliant on maturation of the process, the emergence of collaborative alliances, progressive development of the science and community engagement to enable further analysis and spatial prioritisation. The link between the emerging CFI and guidance offered by next generation plans presents an opportunity in this regard. Stream 1 ($33 million focussed on regional planning activity) and Stream 2 ($11 million focussed on data collection) will support such approaches, though effective integration of effort between the streams is yet to be fully established and realised between Regional Bodies and science partners.

Better contextualising objectives and targets through improved spatial analysis would be beneficial in areas such as improving biodiversity and landscape connectivity (Bryan and Crossman 2008). At the very least, this would allow those developing CFI methodologies and projects based on particular NRM practices to target their efforts in those parts of the landscape that will deliver the best outcomes for improved landscape scale resilience in the face of climate change.

Defining Regional Practices Frameworks

Many regional NRM plans already identify and classify those management practices within particular industries and land uses that lead to enhanced natural resource outcomes, including target setting for practice improvement (Vella *et al.* 2011). There are, however, poorly contextualised and non-standardised approaches across the nation. The CFI concept enables a renewed national focus on a wide range of land management practices that deliver positive GGA outcomes and that avoid perverse landscape outcomes and this information is key to guiding the GGA market.

The CFI's positive/negative list approach currently establishes an effective but blunt national instrument that will guide the terrestrial GGA market. A more nuanced, but nationally consistent regional refinement of practices is required. There would be considerable value in next

generation NRM plans overtly identifying the wide range of management practices across different land uses within their region, and distinguishing between those that are degrading, required by law (code of practice or duty of care), regionally agreed best practices, or aspirational and/or untested future practices. The GGA market and strategic government investment should be focussed on securing targets to achieve regionally-agreed best management practices or to push-test emerging aspirational practices.

Connectivity With Regulatory Planning Instruments

Working with relevant regulatory processes such as State or Local government land use, water resource or vegetation management planning is likely to be an important factor in the ability for regional NRM plans to fulfil their potential in the delivery of good NRM outcomes, particularly for carbon and biodiversity (Pannell 2004). Indeed, all of these plans have some level of responsibility for progressing regional climate adaptation, and these can be informed by the landscape scale implications of regional NRM plans. While this is a longer-term outcome, there is now an opportunity for better alignment between Australian Government policy, regional NRM plans and better-informed regulatory processes. In particular, potentially perverse outcomes that might emerge from the CFI may best be identified in next generation regional NRM plans, but best regulated through subsequent actions progressed through related statutory regulatory instruments (Pannell 2004). This would enhance and clarify the regulatory NRM responsibilities of State and Territory Governments, but enable voluntary regional NRM plans to maintain their wide community support.

Integration With Broader Regional Planning Agenda

There is clear Australian Government intent to ensure regional NRM planning effectively interfaces with Regional Roadmaps being developed by Regional Development Australia (RDA) Boards (RDA 2011). This is an important development in the better integration of social, economic and environmental issues at regional scale and is also likely to be supported in most State/Territory Governments. Many regional NRM bodies have already actively integrated their planning and operational efforts with those of RDA Boards and their emerging Roadmaps. In the FNQ&TS Region, for example, the strategic priorities of the region's four NRM Bodies directly informed the development of that region's Roadmap (RDA FNQTS 2011). The RDA Board itself sees the strengthening of the regional NRM model and planning approach as a key strategy in the region's development. In many cases across the nation and State, regional NRM bodies are also directly represented on RDA Boards.

A clearer and consistent framework for the integration of next generation NRM plans, Regional Roadmaps and other (particularly local government planning activities) is a logical process improvement, consistent with broader adaptive management principles. This brings forward and seeks to secure a combined NRM and regional economic and social development perspective to the issue of resource management, land use and climate change adaptation.

Figure 3. The breakdown of eight NRM group 'clusters'.
Note: these clusters were determined on the basis of: a) the nature of the change in climate; b) the range of adaptation options set by biogeography; and c) the predominant land use. Each cluster has between 5 and 11 members.

Social and Community Development and Building Regional GGA Literacy

First generation regional NRM plans focused on improving the condition and trend of a region's natural assets, but weakly referred to social and community assets (Robinson *et al.* 2009). This was largely driven by a biophysical sciences bias in funding provided for regional NRM planning. Many regions, however, sought to more fundamentally integrate social and environmental issues in their planning processes, rather than just exploring the social and economic impacts of their proposed targets and actions. Next generation NRM plans should be more actively focussed on viewing social and community resilience alongside ecological resilience concepts, as well as viewing their regional communities and institutions as important assets requiring integrated effort and investment (Bohnet 2010).

In this regard, Regional NRM Bodies and the Australian Government have proposed specific investments under the CEF land sector funding, with a specific focus on building the GGA literacy of regional communities to facilitate their active participation in the program (and the CFI in particular) (Commonwealth of Australia 2011). If successful, the resulting targets and actions emerging from this work should be effectively integrated with next generation regional NRM planning processes.

What Regional NRM Bodies Can Do to Help?

It is still early days, but it seems that the Australian Government sees a new and emerging role for regional NRM plans and Regional Bodies in climate adaptation, beyond just supporting the delivery of a few policy and program outcomes. One of the real strengths of this opportunity is the chance to rebuild the critically important link between the strategic and integrative role of regional NRM bodies (i.e. planning and effort alignment) and the coordination and effective management of regional delivery systems (i.e. major program management and monitoring). With effective relationships in place between all governments and regional NRM bodies, this more devolved approach to planning and delivery could raise confidence in the longer-term achievement of national policy and program outcomes.

This fuller use of regional NRM plans and a return to some of their original intent and potential, may guide all parties towards more strategic and integrated NRM efforts based on current science and well-articulated community values. In making this work, however, Region NRM Bodies, through their regional NRM plans, will need to:

- Address greater complexity while delivering outcomes in a simpler way;
- Integrate rapidly emerging and new expectations and values around climate change and land sector based GGA;
- Become more explicit (spatially and in practice terms) in communicating and debating landscape values and preferred landscape outcomes;
- Be more responsive and adaptive to changing science and community values, particularly in respect of GGA and connectivity of spaces; and
- Better integrate with other processes (land use planning) and other significant strategic players in regions (local government/RDA etc.).

Regional NRM Bodies across the nation and the Australian Government are enthusiastic about the opportunity to make next generation plans even more effective and influential than the first. This manual informs that emerging opportunity.

SPATIAL TOOLS TO UNDERPIN MARKET GUIDANCE

What Regional NRM Bodies Need to Know?

As part of the Australian Government's Clean Energy Future plan, the CFI will see the establishment of a stand-alone scheme trading credits initially in the voluntary GGA market. As well as mechanisms to support the carbon credits scheme (methodologies, projects, audits, etc.) the CFI is accompanied by substantial investments in research and development, planning and direct investment in on-ground actions for biodiversity and carbon benefits (as outlined in Section 3).

NRM groups have a significant role to play in supporting the establishment of Land Sector Program effort and carbon farming in strategic parts of the landscape. As knowledge and action brokers at the regional scale, NRM Bodies can support land managers to engage effectively with the scheme, and facilitate the achievement of strategic natural resource outcomes from the scheme.

At the regional scale, spatial analysis can identify those parts of the landscape that will potentially deliver significant carbon opportunities, biodiversity and indeed other multiple co-benefits. Regional Bodies, particularly with the next generation of plans, have a clear role to play in this regard, guiding the operation of the market through more spatially explicit regional NRM planning and operational mechanisms.

Equally, to engage effectively with the scheme, land managers will need to:

- understand the CFI scheme and its potential operation within the landscape;
- be able to explore how it could apply to their farming system (e.g. approved methodologies and the potential carbon, biodiversity and production benefits as well as the economic and social implications; and
- understand how they might be able to access the market in way that provides sufficient revenue at minimised transaction costs.

At the strategic level, Regional NRM Bodies and their key partners and stakeholders want to see the market function with minimal transaction costs (i.e. be efficient) and achieve optimal cumulative benefits at the regional and larger scales to be effective. Consequently, a critical role for Regional NRM Bodies is to provide information products at a range of spatial scales to support this. Information products will need to be useful at the property scale for land managers to identify and deliver good quality projects). It is also need to target those areas that should be a priority for support, and facilitation of, the aggregation of outcomes (for market access) and to determine co-benefits and risks (for landscape resilience and other benefits). It is important to recognise that a consistent approach to a core set of information products across regions will be needed to build confidence and support the emerging market.

Spatial tools and information products will be major regional NRM planning and delivery output that Regional NRM Bodies can provide to support CFI and the carbon market more generally. This section outlines the sorts of spatial analyses that will be useful in this regard. In particular, based on pilot work in the Fitzroy Basin and the (Queensland Government) CATER (Carbon Accumulation Through Ecosystem Recovery) pilot, there is a foundation for further development of spatial products.

What Can Be Done to Maximise Landscape Resilience?

As discussed previously, landscape resilience refers to the capacity of a landscape to respond to changes and disturbance, yet retain its basic functions and structure. Climate change will put human and ecological systems under additional stresses at the regional scale (e.g. through changes to rainfall and temperature). Building landscape resilience to help mitigate climate change is about growing the capacity of these systems to cope with these and other coincident pressures.

On ground actions that increase landscape resilience should be consistent with existing Regional NRM Plans, but the next generation of plans present an opportunity to more explicitly support resilience building. It should be noted, however, that some of the greatest opportunities for large scale carbon sequestration lie with vegetation management and revegetation activities. Incorporating more explicit strategies to maximise landscape resilience will involve a greater emphasis on the spatial location and configuration of vegetation and revegetation actions. Efforts to improve landscape resilience should reduce the vulnerability of NRM assets (e.g. by increasing the size of habitat patches, providing buffers above critical thresholds) and/or supporting adaptation responses through a focus on connectivity and diversity of habitats to allow species to move. Spatial analysis to identify priorities (at a range of scales) could incorporate some of the following principles:

- maintain or restore the extent and diversity of habitats;
- repair ecosystem processes (e.g. soil stability, water balance, etc.);
- protect, improve, enhance and reconstruct native vegetation;
- build spatial variation (e.g. patchiness and variability);
- simulate natural processes and features (e.g. vegetation corridors/wildlife migration paths); and
- bridge climate gradients allowing movement/adaptation (Radford, Williams, & Park, 2006).

Tailoring the spatial prioritisation of investment strategies at regional scale to optimise these benefits will continue to be a rich field for further research and development. It also provides a foundation for further testing and development of decision support tools to help decision makers maximise multiple landscape benefits. In particular, spatially-oriented decision support tools exploring priority investments in vegetation for carbon benefits can focus on securing multiple benefits for terrestrial/aquatic biodiversity and degraded/productive landscapes.

Potential terrestrial biodiversity co-benefits that can be further explored through enhanced spatial mapping, analysis and decision support include:

- restoring heavily cleared landscapes to and/or expand remnant patches;
- restoring heavily cleared regional ecosystems; and
- expanding habitat for threatened and other species.

Potential co-benefits of revegetation or vegetation management for aquatic biodiversity include restoring riparian and wetland vegetation and improving water quality through improved riparian restoration and ground cover. Vegetation can also be a useful tool for restoring degraded landscapes, including:

- salinity management through groundwater interception;
- soil stabilisation on steep slopes, gullies and landslips; and
- improving soil properties through improved soil carbon.

Vegetation may also contribute to agricultural and pastoral production improvements through the provision of shade, shelter belts and feed reserves. All such benefits can be prioritised spatially in the landscape at regional or even at finer scales required.

What Regional NRM Bodies Can Do to Help?

Implications for Regional NRM Planning

As mentioned previously, under the Land Sector Package, the Australian Government will fund the update of regional NRM plans to guide planning for climate change impacts on the land and to maximise the environmental benefits of biodiversity and carbon farming projects. The Australian Government has articulated three principles to guide these efforts (Table 8). Given the priority on the identification of priority landscapes for on-ground action, effort could include:

- Areas that create regional connectivity between remnant vegetation;
- Areas that contribute to large scale cross-regional biodiversity corridors;
- Riparian areas that create biodiversity connectivity and water quality;
- Core areas of biodiversity for enhancement;
- Areas of marginal agricultural land where effective revegetation could occur;
- Areas of unusually high concentrations of biodiversity assets;
- Areas that maximise linkages with existing conservation priorities;
- Areas of high vulnerability for biodiversity; and
- Areas of degraded landscapes, such as high salinity areas.

Regions will need to spatially define opportunities for 'biodiverse plantings' for their region, reflecting the characteristics of local native vegetation communities. Thus, management strategies that could be spatially represented to achieve environmental benefits/landscape-scale resilience in a changing climate may include:

- Undertaking landscape-scale ecological protection, restoration and connectivity building;
- Creating wildlife corridors across a landscape that allow the movement of species and genetic exchange across flora and fauna populations;
- Protecting biodiversity through maintaining and re-establishing ecosystem functions and building connectivity in the landscape;
- Protecting remnant vegetation to a level that reflects the area's vulnerability;
- Rehabilitating riparian areas for effective biodiversity connectivity;
- Promoting conservation activities on priority public and private lands;
- Promoting biodiverse plantings on previously cleared land to build resilience;
- Implementing targeted species-specific conservation initiatives;
- Maintaining and improving habitat for native species;
- Reducing threats to biodiversity by addressing habitat loss, degradation and fragmentation, the spread of invasives and changed fire regimes;
- Using best practice weed management strategies to prevent new weed species being introduced and to reduce the impacts of existing priority weeds;
- Guiding biodiverse plantings/revegetation projects within priority areas and best practice seed collection and revegetation methods;
- Rehabilitating and restoring degraded landscapes; and
- Preserving or enhancing existing remnant vegetation that serves as core areas (source areas) for biodiversity.

Regional NRM Bodies will also need to provide a risk analysis associated with carbon sequestration activities in their region, and to provide strategies to avoid and mitigate the indirect, direct and cumulative impacts of these activities. Potential impacts to biodiversity may include:

- Impacts on the availability of water to aquatic ecosystems, wetlands and native flora and fauna owing to surface water interception;
- Direct and indirect impacts associated with the use of fertilisers, pesticides and herbicides within revegetation or rehabilitation areas;
- Further fragmentation of the landscape by the introduction of species not native to the region or neighbouring native vegetation types.
- Introduction of weeds, pest species and pathogens;
- Conversion of existing native vegetation communities, for example converting open forest to closed forest communities; and
- Disturbance and/or degradation of habitat due to works associated with carbon sequestration activities, such as machinery into sensitive areas.

Production systems are areas used for agricultural activities and, may include areas identified as high productivity (prime) agricultural landscapes. The conversion of prime agricultural lands for CFI and Biodiversity Fund activities may result in:

- A reduction in agricultural production impacting on the community and consequent social and economic impacts relative to benefits;
- A reduction in economic opportunities associated with existing and future agricultural endeavours; and
- A reduction in livestock or cereal production impacting on food security.

Potential impacts to water resources associated with carbon bio-sequestration activities, such as revegetation, may include:

- Reduction and/or disruption of water availability for the environment and/or the community;
- Impacts on natural watersheds, such as changed flow direction/volume; and
- Reduction in water quality through increased sediment load and turbidity, introduction of fertilisers, pesticides and herbicides.

Again, all these areas of potential perverse impacts can be spatially defined within next generation NRM plans and associated information products. From this point, any areas where carbon farming activities might best be regulated can then be negotiated into appropriated State/ Commonwealth regulatory instruments where appropriate community support exists. The regulatory mechanism selected and progressed, however, depends on the specific issue at hand. Potential opportunities for such regulation to be negotiated could include:

- Areas subject to degradation under *Qld's Vegetation Management Act 1999*;
- Performance criteria or code assessable actions under the *Queensland Sustainable Planning Act 2009*; and
- Desired environmental outcomes in Regional Statutory Plans.

Mapping Carbon Potential and Economic Viability

While spatial datasets can provide rich information that can inform NRM planning at multiple scales, they are also effective communication tools for stakeholder engagement, conveying a lot of relevant information quickly and easily. Of particular value here will be spatial products that can identify the carbon sequestration and GGA abatement potential of landscape. Analysis in this regard can then also be directed towards determining the potential viability or otherwise or landholder or participation within regional aggregation or other approaches.

The National Carbon Accounting Toolbox (NCAT) prototype, for example, provides estimates of changes in emissions resulting from changed land management actions, such as forest establishment and harvesting, soil cultivation, fire management and fertiliser application. To this point, the NCAT has provided a nationally consistent mechanism for developing the carbon

forecasts for ecosystem restoration projects. Development of the next generation of the NCAT has commenced and other powerful analytical tools are also now emerging. This will include user-friendly (Google Earth style) and spatially explicit forecasts for carbon sequestration on lands suitable for reforestation. Over the next few years, comparisons of modelled predications and measured biomass across a range of Queensland ecosystems are likely to improve the accuracy of carbon forecasting.

The Fitzroy Pilot – Demonstrated Spatial Outputs

The Queensland Herbarium has led the CATER project to undertake a pilot project in central Queensland in 2012. The pilot developed spatial products to identify the biodiversity co-benefits of potential carbon sequestration through vegetation management activities.

A review of relevant regional spatial datasets identified the following key data sets:

- Biodiversity Assessment and Mapping Methodology (BAMM) as it identifies regional scale biodiversity corridors;
- Bare Ground Index (BGI) as it identifies areas of chronic low ground cover (regional to local scale);
- Water quality modelling (Sednet and ANNEX) as it identify areas where sediment and nutrients are mobilised and delivered to the Great Barrier Reef (regional and subcatchment scale); and
- Strategic Cropping Lands, which are coarsely mapped and criteria for paddock-scale determination established.

Identifying high priority biodiversity areas at the landscape (sub-regional) and property scales emerged as a key gap. Better information was required to establish where in the landscape vegetation was best restored for biodiversity outcomes. The project team (the Queensland Herbarium, Fitzroy Basin Association and Biocarbon) developed a biodiversity metric to address this need. The metric represents the relative value of restoring a site to pre-clearing native vegetation as a complement to remaining habitat (i.e. the metric is location specific). The highest priority areas represent where the greatest additional biodiversity benefits can be realised through changed vegetation management to restore native vegetation.

Figures 4 to 7 below demonstrate the biodiversity metric displayed from the scale of the regional NRM plan (Figure 4), to catchment scale (Figure 5), subcatchment (Figure 6) and local scale (Figure 7). Areas highlighted in red have identified priority areas on the edge of remnant vegetation in highly cleared areas and regional ecosystems with high habitat value. The scale-ability of the metric allows it to address the identified gap in prioritizing revegetation efforts at the landscape (sub-catchment and local scales) and at the property scale. This enables multiple mapping products to be developed that serve a functions ranging from broad-scale regional planning down to local site and engagement prioritisation tools.

Through this spatial analysis, the next NRM plan for the Fitzroy Basin (CQSS2030) will be incorporate significant changes to structure and content. The plan itself will be modular, allowing various levels of detail from strategic regional directions right down to issue specific operational strategies. The spatial prioritisation of carbon sequestration will be a significant new component of the new plan and part of a more substantial effort to support climate change mitigation and adaptation. CQSS2030 will support carbon sequestration activities by providing:

- Spatial priorities for carbon sequestration and biodiversity co-benefits (using the CATER project outputs);
- Spatial priorities for additional co-benefits and/or risks e.g. water quality, threatened species, salinity, water availability;
- Online access to spatial datasets for interrogation by regional stakeholders;

- Strategies to support landholder engagement through property scale information and support; and
- Monitoring, evaluation and reporting of the outcomes of carbon sequestration.

CATER – An Integrated Analysis

The CATER pilot project methodology applied in the Fitzroy was designed to prioritise investments in revegetation and vegetation management. The approach combines the following analyses:

- The pre-clearing extent of remnant vegetation by regional ecosystems;
- The local (=<20km radius of site) extent of existing vegetation;
- Neighbourhood habitat value and permeability (patchiness,connectivity); and
- The likelihood of threatened species distributions.

The intersection of these datasets identifies potential revegetation sites that historically supported a regional ecosystem that has been extensively cleared, and/or has little remnant vegetation within 20km, and/or are strongly connected to remaining high-value habitat, and/or are likely to support threatened species once restored. The metric was field tested by regional staff in the pilot area.

The metric is most applicable at the sub-catchment and property-level scale, appropriate to support targeting effort towards the aggregation of small parcels of restoration lands into a single carbon project with a more commercially viable critical mass. Having information relevant at the property-scale is critical because this is the scale where management decisions will be best made. For a land manager, the CATER spatial analysis, in combination with carbon sequestration potential, can provide information to support investment decisions. The CATER team are also developing management guidelines for the restoration of broad vegetation types (e.g. brigalow, eucalypt woodlands) for carbon and biodiversity benefits. Regional perspectives can be further incorporated by consideration of regional-scale corridors identified through the BAMM (Biodiversity Assessment and Mapping Methodology). Financial support for the ongoing development of the CATER project recently came to a close. The spatial datasets generated (for the whole of Queensland), however, will be available on the agency website early in 2013. These will include the biodiversity metric and carbon forecast datasets, as well as guidelines for managing regrowth for carbon and biodiversity benefits.

The CATER methodology has provided a clear demonstration of how spatial analysis can support prioritization for forest-based carbon farming, providing robust information relevant at the appropriate scales. These products are relevant for land managers, for project aggregators and brokers, and for investors. Unfortunately there currently is no commitment for the further development or refinement of these products (beyond making them available) at this time, though a real opportunity exists for regions to join resources to further progress their development.

The CATER methodology provides a spatial analysis that identifies the potential for terrestrial biodiversity benefits through the restoration of regional ecosystems and their habitat potential. A wider range of potential co-benefits exists and these are described earlier, as also are the potential risks associated with extensive landscape revegetation. The following list identifies some of the other datasets that could also be easily incorporated in an emerging spatial analysis to identify additional benefits or risks of revegetation activities.

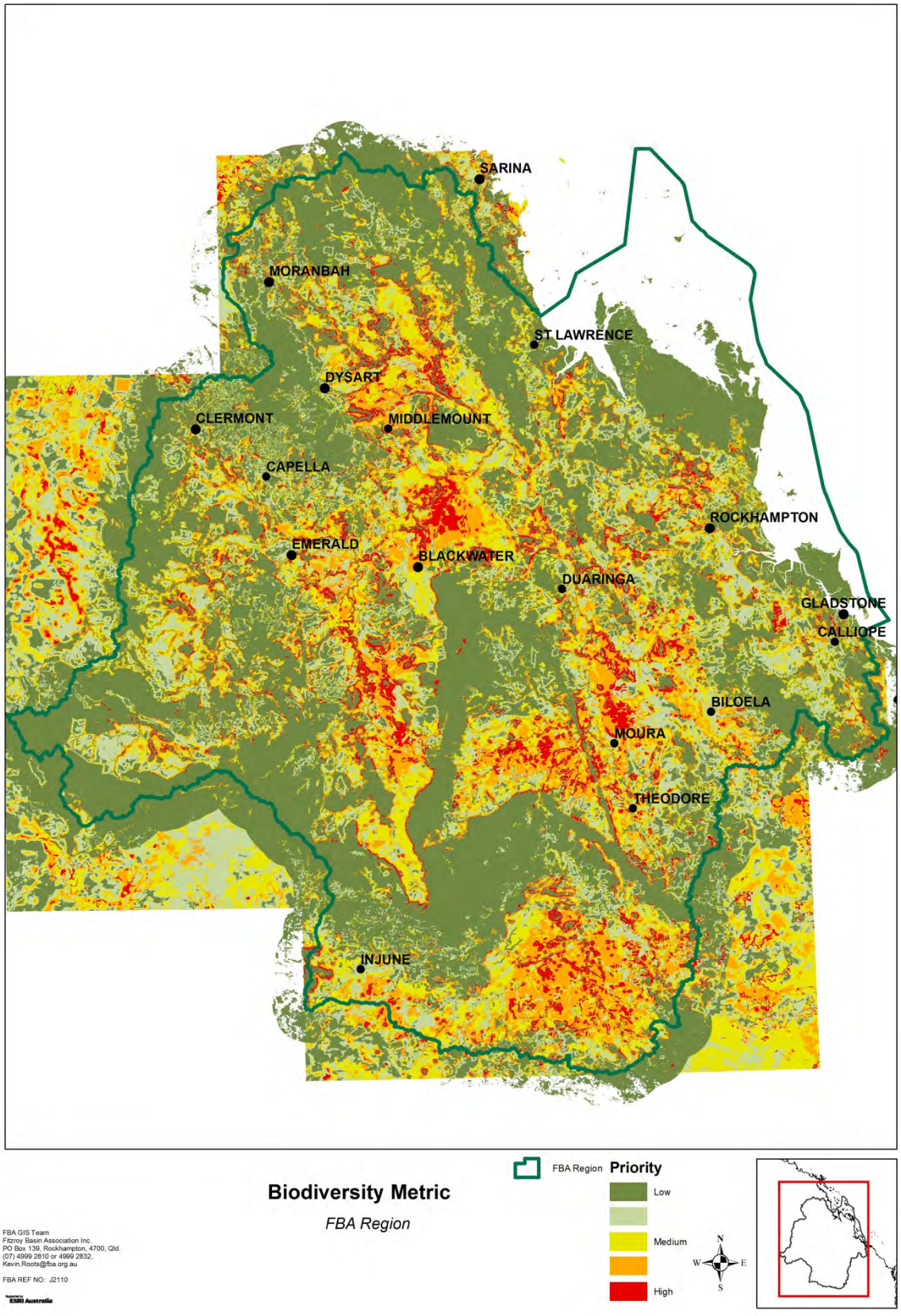

Figure 4: Biodiversity metric mapped at the regional scale (Central Queensland).

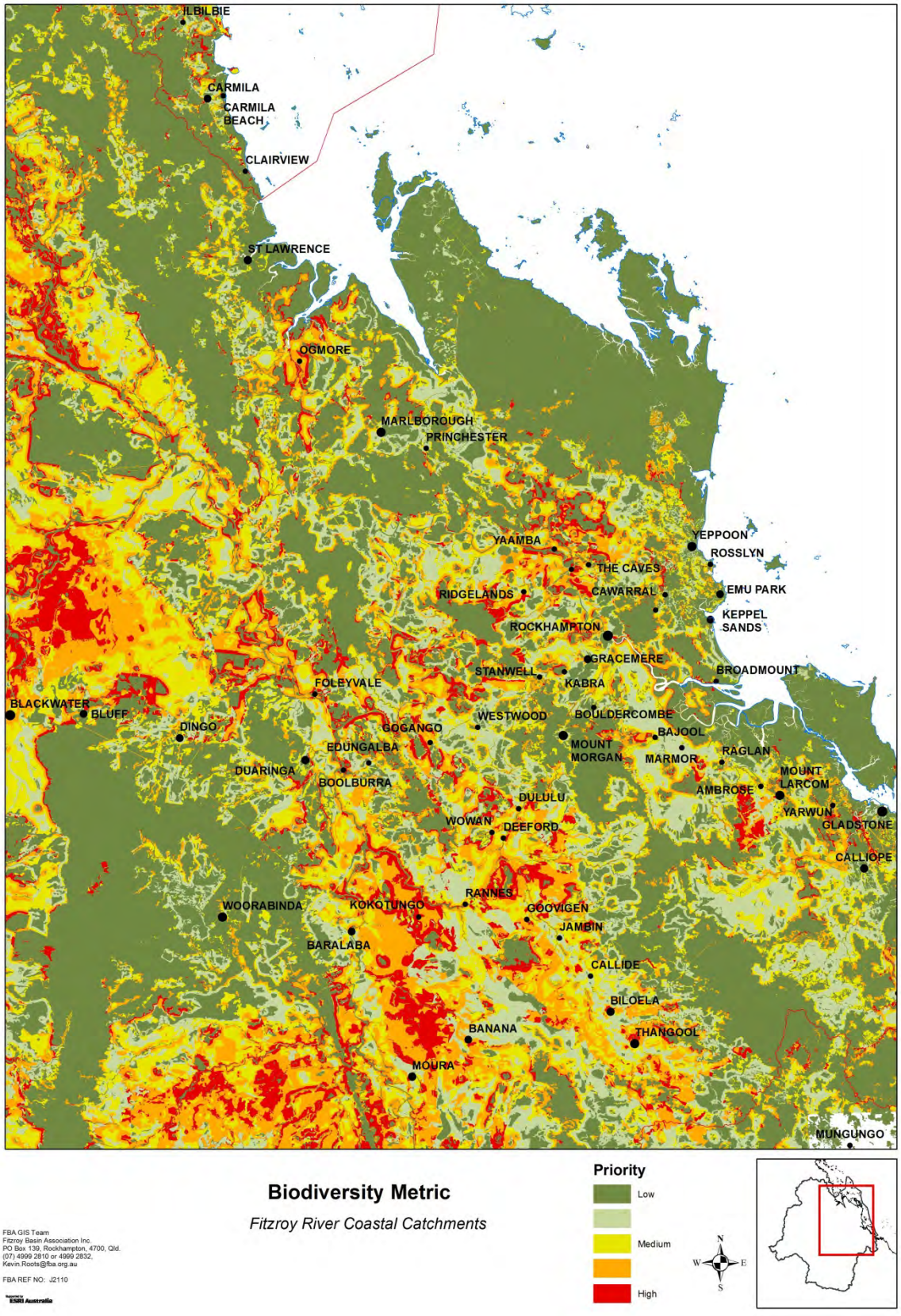

Figure 5: Biodiversity metric mapped at the catchment scale (lower Fitzroy).

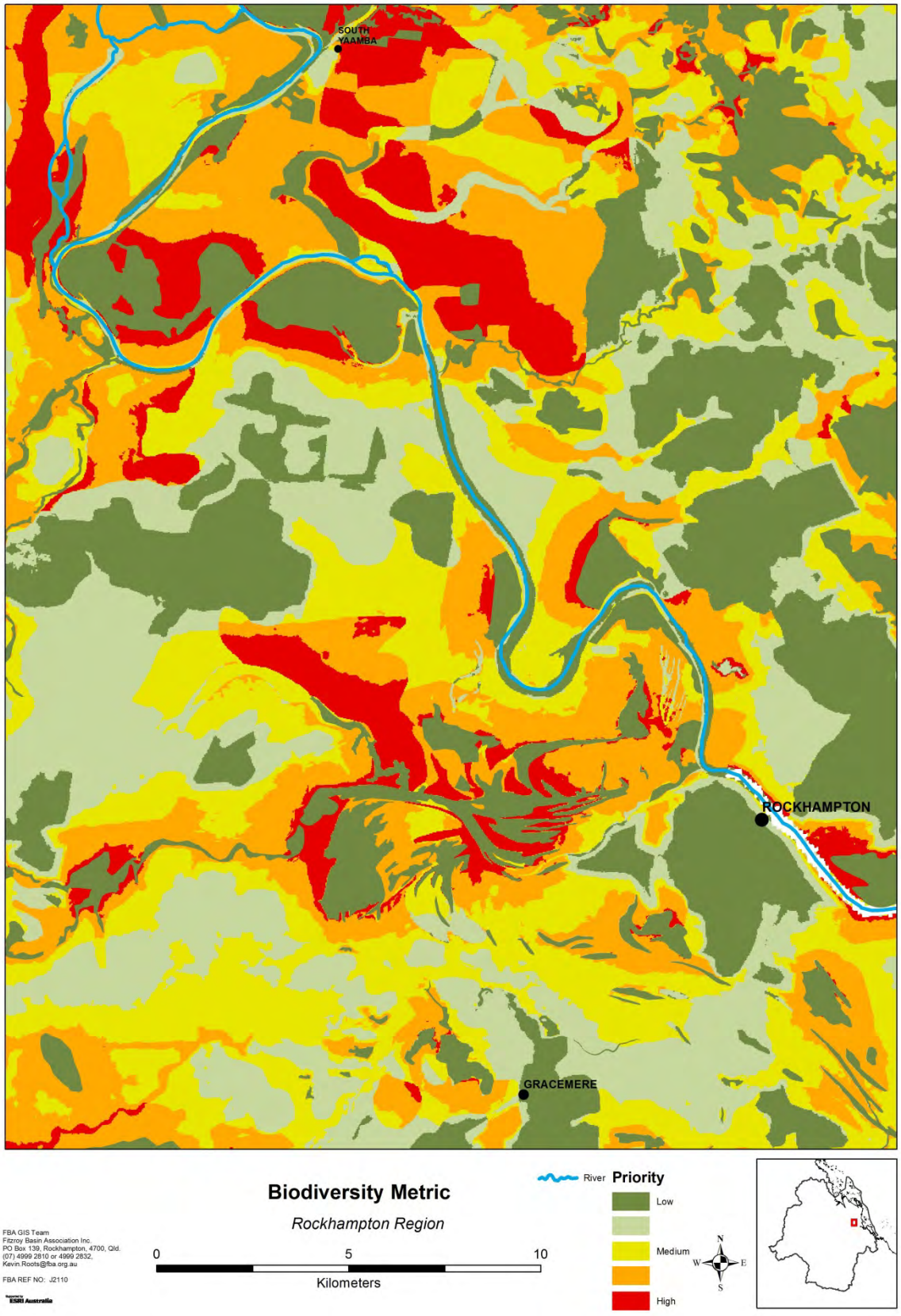

Figure 6: Biodiversity metric mapped at the subcatchment scale (Rockhampton).

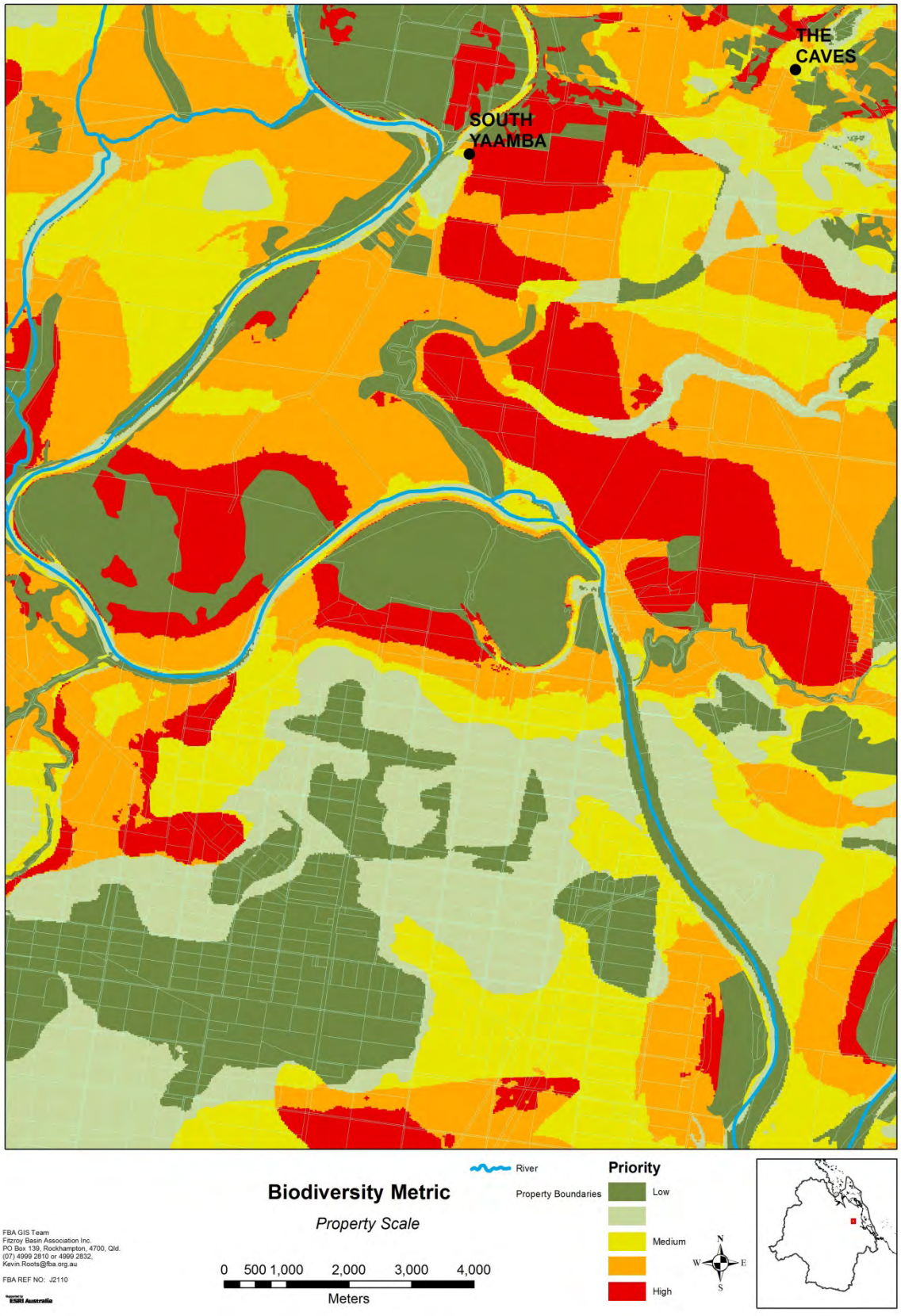

Figure 7: Biodiversity metric at the local scale (Alton Downs).

- Water quality:
  - Bare Ground Index (BGI) that can identify areas of chronic low ground cover and associated erosion potential in the Queensland rangelands; and
  - Sednet/ANNEX and other modelling of water quality loads exported from Great Barrier Reef catchments.

- Aquatic biodiversity:
  - AquaBAMM (Aquatic Biodiversity Assessment and Mapping Method) that assesses the conservation values of wetlands. This is available for most of the GBR, Queensland Murray-Darling and Southern Gulf catchments.

- Land degradation or degradation potential:
  - Salinity hazard maps developed for the Burdekin, Fitzroy, Queensland Murray-Darling, Burnett-Mary and parts of SEQ catchments.

- Perverse outcomes:
  - High-value strategic cropping lands identified across Queensland; and
  - Risks of perverse outcomes (e.g. water use, fire, weeds, monocultures, strategic cropping lands, etc.).

Note that this is a preliminary list provided only to indicate the potential for more sophisticated spatial analysis and communication of potential co-benefits and risks in the next generation of regional NRM plans. These datasets will have particular relevance for some regions and are not necessarily available in all regions.

In conclusion, additional and development of targetted spatial analysis methods remain a priority for the development and implementation of the next generation of NRM plans and the CFI. The CATER method provides a strong foundation, but needs further development and wider testing. Other spatial datasets should also be considered for inclusion, and this would best be done in a coordinated way across all Regional NRM Bodies across the nation. As well as the datasets outlined above, additional layers could be derived for other strategic benefits or hazards e.g. weed and fire risks. There are obvious benefits in this work being undertaken at a state-wide or multi-region scale to ensure a consistent approach that will best support the emerging carbon market.

WHAT LAND MANAGERS NEED TO KNOW ABOUT DEVELOPING GGA PRODUCTS

What Regional NRM Bodies Need to Know?

To support their land managers, Regional NRM Bodies need a clear understanding of some of the finer detail processes and compliance obligations with respect to methodologies, projects and project compliance under GGA schemes. In part, many of the details outlined in this following section have been adapted from the Verified Carbon Standard (VCS), as these have been adapted for schemes like the Carbon Farming Initiative.

Understanding Methodologies and Projects

A methodology represents a scientifically valid approach to the measurement of the benefit arising from particular types of GGA activities or land management practices. Some methodologies are being developed rapidly under the CFI as they have existing status in the historical context of the Kyoto Protocol. Others with require more scientific research before they could become reliable enough to be assessed. New methodologies are submitted to and assessed by the Domestic Offsets Integrity Committee (DOIC) and include a public comment period before approval.

Several research and management institutions, carbon suppliers, brokers and the Department of Climate Change and Energy Efficiency (DCCEE) and the Department of Agriculture, Fisheries and Forestry (DAFF) are working with industry to develop offset methodologies that have broad application. This work is being progressed through a number of methodology work streams, including:

- Reforestation, forest management and native forest protection;
- Savanna fire management;
- Landfill gas recovery;
- Manure management;
- Management of methane from livestock; and
- Soil carbon and biochar.

Approved methodologies (available for Environmental Plantings, Savanna fire management and for regrowth) are most relevant to this manual with significant implications for building landscape resilience. This part of the manual, however, is focussed particularly on what a landholder might need to know about the concept and detail of developing and securing a Project under the CFI. This landholder-based information is useful for regions to understand, regardless of whether the landholder is running their own project, or simply supplying GGA product into a wider aggregated carbon project. Projects are effectively proposed as GGA reduction proposals within the context of the CFI. Projects can only be developed and submitted to the Regulator if the proponent is registered and an Eligible Forest Entity. Project reports are assessed by the Regulator, leading to an ACCU being issued to the proponent.

Helping Landholders Determine That They Have a Product

Before starting the process of systems design for a project, an aggregator or an individual landholder needs to determine if there is a product or a suite of products, which can be traded in the carbon market. A starting point is to assess the agriculture, forestry and other land uses in relation to related practices or activities covered by methodologies under the CFI, and eventually the Australian ETS. Current potential activities include:

- Reforestation and revegetation;

- Reduced methane emissions from livestock;
- Reduced fertiliser emissions;
- Manure management;
- Reduced emissions or increased sequestration in agricultural soils;
- Savanna fire management;
- Avoided deforestation;
- Burning of stubble/crop residue; and
- Reduced emissions from rice cultivation.

If it can be determined that activities such as these may have the potential to sequester carbon or abate emissions, then the project proponent needs to determine if a baseline of historic emissions or sequestration can be determined and if the project will result in net carbon benefit through sequestration or reduced emissions.

The historic baseline timeline required may be a matter of years (such as 5-7 years for fertilizer usage reductions) or longer for savanna fire management (a period of 10 years) depending on the activity and the approved methodology.

Determining Eligibility of the Land and Project

To be able to trade carbon, projects must meet eligibility criteria set by the Australian Government. Key eligibility criteria include:

- Land title security;
- Project type eligibility;
- Approved methodology being available;
- Unique rights to the carbon or equivalent greenhouse gas abatement;
- Compliance with additionality tests (i.e. activity is on positive list); and
- Absence of legal impediments to the project proceeding.

On freehold land, many types of carbon sequestration activities are possible and permitted under the *Land Title Act 1994*. Rights are limited on leasehold land under the *Land Act 1994*, however, to **improvements**, which means any 'cultivation, garden, orchard or plantation' (Schedule 6, Land Act 1994, p452). Under the *Forestry Act 1959* (s61J), if the land is land held under the *Land Act 1994*, the owner may enter into an agreement about a natural resource product 'only if the natural resource product is owned by the owner as an **improvement**' within the meaning of the *Land Act 1994*. If the carbon sink forest is a plantation, then the holder of land under the *Land Act* (mostly leasehold land) may enter into an agreement with another person to transfer rights to carbon under a *profit a prendre* under the Act.

Helping to Determine the Project Boundary

The project boundary must be clearly and unambiguously defined. At a property scale, this may be a single stand of trees in a forest, or multiple stands on multiple Lots. At a regional scale, the aggregated Project Boundary will need to include the boundary encompassing all the property-level projects, with precise descriptions of each carbon sink or forest stand.

Determine the Carbon Pools

Carbon pools, for the purposes of this manual, include forest stands, whether planted as plantations or as environmental plantings, or regrowth forests. Both of these are dependent on methodologies approved by the Domestic Offset Integrity Committee.

Establish a Project Baseline

A project baseline is a detailed description of the activities and resultant emissions and sequestration that would have occurred in the project area if the project was not undertaken. Credits are issued for the difference between the project and the baseline. The details of how baselines are set are specified in methodologies. Assumptions about baselines are one of the most important criteria determining whether a particular methodology can be applied to a particular situation. It is common to assume that patterns over recent years, such as the last 5 to 10 years, would have continued unless a GGA project occurs. So the baseline is set by describing recent practice. Thorough documentation of land management practices and plans will generally be useful in establishing a project baseline.

The Elements of a Property-Scale Project

Any viable project would comprise a number of specific property-scale activities measured from a baseline, such as carbon sink forest stands, which can be aggregated into a single large project for marketing purposes. Each individual forest stand must be mapped, photographed and measured and this database must be retained for the life of the project. An example of a structure for the recording and retention of these elements is shown in Figure 8. All records may be subject to audit at a future date, and so must be archived in a secure location, and updated as new technology evolves.

Defining the Forest Stand

Forests eligible under the CFI will be subject to compliance with methodologies approved by the DOIC. Forest stands will need to have similar elements (for example 20% crown cover, 2 metres height, or have the potential to do so), and be capable of sequestering carbon for a long period. Essential elements of defining a forest stand include:

- Defining and plotting the edge of the forest stand with a GPS;
- Identifying the main tree species in the stand;
- Recording the infrastructure in and around the forest stand, including fences;
- Recording the year of establishment and treatments applied to the stand; and
- Mapping the forest stand in a GIS or by other means such as the CFI mapping tool developed as part of the CFI.

National Carbon Accounting Toolbox and FullCAM

The Australian Government models Australia's Greenhouse emissions and abatement at national scale through the National Carbon Accounting Tool (NCAT). NCAT can also be used to enable landholders to estimate the carbon sequestered in their Project activities, subject to certain caveats. It has been developed for forest and agricultural systems, with further developments and new activities to be incorporated as developed. The prototype Toolbox (2005) is available on CD from the Department of Climate Change and Energy Efficiency.

NCAT is evolving and a new version was due for release in 2011 (to cover planted forests). NCAT provided the back-end to reports published in the National Carbon Accounting System by the former Australian Greenhouse Office and later the Climate Change Department. It is the gateway to the modelling tool which models carbon in forests and agriculture. The Full Carbon

Accounting Model (FullCAM - Version 3.10) runs a series of incorporated models estimating the carbon sequestered by various forestry and agricultural activities.

The DCCEE has released a short help guide to the NCAT (2008), though users can gain their own experience in using FullCAM in real-life situations. FullCAM steps are not necessarily intuitive and there are limits to the number of options available when choosing model alternatives. Unless you are familiar with the operation and modelling of FullCAM, and have access to good data, you should use the default parameters and make adjustments as required. It is also worth noting that FullCAM runs on a Windows platform and will not run on the Apple platform.

The CFI saw the development of simple on-line tools that allow landholders to estimate and map their forests carbon farming initiatives and they directly to FullCAM. Appropriate online instructions and inputs can be found at http://ncat.climatechange.gov.au/cfirefor/. The main entry point is via the RMT (the Reforestation Modelling Tool). There is also a CFI mapping tool, which enables simple mapping of a carbon forest Project, and the Reforestation Abatement Calculator (RAC), which allows individual users to make final calculations of the project. The CFI mapping tool will produce maps, but these will not satisfy the requirements for registration on title or other mapping requirements for a carbon offsets project, so a Geographic Information System (GIS) will need to be used.

At present, the RMT is designed for single land title (or lot) activities. This makes aggregation (across more than one activity on more than one lot) difficult, although individual activities and carbon estimates can be aggregated in a spread-sheet just as with the outputs from the FullCAM program.

Field Measurements and Monitoring Plots

Field measurements, at the landscape or forest stand scale, are important for a number of reasons. Buyers may require verification that the forest stands or other activities actually sequester as much carbon as is claimed, and the growth rates are in accordance with predictions. Field measurements should provide the basis for improvements to models used in estimating carbon sequestration. Auditors may require evidence that the carbon sequestration claims and carbon credits sold are real. The Australian National Registry of Emissions Units (ANREU) may require proof of existence and claims.

The modelling outlined above is based on national scale data sources, such as Net Primary Productivity and Soils maps, mostly at a relatively coarse scale. The real accuracy of the models' predictions can be tested only with field data. Field measurements can be used to adjust the models to give more accurate estimates and predictions. They must be rigorous, and for them to be used to modify the models, they need to be peer-reviewed and published in the scientific literature. Ultimately, whether field measurements are required will depend upon the details of the CFI methodology being used.

Monitoring of plots, however, do not need to all be scientific research projects and some form of project monitoring is recommended. A monitoring plot on a landholder's property can be as simple as a steel post in the forest, a photo or two, and coordinates obtained from a GPS. Such simple monitoring points can build to more sophisticated monitoring systems later as a Project evolves. The main elements of a monitoring point are:

- Permanent markers (such as a steel posts);
- Coordinates obtained from a GPS;
- A map (or sketch plan at least);
- The date of establishment;
- Tree species planted, and number or proportions; and

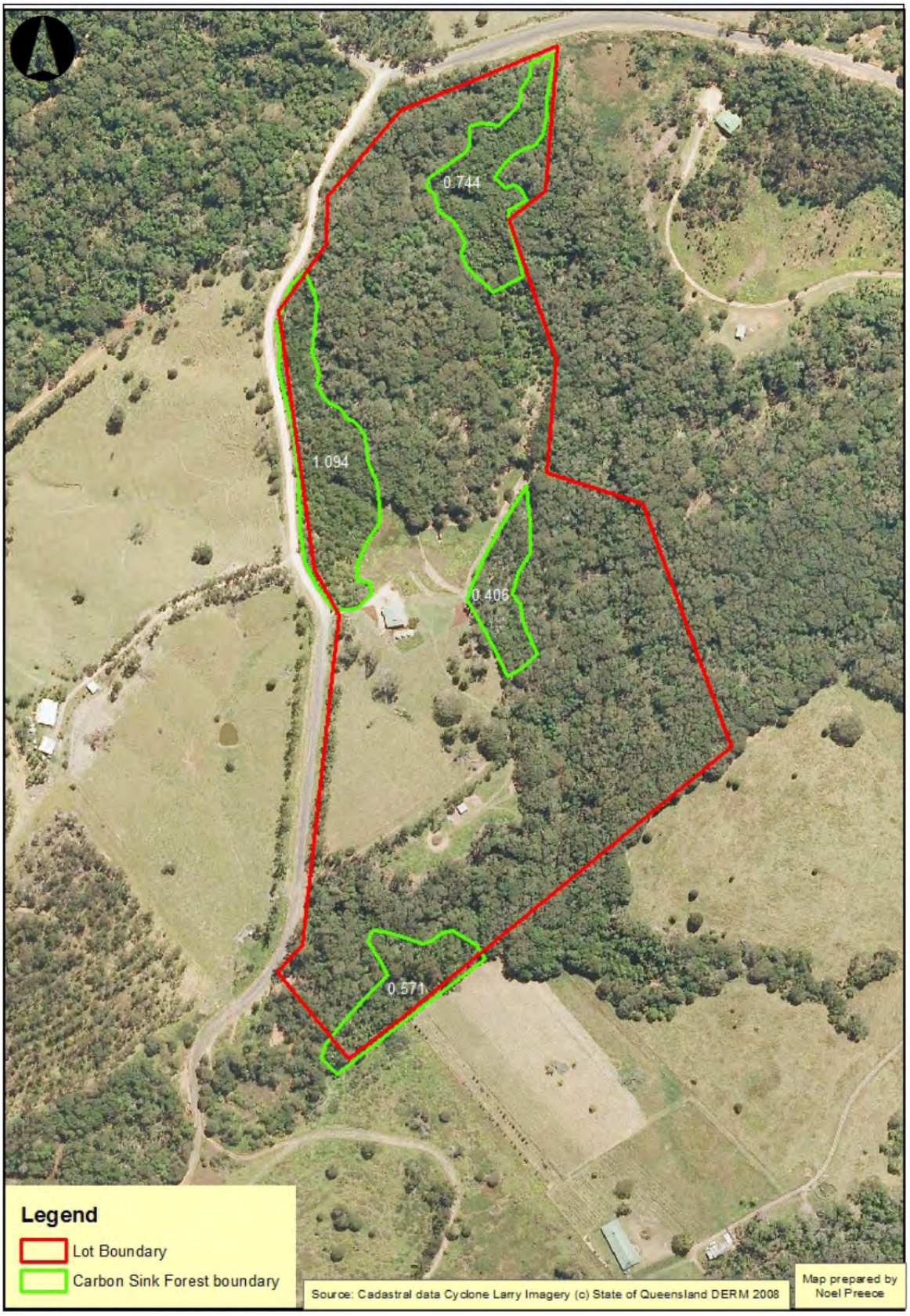

Figure 8: Forest stands on one lot, showing edges of planted areas and the area of planting in hectares. Where planted areas overlap the Cadastral boundary of the Lot, only the area within the Lot boundary will be counted.

- Records of observations at the time of the monitoring point being established.

More detailed information is required if landholders wish to improve estimates of the carbon sequestered over the estimates obtained from models such as FullCAM. Recent studies in the Wet Tropics region, for instance have shown that forest plantations and environmental plantings may sequester 40% more than the FullCAM model estimates (Preece *et al*. 2011). This would result in 40% more financial return to the landholder and investor.

Establishing plots which can be used for estimating carbon sequestration requires technical expertise. A number of guides on how to measure and record plot data have been published, including *Field Measurement Procedures for Carbon Accounting*, published as part of the Australian Government's Bush for Greenhouse program (Australian Greenhouse Office 2002). This provides a reasonably clear introduction to establishing and monitoring forest stands. For many project monitoring sites, these guidelines are possibly too complex.

Carbon Sequestration Rights and Contracts

Guidelines on legal, taxation and contractual issues for Carbon Sink Forests developed by the Australian Greenhouse Office (the pre-cursor to the Department of Climate Change) outline some of the elements of a contract between the producer of carbon sink forests and the buyer (Australian Greenhouse Office and Australian Government Solicitor 2005). These elements are summarised below to guide producers on what may be required, but have been amended in accordance with the CFI's legislative framework (as it stood in October 2011).

The CFI Handbook (http://www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/carbon-farming-initiative-handbook) identifies a range of options for involvement in the CFI. The most straightforward approach is for landholders to act as the Registered Offset Entity (ROE) for their project. Slightly more complex models include collaboration and cost sharing among groups of landholders, where each is the ROE for projects on their lands. The most complex arrangements involve transfer of carbon rights to a ROE that is not the landholder.

Most investors in GGA projects, such as project developers, aggregators, traders and brokers will have their own contracts, which landholders may be offered. If a landholder is going to run their own GGA project they need only deal directly with the CFI regulator. For more complex business models, sale contracts are required for the sale and purchase of carbon sequestration rights, and advantage both the buyer and the seller. The main elements are outlined below.

1. Scope of the contract

Under the Queensland *Forestry Act 1959*, carbon stored in a tree or vegetation or sequestered by a tree or vegetation on land is considered to be a natural resource product. Under this Act, the owner of the land and another person may enter an agreement about a natural resource product, such as a carbon sink forest. There are caveats to this, such as restrictions in relation to improvements on land held under the *Land Title Act 1994* and with respect to the rights of mortgagees.

The scope should include details such as the date of the agreement, names of parties to the agreement, the landowners, investors, holders of interests in the land, and details of companies and trading entities. The scope should also include recitals, which provides a clear statement to all parties about the agreement, how it came about, and what is it designed to achieve. Authorising legislation, state policies and Ministerial approval (if required) should also be detailed. A Term of Agreement needs to be specified, in order that both parties are clear about the time-frame of their rights and obligations. This will cover both the term of agreement for payments, but also obligations to maintain the forest stand in good condition.

2. Sale of carbon sequestration rights and payment arrangements

Both parties to the agreement need to have a clear understanding of the commodity being traded. This contract section should include a provision which formally records the transaction between the parties, reflecting the fact that that the landowner has agreed to sell and the purchaser has agreed to buy the carbon sequestration rights in the forest stand for the period of time specified in the agreement. There needs also to be a clear statement of how ownership of those rights can be transferred, even if it is not envisaged that this is intended to occur.

The contract needs to be clear on how payments are to be made, the value of those payments, and the timing of the payments. There may need to be a formula or means to adjust payments over time, or an agreement on how changes to payments can be made, as the price of carbon on the market will change over time. There are numerous ways of determining costs and payments. The farmer may choose to incur all costs of establishment and maintenance, or may negotiate with a buyer for them to pay for establishment and maintenance, or various combinations. Insurance costs for cover in the event of fire, drought, disease, storm, insect attack and accidental damage or destruction will need to be considered in the agreement. Factors such as the potential returns to the farmer need to be considered and include:

- Natural resource benefits (e.g. erosion, water quality or salinity control);
- Alternative uses and the opportunity costs of establishing a carbon sink forest;
- On-going costs such as preventing livestock access, fire protection, pest control, supplementary planting; and
- Profit margins and the acceptable discount rates over the commitment period.

There will also need to be a clear statement on the relinquishment of carbon credits should the seller decide to withdraw from a carbon maintenance obligation. Under the *Carbon Credits* (*Carbon Farming Initiative) Act 2011* (Part 7), Australian Carbon Credit Units may be required to be relinquished if:

(a) the issue of the units is attributable to the giving of false or misleading information; or
(b) the units were issued in relation to a sequestration offsets project, and the declaration of the sequestration offsets project as an eligible offsets project has been revoked; or
(c) the units were issued in relation to a sequestration offsets project, and there has been a complete or partial reversal of sequestration.

The maximum potential relinquishment period is 100 years or greater or less if specified in regulations. This means that carbon credits to the value of the amount issued for the carbon sequestration project for the lifetime of the project would have to be purchased at market rates to compensate for the loss of sequestered carbon. This places burdens on both the buyer and seller of the carbon credits.

3. Establishment and management of vegetation

There are a number of ways of establishing and managing vegetation that has been planted or managed to sequester carbon. The landholder may have established a plantation or encouraged regrowth, for instance, or an investor may approach a landholder to establish a plantation. Any arrangement made could be subject to an agreed *management plan* which sets out the parties' duties and obligations for the establishment, maintenance and monitoring of the project. Matters which should be addressed include:

- Responsibilities for establishment of the project;
- Costs of surveying and mapping the project;
- Details such as species to be used, stocking rates (trees per hectare), establishment and maintenance treatments;

- Use of timber for purposes other than carbon sequestration such as for firewood, poles and under what conditions;
- Fire management, weed management, vermin and pest control;
- Third-party management agreements, such as a forest manager;
- Provisions for compliance with mortgage obligations, rates, taxes and other charges in respect of the land; and
- Agreement about access to the land for project purposes.

The project boundary needs to be clearly identified and mapped. Mapping and survey requirements are discussed under the *profit a prendre* section below. Approvals may be required from a mortgagee or other person with an interest in the land before planting can commence, and before either party can enter into an agreement. This may include lending institutions, insurance companies, a statutory authority, and in some cases Ministerial approval. It may also include local or regional council approvals where the project may, for instance, be designated under a local planning control instrument of some kind.

Insurance of the project will also be required to protect both the investor and the landholder. Either a buyer or a seller may take out insurance, depending on a number of factors and the risks involved. Insurance matters should be considered with the advice of experts in insurance.

Harvesting of timber or timber products in an eligible offsets project may or may not be permissible under the future legislation and approved methodologies. The environmental plantings methodology envisaged limited use of fallen timber for fire wood, but no harvesting. Earlier iterations of Federal Government policies considered for-harvest and not-for-harvest forests, with different rules governing each in order to protect the sequestered carbon's integrity. Future methodologies may allow harvest of timber for certain purposes or under certain circumstances (such as thinning to improve tree growth), but will certainly require that all sequestered carbon is retained in a carbon sequestration forest. The management agreement should allow for these circumstances and allow for variations to the agreement subject to the methodologies, regulations and acts. If harvesting is envisaged, agreement needs to be reached on exactly how this is to be done, how the biomass extraction is to be calculated, and who has the rights to the timber, considering that it is also the sequestered carbon in a project.

Accounting for the carbon sequestered by the project needs to be considered in the contract. The methods used to determine sequestered carbon and CO_2-equivalent should be stated explicitly so that no confusion or disagreement arises during the term of the contract. The ownership of the carbon after the contract expires should also be stated, and this would normally be the landholder. Modelling using tools such as the FullCAM model provided in the National Carbon Accounting Toolbox can be used to model carbon sequestration rates. Caution is suggested in relying on the FullCAM model outputs as the model is still under development and under-estimates and over-estimates are known to occur (Preece *et al.* 2011). This is due partly to the underlying models used and the data on which the models are based. As the forest grows, monitoring is likely to be required in order to verify the modelled results with field data. Monitoring points should be established at the beginning of the project, and methods of monitoring established and agreed in the contract. A number of field methods are available and are discussed further in this manual. Auditors and investors are also likely to require independent verification of the carbon estimates and verification that the project exists in the form understood in the contract.

4. Rights and obligations

In addition to the allocation of responsibilities, the investor in a GGA project is likely to require the following additional rights:

- The right to deal with or sell the Carbon Sequestration Rights;
- A right of access to the site upon giving the land owner reasonable prior notice coupled with an obligation to protect the land owner's property when exercising this right of access; and
- A right to remedy in the event that the land owner fails to meet their obligations under the agreement (see Australian Greenhouse Office and Australian Government Solicitor 2005).

Landholders also have rights and obligations in any contract (see Australian Greenhouse Office and Australian Government Solicitor 2005). These may include:

- An obligation to promptly pay applicable rates/taxes in respect of the property;
- A right to remedy in the event that the investor failed to meet their obligations under any agreement or attached Management Plan;
- A right to refuse access unless prior notice has been given or the person has been authorised to access the site by the investor;
- An obligation not to cut or remove any vegetation from the agreed site unless otherwise agreed in the management plan or under a harvesting clause; and
- An obligation to comply with any notices be issued in relation to their land.

Assignment or transfer of the rights and obligations under an agreement should be considered (Australian Greenhouse Office and Australian Government Solicitor 2005). For instance, the buyer may be a broker or a trader and may wish or be required to transfer negotiated rights to a company that intends to offset their emissions through carbon sequestration. The landholder may seek to require their consent before a transfer or assignment is made, or the investor may seek to avoid or remove such a condition. The contract should state clearly what is agreed in the contract in relation to assignment or transfer. There may also be circumstances in which the investor may seek to obtain rights to give consent or to be notified of a sale of change in use of the property on which the project lies.

While the landholder usually has rights to sell the land, there are a number of caveats, such as mortgages, third-party interests and covenants that may limit or modify these rights. As the carbon sequestration rights on a parcel must be registered on title as a *profit a prendre*, the carbon sequestration rights become one such caveat. There may be situations during the life of the project where the landholder or investor decides to engage a subcontractor to carry out certain works. A forest manager or a plantation company might be considered to provide a better outcome for investors and landholders. A right to subcontract should be written into the agreement, usually with the consent of the other party. Subcontracting does not usually absolve any party to the agreement of their rights and obligations, and whoever lets the subcontract should assume responsibility for the subcontractor.

A clause on relationships between the parties and indemnities is also useful to:

- Seek to make it clear that, unless expressly provided for in the actual agreement, neither party has any authority to act as the agent of or to otherwise bind or commit the other party. This avoids the possibility of one party to the agreement seeking to in some way to represent themselves as the agent or representative of the other party; and
- Flag indemnity from each party in favour of the other against any loss, damage, claim or expense that the other party may suffer as a result of the negligent, wilful or fraudulent act or omission of the first party.

5. Dealings with the land

Protection of any carbon sink forest is required for the life of the project. This is covered to some degree through the *profit a prendre* process, as the *profit a prendre* is registered on title. This

means that if or when the landholder decides to sell the property on which the project lies, a potential purchaser will be notified of the agreement for assignment of carbon sequestration rights. There remains, however, a need for the investor to protect their interests under such circumstances. How this is dealt with will depend on the negotiations between the landholder and the investor. There may be, for instance, a clause to prevent outright sale of the land without first notifying the investor/owner of the transferred carbon rights of the potential sale, or a clause to seek to preserve the investor's rights under the agreement.

These caveats could effectively restrict the landholder from dealing with their property without referring to the investor, so as to protect the investor's interests in the land. While a clause to this effect is related to the registration of carbon sequestration rights on title, 'unless the restriction on disposal without consent is itself incorporated into the actual agreement, registration of the agreement would generally not prevent disposal from occurring' (Australian Greenhouse Office & Australian Government Solicitor 2005).

The only means by which carbon sequestration rights can be assigned in Qld are through the provisions of the *Land Title Act*, the *Forestry Act* and related Acts, including the *Land Act*. These are discussed in detail in the next section.

6. Termination and dispute

Any contract should specify the situations under which the contract can be terminated and the means to resolve any dispute. Circumstances under which the contract may be terminated include:

- Agreement between the parties;
- Default of either party or insolvency;
- Failure to register carbon sequestration rights;
- Termination for convenience, such as when government policies and laws change over time; and
- Where there has been a force majeure event (and extraordinary event beyond the control of either of the parties to a contract).

The parties would need to clarify how the financial interests under the agreement should be resolved if termination does occur. Consideration could be made of the profits and loss, maturity of the vegetation, the amount of carbon sequestered, and other factors. Buy-back by the landholder, such as in the form of buying ACCUs to compensate for the carbon lost, could also be considered in the agreement. The consequences of termination need also to be considered. These may include:

- Although the agreement is terminated it is possible that each party may have accrued certain rights under the agreement that need to be preserved so as to enable possible future enforcement or recovery action to be taken;
- Clarification that termination of itself does not necessarily affect any right or claim that arises on, or has arisen before, termination;
- Making it clear that termination does not affect any provision of the agreement intended to survive termination (e.g. a right to salvage the vegetation, an obligation to remove improvements or to restore the site, or an obligation to maintain confidentiality or *certain records for an agreed time period* (Australian Greenhouse Office & Australian Government Solicitor 2005).

Disputes may arise between parties to the agreement during the life of the project and should be addressed clearly in the contract. Arbitration by an external party may be needed in some situations. The Institute of Arbitrators and Mediators, Qld Branch, can provide a means of arbitration on contracts. Technical expertise may be required for some special situations, such as

carbon sequestration measurement and estimation. The contract should outline how disputes should be resolved.

7. Common contract clauses

Warranties are an important aspect of understanding between parties in a negotiated contract. Each party is expected to fully and accurately represent themselves. Some considerations that should be made in preparing or reviewing a contract are:

- Ensuring both parties make representations to each other, for instance about their status and capacity to enter into the agreement, their bona fides, their intentions, etc.;
- Including in the agreement warranties by each party to the other about the accuracy of any representations of factors leading to the agreement. A breach of warranty could give rise to a right to seek damages from the party in breach in the event that the party placing reliance on the warranty suffers a loss. Sometimes agreements might also provide for one party to indemnify the other for any loss or damage suffered as a result of a breach of warranty. Consideration could also be given to placing a "cap" on liability for a breach of warranty (AGO & Australian Government Solicitor 2005).

Costs and stamp duty are usually paid for by the party which incurs them, but this may be specified in the contract. Costs such as Transfer Duty for the value of the traded carbon sequestration rights will need to be calculated and paid by one or other party. Transfer Duty costs are detailed in the section below. The agreement should be lodged with the Land Titles Office, as part of the *profit a prendre* process. This provides protection to both parties to the agreement. The Land Title Practice Manual (http://www.derm.qld.gov.au/property/titles/ltpm.html) provides guidance on how to register an agreement on title. Further information can be sought from the Titles Registries located in a number of major towns across Queensland.

It may also be prudent for the agreement to require the landholder to seek the consent of any person or organisation to which the land may be mortgaged. Reasons for this include the fact that the land owner may inadvertently breach the terms of the mortgage if they enters into an agreement. If the mortgagee is on notice under the agreement they will also not be able to act in a manner Inconsistent with the investor's rights (AGO & Australian Government Solicitor 2005).

The contract should specify where notices should be sent, who they are to be sent to, whether they are to be in writing or other form, and the time frame in which a notice is deemed to be received. Usually amendments will need to be agreed by both parties, specified in writing and signed by both parties. Situations may arise where rights of either party to the agreement may be compromised. The contract should specify how these are to be dealt with. Common situations may include:

- Where a party delays in exercising a right under the agreement;
- Where a party exercises only part of an agreement; and
- Where a party intends to waive a right.

The parties also need to determine how much of the agreement and under what circumstances the terms of the agreement are confidential. Disclosure may be affected by a number of factors, such as legal requirements, and these also must be taken into account. Governing law and jurisdiction for these contracts will most likely be the Queensland jurisdiction, but may include some Federal jurisdiction, especially as the agreement will be framed in terms of national carbon trading legislation.

8. Profit a prendre processes

Landholders should refer here to the document "Assigning Carbon rights on Land Title in Queensland Management Plans". This has not been amended to reflect changes to carbon sequestration rights introduced in the *Qld Waste Reduction and Recycling Bill 2011*. In Qld, carbon sequestration rights are defined as 'natural resource products' under the *Forestry Act 1959*, Section 61J as amended by the *Forestry and Land Title Amendment Act 2001*. The definition is that a **natural resource** product includes the following:

(a) all parts of a tree or vegetation, whether alive or dead, including parts below the ground;
(b) carbon stored in a tree or vegetation; and
(c) carbon sequestration by a tree or vegetation.

Carbon sequestration rights are dutiable property and require a *profit a prendre* to assign the rights to a third party. To assign the rights to carbon sequestered in forests on Freehold land in Qld, a *profit a prendre* must be registered on the land title (on form 29 under the *Land Title Act 1994*) in accordance with Section 97E. This is an on-line form (http://www.derm.qld.gov.au/forms/index.html).

To register a *profit a prendre* for the purposes of a carbon sink forest, the Registrar of Titles in Qld provides several options. The Land Title Practice Manual (QDERM 2010) describes the requirements. A plan of survey or explanatory format plan is required if the interest (i.e. the transfer of existing rights – that is carbon sequestration rights) affects *part of a lot*. If the *profit a prendre* is for the whole of a lot, no plan is required. These requirements are explained below:

- The **profit a prendre can be submitted over the whole Lot.** If submitted over a whole of a Lot, no plan of survey nor explanatory format plan is required. It is not acceptable, however, under the registration rules, to be more precise about which part of the Lot the *profit a prendre* applies to, even though the schedule may state it is for the purposes of a carbon sink forest. There is no mechanism, for example, to state that the *profit a prendre* is 'for the forest on the south-west corner, between the creek and the fence' of the Lot); in other words, the *profit a prendre* applies to the whole Lot. The simplest approach is for the declaration of the rights over a whole Lot or group of Lots via a declaration on Form 20 (attached to the *profit a prendre)*, stating that the carbon rights over a whole lot or lots have been assigned. The simple method may not be suitable for some types of sequestration activities;
- **The profit a prendre can be submitted over part of a Lot and if it is a simple shape.** An Explanatory Plan (or survey plan) may be submitted with the *profit a prendre* in accordance with Direction 19 of the *Registrar of Titles Directions for the Preparation of Plans, Version 3.1*. The Registrar will need to be satisfied that the plan meets normal plan drafting standards; and
- **The profit a prendre can be submitted over part of a Lot and if it is a complex shape:** The area must be surveyed and submitted by a licensed surveyor or other person.

Alternatives to the registration of rights to carbon on the land have been considered, but are limited in application and usefulness in most circumstances. These include:

- Administrative Advice on Title (such as for a Nature Refuge). This is not very workable as an Administrative Advice is applied over the whole Lot, and defined by location. Administrative Advice does not define an 'interest' in the land and could be used only if legislation enabled its use for carbon rights;
- 'Off the register' agreements can lease part of a property (or Lot) but they are not registered on title and do not register an interest in the land. They also do not have the benefit of indefeasibility, and do not travel with the land. They would not comply with Federal carbon trading legislation; and
- A Queensland 'Register of Carbon Trading Interests' could be developed and implemented, but such would not necessarily fulfil other requirements of transactions

related to carbon trading rights, especially between those of a land owner and a carbon trader or aggregator as the rights would not necessarily be attached to title and be indefeasible.

Registration on title of legal rights to carbon through a *profit a prendre* appears to be the only means of substantiating legal rights, for the purposes of the *Income Tax Assessment Act 1997*. It is likely to be a requirement under both the CFI and any future Federal ETS as the DCCEE requires this substantiation.

9. Costs of registration

Costs of registering interests in carbon through the *Land Title Act 1994* include submission of Form 29 (costs $127.90) and contracting a cadastral surveyor to prepare an Explanatory Plan. To register a non-complex stand of forest on title, for instance, through a *profit a prendre,* would cost $500-$1000 or more if complex. Contracting a licensed surveyor to prepare a survey plan could cost $5,000 to $10,000 or more. Hence, the cost of preparing a *profit a prendre* can be quite onerous, considering the potential returns envisaged from selling carbon rights. For instance, at $10 per tonne of CO_2-equivalent, a cumulative return from CO_2-e sales might be in the order of $120 for one hectare of forest in the third year after planting for the first three years of growth (based on a rate of growth of 3.28 tC/ha (~12 t CO_2-e) over three years in a wet tropics forest, as modelled with the NCAT for a *Eucalyptus pilularis* planting). This return would not cover the costs of registering the *profit a prendre*, let alone the costs of survey and plan preparation, which could be in the thousands of dollars.

10. Transfer duty

Each transaction of a commodity, such as carbon rights, attracts transfer duty under the *Duties Act 2001*. In Queensland, transfer duty must be paid on dutiable transactions for property, including an existing right to commodities such as carbon, and is calculated on the value of the property. Rates are calculated according to the value of the traded commodity and published on the Qld Government website (https://www.osr.qld.gov.au/duties/about-duties/rates-of-duty.shtml).

Dutiable property, as defined in the *Duties Act* and interpreted on the Queensland Treasury website (http://www.osr.qld.gov.au/duties/glossary.shtml), is property that is involved in a dutiable transaction in Queensland. When dutiable property is bought or sold, people are liable to pay duty under the Act. Calculating the value of the carbon rights requires calculation of the carbon sequestered over the period of the commitment to sequestering carbon on the land or abating emissions. Therefore, the amount of carbon sequestered needs to be modelled using NCAT, the Reforestation Modelling Tool or other calculator approved in a methodology and calculated over the crediting period. As it is not possible to calculate the value of the carbon rights beyond the *crediting periods* set by the Federal Government, the calculation period is limited to the *crediting period* (that is 7, 15 or 20 years).

The carbon price in tonnes of CO_2-equivalent may be the value paid to the landholder, or the landholder may receive only a proportion of the value. If the landholder, for instance, sells the sequestered carbon to a business, or assigns the rights to an aggregator, they may receive say 50% of the going price of carbon. At the current transfer duty rates, duty would not be payable until the landholder received over $17.10 p.a for the sequestered carbon.

A *profit a prendre* is a dutiable instrument under the *Duties Act* 2001. As noted in the Land Title Practice Manual, section 29-2100, when a *profit a prendre* is presented for registration, evidence of the payment of transfer duty is required either:

- By impressed duty by the Office of State Revenue; or

- Stamped as duty paid by an authorised self assessor.

This requirement applies even if the dutiable value is less than the amount attracting duty ($5,000). A duty stamp is required on the *profit a prendre* form in all cases, otherwise it will be returned to the title holder and attract an additional requisition fee.

11. Carbon sink forest tax concession

Since 1 July 2007, it has been possible to claim a deduction for expenditure incurred for the establishment of trees in a carbon sink forest under Subdivision 40-J of the *Income Tax Assessment Act* 1997. To register a Carbon Sink Forest to claim a tax deduction for the costs of establishing trees, the Australian Taxation Office requires details or copies of documentation demonstrating how legal rights concerning carbon sequestration in carbon sink forests were registered on the land title in accordance with State and Territory Government legislation.

From 1 July 2012 onwards, a deduction may be claimed for costs incurred in establishing trees for a carbon sink forest from the start of the income year in which the trees are established and ending 14 years and 105 days later at a write-off rate of 7%. The tax concession also applies for the period 1 July 2007 to 30 June 2012.

12. Management plan

Under the contractual agreement between parties, a management plan should spell out the duties and obligations of each party for the management of the forest stand.

What Regional NRM Bodies Can Do to Help?

While complex and detailed, the above gives Regional NRM Bodies a sense of the sort of information that landholders will need to be familiar with before considering developing a project under the CFI, or before even thinking about participating in some form of aggregated scheme. With this detail in mind, there are several things that Regional NRM Bodies can do to help secure greater landscape resilience through the structured roll out of the scheme. Some of these actions include:

- Ensuring there is realistic information available to landholders in the region, tailored to regional needs, about their potential involvement in the CFI or equivalent ecosystem service arrangements;
- Ensuring brokers and aggregators coming into the region are adequately communicating with landholders and delivering the best possible deals both to landholders and to the progression of resilience in the landscape;
- Targeting high priority parts of the landscape to facilitate information delivery and effective brokerage or aggregation;
- Modelling possible uptake of projects using different methodologies, based on genuine assumptions about costs and participation requirements; and
- Advocating policy and procedural changes to improve the efficiency and reducing the costs of land holder participation in the scheme.

AGGREGATING COMMODITIES TO ACHIEVE MARKETABLE LANDSCAPE PRODUCTS

What Regional NRM Bodies Need to Know?

Much information about the CFI and GGA programs are focussed at the property level. Much effort is carbon sequestration activities, however, is likely to based on aggregation of property scale activities to secure a greater critical mass of GGA at catchment, regional, cross-regional, State or even national scales. Aggregation at regional scale, aligned with the strategic priorities of regional NRM plans, makes practical sense and creates great market opportunities. New rules under the CFI state that projects must take account of regional natural resource management plans. Consequently, NRM plans can guide the aggregation of property level GGA products into high value, multi-benefit aggregated products (van Oosterzee *et al*. 2011). Carbon sequestration rights (CSRs) required for the trade of carbon credits can be bought from carbon trading companies that aggregate product.

Once purchased, the obligations/liabilities for carbon sequestration rights are transferred to an aggregator, trader or buyer. If it is found (via monitoring or auditing) that claimed ACCUs are more than occur on the ground, then the liability for the short-fall falls on the owner of the carbon sequestration rights. They would have to buy back credits from the market at the going price, having retired the credits when they were first traded. Some companies who decide to offset some of their emissions require that they obtain the carbon sequestration rights at the time of purchase of the ACCUs. They are then directly liable for the CSRs and will hold to account a landholder who has sold the CSRs to them. As such, an important decision needs to be made by aggregators, traders and buyers as to who holds the CSRs.

What Regions Can Do to Maximise Landscape Resilience?

Again, given the potential benefits of aggregation already outlined, there are several things that regions can do to support effective aggregation within the landscape. Some are much the same as those things outlined at the end of the landholder-focussed section. Others, however, are outlined in more detail below.

Facilitating Effective Aggregation

Regional NRM Bodies can't themselves be aggregators or brokers in the carbon or GGA market, but they do have a strong public good role in seeking to help the market operate effectively. As mentioned above, these roles can range from ensuring landholders are well informed about options available to them with regard to their involvement in the market and ensuring bona-fide brokers and aggregators are able to develop projects that deliver significant regional benefit.

In particular, regions can play a very proactive role in identifying these parts of the landscape that would particularly lend themselves to aggregation approaches and particularly when aggregation will deliver significant landscape benefits consistent with their regional NRM plans. Making the connections, brokering relationships and ensuring the system works effectively is at the heart of the emerging opportunity.

Finally, the opportunity to develop cross-regional projects or products of substantial size and complexity are worth considering to achieve a critical tradeable mass of ACCUs and potentially to reduce the total transaction costs at landholder level. Examples could include reef-wide products, entire ecosystem-type products (e.g. brigalow-based avoided deforestation or regrowth projects), or even state wide products based on particular practices (e.g. mangrove restoration).

Science Partnerships and Resources to Support Regional Aggregation

Science and researchers have an important role at regional scale in building a strong project narrative behind a regional or cross-regional aggregation case. Indeed, local, regionally-based science providers often have the most relevant knowledge for effective project and methodology development as the relevant relationships between NRM Bodies, landholders and researchers are already in place. Regional researchers are also more likely to know how certain ecosystems and carbon stocks will respond under certain management practices and under certain climate change scenarios. The cluster-based approach to supporting the next generation of regional NRM planning under Stream 2 investment will help build these relationships. Important national or state-scale science information of importance in the development of regional scale aggregation, however, will always remain important and should be consistently considered. These include the following in Table 9.

Table 9: Key examples of national and state-wide science efforts that might help inform the regional aggregation of carbon for landscape scale outcomes.

Research Area	**Key Contacts**
National Scale	
Terrestrial Ecosystem Research Network: A wide range of relevant terrestrial ecosystem information.	Suzanne Long (s.long5@uq.edu.au)
Continental Scale Satellite Images in Time Series: New continental-scale satellite time series images relevant to estimating biomass, forest cover and fire impact on carbon stocks in Australia.	Alex Held (alex.held@csiro.au)
Environmental Fluxes: Near-real-time measurement of local, national and global fluxes of energy, water and greenhouse gases, and the best available estimates of national carbon uptake and water use.	Helen Cleugh (helen.cleugh@csiro.au)
Evolution of the National Soil Carbon Map: Progression towards national scale information concerning soil carbon.	Mike Grundy (mike.grundy@csiro.au)
Soil Carbon in Rangelands: A nationally accepted field survey methodology that is generating estimates of standing and soil carbon stocks in Australian rangelands	Nikki Thurgate (nikki.thurgate@adelaide.edu.au)
The EucFACE Experiment: Tracking carbon storage in an Australian native woodland under CO_2 enrichment.	David Ellsworth (d.ellsworth@uws.edu.au)
Blue Carbon: Emerging science in respect to carbon sequestration in wetland and mangrove ecosystems.	Andy Steven (andy.steven@csiro.au)
State Scale:	
Carbon and Terrestrial Ecosystem Research: Linking carbon sequestration opportunities to vegetation types and vegetation management guidelines.	Don Butler (Don.Butler@science.dsitia.qld.gov.au)
QLUMP Data: Queensland's land use mapping program.	

Ensuring Good CFI Engagement Mechanisms Are In Place

Another key role for Regional NRM Bodies is ensuring that there are effective regional engagement mechanisms in place regarding the CFI. These engagement activities could range from higher level partnership building to landholder awareness raising. The engagement

strategy pursued will depend of the role each region sees themselves playing in the roll out of the scheme.

To ensure the appropriate skills are in place, during 2013, the Department of Climate Change and Energy Efficiency contracted AgriFood Skills Australia to develop a national accredited Vocational Education and Training qualification in carbon farming as part of the Carbon Farming Skills Program. The aim of the qualification has been to provide people with the skills and knowledge necessary to give accurate advice to landholders and other stakeholders about participation in the CFI and to develop and implement compliant CFI projects. AgriFood Skills Australia has also released for public consultation a draft of the units of competency that will be addressed by the qualification. The consultation material is available at: http://www.agrifoodskills.net.au/?page=CarbonFarming.

Well aggregated GGA products have the potential to draw significant investment into regions to progress key targets envisaged within regional NRM plans. As such, one of the key roles of Regional NRM Bodies will be ensure high quality brokers or aggregators are seeking to work in your region, and that these aggregators are focussed in securing multiple landscape outcomes and maximising the economic and social benefits of landholders participating in any aggregated project.

The Australian Government also recently invited comments on a proposed national accreditation scheme for carbon service providers operating under the CFI. The aim of the scheme is to make it easier for regions and landholders to identify appropriately qualified service providers such as aggregators. Comments are being sought on key elements such as to whether participation should be voluntary or mandatory; whether coverage of the scheme should be broader than project developers and agents; and the proposed criteria for accreditation. The *Carbon Farming Skills: Accreditation Scheme for Carbon Farming Initiative Service Providers - Public Consultation Paper* is available at:

http://www.climatechange.gov.au/reducing-carbon/land-sector-measures/carbon-farming-skills-program/accreditation-scheme-cfi-service-providers-september-2012

Quality Control and External Auditing Objectives

Project quality control is the key to successful aggregation and it is important for Region's to be aware of the things aggregators should know about it. Quality control is integral to the management of carbon sequestration and mitigation projects, be they individual or aggregated projects. Accountability is a cornerstone in the management of carbon sequestration commitment periods, so quality systems need to be established at the outset. Project proponents and aggregators need to ensure quality control is addressed so liabilities and risks are reduced to acceptable levels. Individual forest owners need to ensure that all aspects of their projects on their properties are accountable and verifiable so that they do not become liable at some later stage for poor record keeping or other project quality control aspects.

Project proponents and aggregators are likely to prepare a Quality Plan that seek to ensure that carbon sequestration providers comply with quality control requirements. These are likely also to be included in a contract between parties. The guidelines outlined here were developed to address those matters identified in the IPCC Guidelines for National Greenhouse Gas Inventories (2006) and follows the format of *AS/NZS ISO 10005:2006 Quality management systems - Guidelines for quality plans for structure and content*. The IPCC Guidelines were intended for national inventories but can be used at the sub-national level.

Quality control, quality certification and verification have been defined in the IPCC Guidelines (2006). *Quality Control* (QC) as a system of routine technical activities to assess and maintain the

quality of the carbon stock inventory as it is being compiled. It is performed by personnel compiling the inventory. The QC system is designed to:

1. Provide routine and consistent checks to ensure data integrity, correctness, and completeness;
2. Identify and address errors and omissions; and
3. Document and archive inventory material and record all QC activities.

QC activities include general methods such as accuracy checks on data acquisition and calculations, and the use of approved standardised procedures for emission and removal calculations, measurements, estimating uncertainties, archiving information and reporting. QC activities also include technical reviews of categories, activity data, emission factors, other estimation parameters and methods.

Quality Assurance (QA) is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. Reviews, preferably by independent third parties, are performed upon a completed inventory following the implementation of QC. Reviews verify that measurable data quality objectives were met, ensure that the inventory represents the best possible estimates of emissions and removals given the current state of scientific knowledge and data availability and support the effectiveness of the QC program.

Verification refers to the collection of activities and procedures conducted during the planning and development, or after completion of, an project inventory. It can help to establish its reliability for the intended applications of the inventory. For the purposes of this guidance, verification refers specifically to those methods that are external to the inventory and apply independent data, including comparisons with inventory estimates made by other bodies or through alternative methods. Verification activities may be constituents of both QA and QC depending on the methods used and the stage at which independent information is used.

The purpose of a *Quality Plan* is to document the quality management system and to make transparent the policies and procedures the project proponent implements to maintain a high quality provision of products and services. Typically, the following quality objectives need to be established to:

- Consistently meet and exceed the expectations and requirements of clients and to exhibit a high standard of competence, professionalism and integrity;
- Perform consistently within industry guidelines, principles and standards;
- Ensure that systems are robust and rigorous, providing high levels of security of both data and other material information and contracts; and
- Promote awareness, sustainable management and environmental protection.

Data quality objectives are based on the IPCC's (2006) inventory principles. These include timeliness, completeness, consistency (internal consistency as well as time series consistency), comparability, accuracy, transparency and improvement.

A Quality Plan is founded on a number of key operational elements. These include:

- Communications with landholders and other stakeholders;
- Initial assessment and follow-up of the activity components;
- Data and information control and management;
- Field measurement and site establishment of activity elements;
- The use of proven/accepted methodologies for assessment of carbon stocks;
- Modelled activity elements;
- Validation and verification of the aggregate elements and totals; and

- Archiving and management of the activities and records.

The senior person in an organisation supporting a GGA project is ultimately responsible for the development, implementation and continual improvement of its Quality Plan, but all involved staff are responsible for its ongoing management, implementation and improvement. Specific responsibilities may be shared between staff. In a business or project, a Quality Compiler is responsible normally for:

- Establishing the quality policy and quality objectives;
- Approving the various aspects of the Quality Management System;
- Establishing authorities and responsibilities;
- Communicating the importance of quality management to employees and subcontractors;
- Conducting periodic management reviews of the quality system;
- Peer review, data validation and verification; and
- Ensuring the availability of all resources required for implementation of the quality management system.

A Project Officer is usually responsible for data collection, selection of methods, emission factors, activity data and other estimation parameters, estimation of emissions or removals, uncertainty assessment, QA/QC and verification activities and documentation and archiving. It is the responsibility of each person working on the project to ensure that the integrity of each and every element is high and in accordance with the intent and substance of this quality plan.

Many QC procedures apply to all elements of operations, including initial assessment with landholders, field inspection, field site establishment, data documentation, data entry from field records, and modelling using the NCAS. The personnel who obtain the data have a responsibility to check the data they record, and to document that they have done these checks. The data gatherers are then responsible for obtaining a peer review of the data to validate that the data have been obtained and entered accurately. The reviewer is responsible for ensuring that the data are correct and for documenting that the data have been reviewed.

Inventories must be archived so that any current inventory will be determined and not subject to variation at a later date. To this end, each inventory will need to include the date of inventory in the title, and will need to be archived to a secure folder. Periodic updating of the archived material will be required from time to time, particularly as most archived material is in digital form and digital technology changes fairly frequently over periods of decades.The nature of NRM projects means that documents and data may be dispersed across the regions, often in different offices. A central repository of all documents, data and records may be required for an aggregator. Documentation of project components may include:

- Hard copy files;
- Images, both aerial/satellite and ground;
- Project notes;
- Landholder information;
- Field assessment data;
- Field survey data and calculations;
- National Carbon Accounting System calculations; and
- Inventory.

Integrity of confidentiality is vital to client relations and is required at all times for all landholders. Confidential material, including the names, addresses and other personal details of clients who are the landholders contributing their activities to the project, financial transaction details relating to individual landholders and to project proponents and partners, contract details and property locations and details which are not already publicly available, will be subject to quality control and a Quality Plan and comply with legislative requirements of the *Privacy Act1988*.

The project planning and monitoring and measurement processes that form part of the QA/QC are designed to minimise the chances of a non-conforming product being developed. Product quality issues should be identified through the internal peer review process. Where required, monitoring equipment will need to be maintained, calibrated and used according to the manufacturer's information and any relevant Australian Standards. Maintenance and calibration records will need to be maintained in relevant administration files for the piece of equipment.

Internal audits will often need to be conducted as required to determine whether the Quality Plan conforms to the planned operational controls. Auditors can not audit their own work and should take into account the status and importance of processes as well as previous audit results. Audits by external parties may be required from time to time. Audits may also be conducted by offset buyers, project proponents, project aggregators, the Carbon Credits Administrator or others. Auditors are likely to require inspection of Quality Plans, quality systems, all documents and records, data, and project sites. An annual review and audit of a Quality Plan is likely to be required. The purpose of a review is to assess the effectiveness of the system and to identify areas where the system is ineffective and list actions required improving these areas. The output and recommendations of the review are usually documented. A Quality Plan usually will be revised periodically, as required by the review process, or as individual aspects which require revision or addition or deletion are identified.

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