



Emission Reduction Fund – Response to Green Paper

Rangelands NRM (WA)

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1. Summary

Rangelands NRM (WA) believe that CFI carbon offsets represent a significant opportunity to improve the environmental, economic and social sustainability of the Western Australian (WA) rangelands whilst generating offsets for the *Emissions Reduction Fund (ERF)*. This vision is consistent with the overarching aims of the *Carbon Farming Initiative (CFI)*.

Economically viable carbon offsets with associated environmental co-benefits, could be the catalyst that triggers a much-needed paradigm shift in land management to reverse the downward trends affecting much of the rangelands.

At this time there are still technical and legal barriers to be addressed before the WA rangelands will deliver low cost carbon offsets for the ERF. Rangelands NRM is in the middle of a major project that will address some of the technical barriers, but further funds are required to overcome all technical issues.

Progress to date suggests that it will be possible to estimate changes in carbon stocks in the rangeland using remotely-sensed data and computer (numerical) models. But further funds are required so that the large field data set being developed by Rangelands NRM (WA) can be used to calibrate or validate both remotely-sensed data and models. Also, further field trials and demonstrations are required to identify the land systems and management packages that will deliver the highest rates of carbon sequestration.

Legal barriers relating to pastoral lease tenure, state Carbon Rights and Native Title also still need to be resolved. Once these issues are properly addressed, the pastoral lands of the WA rangelands could deliver large volumes of relatively low cost offsets with co-benefits from an improved environment, more economically robust pastoral businesses and new employment / business opportunities for local indigenous people.

2. Background

The WA rangelands cover a vast area and thus present a major opportunity to generate relatively low cost carbon abatement through sequestration. Of the 217 million hectares comprising the WA rangelands, 98 million hectares are managed as pastoral leases for livestock production. We believe it will be possible to generate carbon offsets by changing the management on parts of this pastoral land.

A modest sequestration rate of 0.5 t CO₂-e per hectare per year on 20% of the WA pastoral land would generate 9.8 million t CO₂-e per year, which is equal to 18% of WA's total annual Greenhouse Gas (GHG) emissions.

Regenerative land management practices on pastoral properties could result in sequestration of carbon in both vegetation and soils. Practices that improve the ecological health of vegetation communities will inevitably result in an increase in the amount of carbon stored in the soil and vegetation. While the rate per hectare of storing carbon in the rangelands may be less than in the cooler climate, intensive agricultural districts of southern WA, the vast area of rangeland means the total storage capacity is very significant.

Currently there are barriers which prevent rangeland managers from participating in commercial CFI carbon abatement projects. These barriers are:

- a. Lack of an approved CFI Methodology for rangelands sequestration.
- b. Paucity of technical information about carbon stocks and sequestration rates.
- c. Lack of cost-effective measurement and verification tools.
- d. Lack of business risk management and financial tools for carbon offsets.
- e. The hundred year permanence rule.
- f. Legal issues relating to Native Title and WA pastoral lease tenure.
- g. Financial viability of pastoral enterprises.

It is clear that the WA rangelands will not be ready to deliver sequestered carbon CFI offsets by the 1st July 2014 when the *Direct Action Program* is proposed to start. It will take several more years to overcome the barriers. Rangelands NRM (WA) is currently working closely with pastoralists and other research institutions to overcome some technical barriers (specifically b. and c. above, which will contribute to a), but more work and funds are required.

3. Building on the Carbon Farming Initiative

Views are sought by the government on options for streamlining the CFI.

Current CFI Methodologies for carbon sequestration require intensive field measurements. If this approach is used in the rangelands, involving large areas and relatively low sequestration rates, the cost per tonne of stored carbon is likely to exceed its market value, at least for the next few years and probably longer.

Lower cost approaches to measurement and verification may be found in the accounting rules for the Kyoto Protocol. The IPCC *“Guidelines for National Greenhouse Gas Inventories 2006”* has a three tiered approach to carbon accounting. These are:

- **Tier 1 estimate** - based solely on the applied management practice, with a conservative carbon storage assumption,
- **Tier 2 estimate** - based on a mix of assumptions combined with indirect measurements (i.e. remotely-sensed and/ or model estimation),
- **Tier 3 estimate** - based on direct measurement and land management ‘activity’ data supported by extensive local research.

The current CFI Methodologies are of the Tier 3 type. The costs and administrative requirements for CFI sequestration projects could be reduced by also adopting Tier 1 and Tier 2 approaches to methodologies.

A Tier 2 approach could involve using remotely-sensed data to estimate changes in carbon stocks in the rangelands, rather than extensive on-ground direct measurements. Results from our current project are showing strong correlations between simple measures of tree and shrub morphology, such as canopy dimensions, and contained biomass and carbon. Given that canopy dimensions and cover can be accurately measured by remote-sensing platforms, we firmly believe an accurate estimate could then be made of the above-ground carbon stocks with a high level of confidence. Rangelands NRM (WA) is developing the robust field data necessary to inform or calibrate remotely-sensed data; we just require additional funds to undertake this next step with key partners with experience in remote-sensing such as Landgate (WA) and CSIRO. Discussions with these organisations indicate that they are keen to participate.

A Tier 1 approach would involve estimating sequestration rates based on the management applied to the land and the particular land system. This approach was used in the Chicago Climate Exchange (CCX) where farmers were paid based simply on the land management used, combined with an assumption of the sequestration rate of that practice. The estimate of sequestration rate of a practice is based on previous field experiments. This is a very cheap and simple approach, as all that is required is to verify that the land management practice has actually been applied. However, the Tier 1 method is less accurate in estimating carbon sequestration than direct measurement as it extrapolates from experiments at other sites. Because there is greater uncertainty of the amount of carbon offsets that farmers generate, offsets are discounted.

An improvement on the CCX approach would be to use numerical models to estimate sequestration rates rather than just extrapolating from research sites. The RothC-based FullCAM model is currently used to estimate changes in below-ground (soil) carbon as part of Australia’s National Carbon Accounts. We believe FullCAM is inadequate for the rangelands as (a) a significant proportion of carbon in the rangelands can be stored above-ground, and (b) FullCAM has not been calibrated for the rangelands. We have been using the CENTURY™ ecosystem model which was developed for the USA rangelands, and which has been successfully used in a range of locations around the World. It is able to incorporate many ecological parameters including those relating to above-ground biomass such as rates of decomposition. The CENTURY™ model has the capacity to predict how changes in

management will affect carbon stocks. Initial work with CENTURY™ undertaken by the Department of Agriculture and Food WA (DAFWA) in 2012, leads us to believe that it could be a reliable model for the WA rangelands (Russell, *pers.comm.* 2013). Again further work is needed to validate this model under a variety of Australian conditions.

4. How best to encourage the uptake of land sector activities.

Pastoralists will adopt carbon abatement projects if they are profitable. However, at this stage, we cannot estimate the profitability of offset projects with confidence. There is still too much uncertainty about carbon yields per hectare, carbon market price per tonne and the costs of an offset project per hectare.

The challenge facing us is to identify where, and how, carbon abatement would be more profitable than grazing alone. In some situations it will be possible to increase livestock productivity AND store more carbon synergistically.

All pastoral stations have a mix of soil types and land systems. The land systems vary in their ability to support livestock grazing, habitat and biodiversity values, social values and carbon storage potential. We envisage whole-property management systems that include areas completely destocked for carbon offsets, areas used solely for livestock grazing and areas with modified grazing systems that also sequester carbon. An example of this is the *Ecologically Sustainable Rangeland Management (ESRM)* property plan developed by Rangelands NRM (WA) for Peedamulla Station. Peedamulla is an Aboriginal-owned station and the plan integrates carbon offsets and cultural values into a management system that importantly, includes cattle grazing. See the weblink below for additional information on this important case study of land use integration in the Pilbara Region. <http://www.rangelandswa.com.au/news/79/cattle,%20carbon,%20critters%20and%20culture%20-%20building%20a%20new%20rangelands> .

Locking whole stations up solely for carbon offsets could have significant detrimental effects on local communities and economies.

Rangelands NRM (WA) is focussed on developing sequestration options, but also has active links with groups working on emissions avoidance options. Rangelands NRM (WA) is half way through a major project on quantifying carbon stocks and developing field measurement methods in the WA rangelands. This *Carbon Awareness Project* is funded by the WA Government through their *Royalties for Regions* in partnership with the Western Australian Agricultural Authority (WAAA) and Department and Agriculture and Food WA (DAFWA).

The aim of our *Carbon Awareness Project* is to:

- Increase the awareness of rangelands stakeholders of carbon farming issues, opportunities and risks,
- Robustly measure carbon stocks on a variety of demonstration sites (land systems) across the WA rangelands; we term this work, 'land system characterisation',
- Test and continually improve methods for cost-effectively measuring carbon in the field,

- Develop a database from ground sites that could be used to calibrate low cost, remotely-sensed data acquired by satellite, unmanned aerial vehicles (UAVs) and aircraft,
- Provide solid research to underpin a CFI Methodology for Rangelands Regeneration.

Once the project is completed in mid-2016, we will have the largest land systems based field data set on WA carbon stocks of any other Australian rangelands region, and possibly the world.

Rangelands NRM (WA) is also supporting pastoralists to run their own on-property trials of new practices that could regenerate the rangelands and sequester carbon. Once remote-sensing becomes feasible and reliable, it should be possible to estimate sequestration rates on these producer trials at relatively low cost.

Rangelands NRM (WA) is also committed to involving indigenous people in the emerging carbon industry. We are providing advice and property planning services to indigenous corporations and families that are landholders in the rangelands (pastoral leases and aboriginal reserves). We also see the potential for indigenous people living in remote areas to be employed in the field work required for commercial offset projects. In collaboration with the Ashburton Aboriginal Corporation we have been providing hands-on training to *Community Development Employment Project (CDEP)* participants on our *Carbon Awareness Project* field sites and Rangelands NRM (WA)-funded producer demonstration sites. There are also opportunities for involvement with the *Remote Jobs and Communities Program (RJCP)*.

4.1 Potential carbon sequestration rates

In the eastern state rangelands Witt *et al.* (2011) estimated sequestration rates of 0.92 to 1.1 t CO₂^{-e} /ha/year from semi-arid mulga lands due to total destocking.

To date, there has been only a limited amount of work estimating the sequestration rates in the WA rangelands; work is in progress. However this limited research suggests that some management practices on some land systems may be commercially viable for CFI carbon offset projects with an ACCU price above A\$17 (Alchin, 2012). There is more modelling work underway which will provide more substantive answers to the viability question.

There have been a number of studies that have measured carbon stocks above- and below-ground (to 30cm depth) in the WA rangelands. Thirteen sites in the Pilbara and Kimberley (northern rangelands) have been measured with total carbon stocks ranging from 12 to 102 tC/ha (i.e. 44 to 374 t CO₂^{-e} /ha) (Alchin *et al.*, 2010). These studies show that land systems vary considerably in the distribution of carbon between the above- and below-ground pools. On a cracking clay land system dominated by native grasses at Yalleen Station in the Pilbara there is nine times as much carbon stored in the soil to 30cm compared to that in the above-ground vegetation (Russell, *pers. comm.*, 2013).

In contrast, in mulga woodlands and shrublands on Muggon Station in the Murchison (southern rangelands) the amount of carbon stored above-ground is greater than that stored below-ground to 30 cm. Similar proportions of stored carbon are expected in two other land systems sampled in 2013

at Meka and Yoweragabbie stations, also in the Murchison Region; statistical analysis of the data is in progress. Figure 1 below shows typical mulga woodland.



Figure 1. Mulga woodland at Meka Station (Yanganoo-Belele land system) in the Murchison Region of Western Australia. Photo by Peter Russell, May 2013.

When additional field work and data analysis is completed by end-2014, we will have comprehensive characterisation data on 19 land systems in the Kimberley, Pilbara and Murchison regions. Further work is anticipated in the WA rangelands in 2015.

4.2 Permanence

Rangelands NRM (WA) supports the proposal to reduce the permanence requirement for CFI sequestration projects to 25 years. This period is much more realistic and practicable compared to the current 100 year rule which is well beyond the planning time frame for most commercial graziers.

The 100 year rule is also beyond the term of the Pastoral Leases issued for the WA rangelands. All WA rangelands Pastoral Leases expire in 2015. Legislation for new Pastoral Leases is yet to be passed in WA. The Australian government should hold discussions with the WA government to ensure that the CFI permanence rule is compatible with the tenure duration of the new Pastoral Leases.

4.3 Carbon Rights

The WA government is also yet to determine how carbon rights for CFI sequestration projects will be made available to pastoral leaseholders and other potential carbon project proponents. The WA 'Carbon Rights' legislation states that the State government holds the Carbon Right on all leasehold land, but the Minister for Lands may transfer this Right to another stakeholder (e.g. pastoral leaseholder, Traditional Owners). The Australian government should liaise with the WA government so that 'red tape' does not prevent WA pastoralists from having access to CFI carbon offset opportunities.

4.4 Above- and Below-ground Sequestration

The CFI legislation requires that carbon offset projects must be consistent with the Kyoto Protocol accounting rules. Article 3.4 of the Kyoto Protocol refers to “crop land” and “grass land”, while Article 3.3 refers various types of forests (which are defined as woody vegetation with a mature height of more than 2 m, a minimum crown cover of 20% and a minimum area of 0.2 hectares). Much of the Australian grazed rangelands are “grass lands” that will fall under Article 3.4. The rules for Article 3.4 state that the estimates of carbon stocks must account for **both** below- and above-ground carbon stores. As such, a CFI project would be invalid if it only accounted for below-ground “soil carbon”. And yet, the Green Paper only refers to “soil carbon” giving an impression that above-ground carbon storage in the Australian rangelands is not being considered. The White Paper should clearly state that CFI carbon offsets in the rangelands, where applicable, can be based on above- and below-ground carbon storage, depending on land system characteristics.

5. Views sought in the Green Paper

Views are sought on several other aspects of the ERF, namely, early participation, genuine emissions reductions and calculation of emissions reductions. Our comments are provided below in sections 5.1, 5.2 and 5.3.

5.1 Facilitate early participation in the Emissions Reduction Fund

Western Australian pastoralists will not be early participants in the ERF as there are too many uncertainties and barriers still to be overcome. With concerted effort these barriers could be overcome allowing the WA rangelands to become a significant supplier of carbon offsets. Further support is required from both state and Australian governments to address the technical challenges, and to develop effective policies to address the legal barriers.

The Australian government should support pastoralists and indigenous people involvement in the development of ERF carbon offsets through participation in research programs in their region and with their own on-ground trials. The skills and knowledge gained now will prepare them for participation in commercial ERF projects once the WA industry matures.

Some remote indigenous people in WA have already commenced developing the skills required for the carbon industry through their involvement in CDEP / RJCP programs. New government initiatives such as the “Green Army” could further support indigenous engagement in the carbon industry.

5.2 Ensure that emissions reductions are genuine

Properly calibrated remotely-sensed data, together with a minor amount of ground-truthed data will allow reliable third party verification of rangelands carbon offsets.

5.3 Methods for calculating emissions reductions from priority activities

An adequately validated CENTURY™ model would enable the identification of priority land systems and management practices that could deliver large volumes of relatively low cost carbon offsets from the rangelands.

6. Concluding Statements

The land sector, in particular the vast rangelands of Australia, currently has substantial, unrealised potential to contribute to Australia's carbon abatement targets. Given suitable market- and government-driven incentives, this sector can implement various land management activities to protect (and raise) existing organic carbon soil and vegetation stocks, increase rates of carbon sequestration and improve GHG emissions avoidance and other low-carbon practices.

In regard to incentives, there are several imperatives for the ERF and CFI to improve supply-side barriers to abatement including:

- Providing assurances that the ERF will maintain adequate, long-term (at least 15 years) carbon credit (ACCUs) price levels to support decadal and multi-decadal abatement activities through changed land use practices. The intrinsic long-term nature of sequestration cannot be avoided or ignored, meaning that carbon projects require long-term price and policy certainty.
- Incorporation of a broader range of approved activities and methodologies, including those sourced internationally (suitably modified for Australian use).
- Whilst the government's aim to purchase lowest-cost abatement through a 'reverse auction' process is laudable, we believe that additional purchase mechanisms should be considered for inclusion in the ERF to assist land sector sequestration projects. Mechanisms include:
 - a. Funds banding by sector, that is, allocating funds for specific abatement sectors. For example, rangeland regeneration/restoration.
 - b. Creating incentives for companies to purchase large volumes of abatement from the land sector over long (decadal) terms; long-term partnerships between land managers or carbon brokers and liable companies could be encouraged by developing suitable credit mechanisms.
 - c. Importantly, developing mechanisms for valuing co-benefits. Sequestration projects are intrinsically different from emissions avoidance projects. Sequestration not only removes carbon (CO₂) from the atmosphere but also provides important and sustained benefits of improved soil health and conservation (erosion mitigation), and ecological or biodiversity health, along with social and economic benefits. These benefits should be valued in addition to the actual sequestered carbon. An idea may be to co-finance (local, state and Australian) such projects through the CFI.

In conclusion, for the Australian government to raise involvement in the CFI and ERF, the supply-side barriers outlined in this submission will need to be thoroughly addressed, along with several demand-side issues (not addressed here but by submissions from other organisations).

7. **References**

Anon. (2012) *The Carbon Farming Initiative Handbook*, Commonwealth of Australia (Department of Climate Change and Energy Efficiency).

Alchin *et al.* (2010) *Carbon Capture Project – Final Report*, Department of Agriculture and Food WA, Bulletin N° 5000, March 2010.

Alchin (2012) A preliminary estimation of the carbon sequestration potential of the Brockman land system at Yalleen Station, Pilbara region, WA. Outback Ecology Services and Department of Agriculture and Food WA, March 2012.

Witt *et al.* (2011) Carbon sequestration and biodiversity restoration potential of semi-arid mulga lands of Australia interpreted from long-term grazing exclosures. *Agriculture, Ecosystems and Environment (AGEE)*, 2011.