DEVELOPING A FRAMEWORK FOR 'BLUE CARBON' IN AUSTRALIA: LEGAL AND POLICY CONSIDERATIONS

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I INTRODUCTION

On 2 December at the 2015 United Nations Climate Change Conference ('COP21') in Paris, Australia's (then) Minister for the Environment Greg Hunt unveiled a new plank in Australia's international and domestic climate change strategies, encompassing an international partnership for blue carbon, and a plan to incorporate blue carbon into Australia's National Greenhouse Gas Inventory.[1]

'Blue carbon' is a generic term referring to the carbon sequestered in the biomass and soils of vegetated coastal ecosystems, namely mangroves, seagrass, and saltmarshes.[2] This emergence of blue carbon in Australia's climate change policy is hardly surprising given the increasing scientific understanding of the significance of coastal carbon stocks. Coastal ecosystems provide a particularly effective, long-term[3] and extremely stable carbon sink.[4] The carbon storage capacity of coastal ecosystems can increase over time as soils accrete, compared with terrestrial (land-based) vegetation sinks which become saturated over time.[5] Additionally, this high carbon storage capacity is only one of a number of services provided by these coastal ecosystems, which also help to stabilise shorelines and provide water filtration services and fish habitats.[6] In short, coastal ecosystems are a crucial global environmental resource.

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1 Greg Hunt, 'New Research on the Potential for Blue Carbon to Reduce Emissions and Help Tackle Climate Change' (Media Release, 2 December 2015) <https://environment.gov.au/minister/hunt/2015/pubs/mr20151202.pdf>. These strategies will be discussed in detail below in Part III.

2 Elizabeth Mcleod et al, 'A Blueprint for Blue Carbon: Toward an Improved Understanding of the Role of Vegetated Coastal Habitats in Sequestering CO2' (2011) 9 *Frontiers in Ecology and the Environment* 552, 552; James W Fourqurean et al, 'Seagrass Ecosystems as a Globally Significant Carbon Stock' (2012) 5 *Nature Geoscience* 505, 505.

3 Christian Nellemann et al (eds), *Blue Carbon: The Role of Healthy Oceans in Binding Sediment: A Rapid Response Assessment* (United Nations Environment Programme and GRID-Arendal, 2009) 6; Mcleod et al, above n 2, 554.

4 See, eg, C M Duarte, J J Middelburg and N Caraco, 'Major Role of Marine Vegetation on the Oceanic Carbon Cycle' (2005) 2 *Biogeosciences* 1, 2.

5 Mcleod et al, above n 2, 553–4.

6 See, eg, Edward B Barbier et al, 'The Value of Estuarine and Coastal Ecosystem Services' (2011) 81 *Ecological Monographs* 169.

Unfortunately, this increased understanding of the valuable roles that coastal ecosystems play is at odds with a historical trend of allowing these ecosystems to be removed for development.[7] Estimates show that 30 to 40 per cent of tidal marshes and seagrasses, and a large proportion of the world's mangrove forests, could be lost in the next 100 years unless this trend is reversed.[8] Calculating and recognising the carbon storage capacity of these ecosystems could bolster their economic value, allowing them to compete against more financially lucrative development projects.[9]

As Australia has the second highest percentage of global mangrove coverage in the world,[10] and the highest seagrass coverage in the world,[11] integration of blue carbon into domestic climate policy is particularly pertinent. Minister Hunt's proposal to incorporate blue carbon stocks into Australia's Greenhouse Gas Inventory is a positive step, and one which could open the door to including blue carbon in Australia's climate change approach more generally, which at present is the Emissions Reduction Fund ('ERF').[12]

Inclusion of blue carbon in the ERF would not require any significant re-imagination of domestic climate change law. Historically, terrestrial vegetation biosequestration projects have formed an integral component of Australia's climate change approach, and indeed climate change approaches worldwide.[13] This work in the terrestrial sphere provides a preliminary framework for the creation of blue carbon sequestration projects. However, there are fundamental biophysical distinctions between terrestrial and coastal ecosystems which will raise peculiar legal issues that must be considered prior to including blue carbon in any climate change policy. The object of this article is to identify and provide a preliminary analysis of these legal issues, and present some options for future development of this area.

This article will commence with a more detailed outline of the benefits of including blue carbon in a climate change regulatory framework, building on this introduction. It will then provide a brief analysis of Australia's current legal approach to climate change, which is the ERF. From this, it will analyse the potential legal difficulties involved with incorporating blue carbon into this framework, including identification of an offset site, recognition of a legal right

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7 Mangroves in particular have been extensively cleared for coastal development: see, eg, Daniel M Alongi, 'Present State and Future of the World's Mangrove Forests' (2002) 29 *Environmental Conservation* 331.

8 Linwood Pendleton et al, 'Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems' (2012) 7(9) *PLoS One* e43542, 2 <http://journals.plos.org/plosone/article/asset?id=10.1371/journal.pone.0043542.PDF>.

9 See, eg, Barbier et al, above n 6.

10 Daniel A Friess and Edward L Webb, 'Variability in Mangrove Change Estimates and Implications for the Assessment of Ecosystem Service Provision' (2014) 23 *Global Ecology and Biogeography* 715, 717. Indonesia has the highest coverage (20.6 per cent of all mangroves worldwide), and Australia has 7.1 per cent of global mangrove coverage.

11 Edmund P Green and Frederick T Short, *World Atlas of Seagrasses* (University of California Press, 2003) 14.

12 This was also alluded to as a possibility in Greg Hunt's media release: Hunt, above n 1.

13 Alexander Zahar, Jacqueline Peel and Lee Godden, *Australian Climate Law in Global Context* (Cambridge University Press, 2013) 339–40.

to carry out a project, additionality, permanence, the availability of a methodology and cost. Finally, this article will conclude that blue carbon projects can be included in the ERF framework, but governments must consider a number of issues to ensure that they are legally and practically viable. This article will not go so far as to propose a comprehensive suite of legal and regulatory changes to permit the inclusion of blue carbon in the ERF, as this would involve the resolution of issues beyond the scope of this article, including economic issues. However, it will propose some key points to commence the discussion on this topic.

II THE IMPORTANCE OF BLUE CARBON TO CLIMATE CHANGE LAW AND POLICY

Vegetation and soil carbon is a crucial piece of the climate change puzzle in both a negative and a positive way: in a negative sense, clearing of vegetation releases carbon dioxide ('CO_2') into the atmosphere and contributes to climate change, whilst in a positive sense, CO_2 can be removed from the atmosphere through afforestation and reforestation efforts. Put another way, vegetation can be both a 'source' of, and a 'sink' for, CO_2.[14] At present, deforestation is a major source of global emissions, with the most recent Intergovernmental Panel on Climate Change ('IPCC') report estimating that just under a quarter of global anthropogenic greenhouse gas emissions derive from the Agriculture, Forestry and Other Land Use ('AFOLU') sector.[15]

To date, biosequestration science and policy has predominately focused on terrestrial vegetation. Blue carbon has only received serious attention in the scientific literature since 2009 following the release of a major report by the United Nations Environment Programme ('UNEP').[16] This report emphasised the importance of blue carbon in any effective climate change response, noting that:

> The ocean's vegetated habitats, in particular mangroves, salt marshes and seagrasses, cover <0.5% of the sea bed. These form earth's blue carbon sinks and account for more than 50%, perhaps as much as 71%, of all carbon storage in ocean sediments. They comprise only 0.05% of the plant biomass on land, but store a comparable amount of carbon per year, and thus rank among the most intense carbon sinks on the planet.[17]

The UNEP report sparked further scientific investigation of blue carbon ecosystems,[18] which has found that blue carbon habitats can store CO_2 at a

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14 See, eg, Pete Smith et al, 'Agriculture, Forestry and Other Land Use (AFOLU)' in Ottmar Edenhofer et al (eds), *Climate Change 2014: Mitigation of Climate Change: Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2014) 811, 818.

15 Ibid 816.

16 Nellemann et al, above n 3.

17 Ibid 6.

18 For a detailed review of the progression of scientific literature on blue carbon ecosystems, see Sebastian Thomas, 'Blue Carbon: Knowledge Gaps, Critical Issues, and Novel Approaches' (2014) 107 *Ecological Economics* 22.

greater density than terrestrial ecosystems.[19] Per hectare, mangrove forests have higher carbon stocks than other forests,[20] and seagrass meadows are one of the most productive ecosystems on Earth, with high rates of carbon burial in their sediments.[21] This is because coastal habitats store carbon both in their biomass[22] and their soil, with the largest storage of CO_2 occurring below ground, sometimes up to a depth of several metres.[23] Because of the high carbon density, disturbance of the carbon stored in the biomass and just the top metre of sediment could contribute as much CO_2 emissions per hectare as three to five hectares of tropical forest.[24]

In addition to density, blue carbon ecosystems are remarkable for their longevity. The soils of marine ecosystems accrete over time, and the amount of carbon sequestered per hectare therefore has the capacity to increase. They can also sequester carbon over extremely long time scales, with several studies observing sediment carbon deposits that are over 6000 years old.[25]

Coastal ecosystems are also highly threatened. It has been estimated that approximately one third of mangrove, seagrass and saltmarsh areas globally have already been lost over the past few decades, largely due to human causes.[26] This indicates a need to integrate coastal wetlands into emerging climate change law and policy frameworks as an effort to both slow their further decline, and reverse existing declines.

However, whilst carbon sequestration in terrestrial vegetation has become a major focus in international and domestic climate policy, progress on the inclusion of coastal wetlands has lagged behind. A major barrier to the inclusion of coastal ecosystems in legal and policy processes has been the absence of reliable methods of calculating how much CO_2 they sequester. To address this gap, scientific research over the past few years has shifted its focus towards establishing methodologies for measurement. In 2013, the IPCC released the *Wetlands Supplement*.[27] This document complements earlier guidelines released by the IPCC in 2006 to assist states with preparing their greenhouse gas inventories for the United Nations Framework Convention on Climate Change.

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19 Ibid 24.

20 Daniel C Donato et al, 'Mangroves among the Most Carbon-Rich Forests in the Tropics' (2011) 4 *Nature Geoscience* 293, 294. It has also been found that there is no significant difference between mangroves and saltmarsh in terms of carbon sequestration rates: Gail L Chmura et al, 'Global Carbon Sequestration in Tidal, Saline Wetland Soils' (2003) 17(4) *Global Biogeochemical Cycles* 22-1, 22-1.

21 Carlos M Duarte, Tomás Sintes and Núria Marbà, 'Assessing the CO2 Capture Potential of Seagrass Restoration Projects' (2013) 50 *Journal of Applied Ecology* 1341, 1341.

22 Defined to include 'leaves, flowers, stems, branches, and (in the case of mangroves) trunks … [and belowground] roots and associated flora and fauna': Samantha Sifleet, Linwood Pendleton and Brian C Murray, 'State of the Science on Coastal Blue Carbon: A Summary for Policy Makers' (Report No NI R 11-06, Nicholas Institute for Environmental Policy Solutions, May 2011) 6.

23 Ibid.

24 Pendleton et al, above n 8, 5.

25 Mcleod et al, above n 2, 554.

26 Ibid 556.

27 Takahiko Hiraishi et al (eds), *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (Intergovernmental Panel on Climate Change, 2013) ('Wetlands Supplement').

The *Wetlands Supplement* provides detailed methodological guidance that can be applied by countries to produce reliable estimates of the amount of carbon emitted and removed by changes to coastal ecosystems.[28] In 2014, the Blue Carbon Initiative[29] released a complementary and more detailed methodology to assist with the compilation of carbon inventories.[30] More recently, the Verified Carbon Standard released a methodology for restoration activities.[31] This allows for the development of restoration projects in accordance with the methodology, which can then earn Verified Carbon Units for sale on the voluntary market. These developments have great significance as they have paved the way for the recognition of blue carbon in both carbon accounting and climate change legal and policy frameworks. They have also allowed for the development of cost-effective blue carbon projects in developing countries, which have generated credits for sale on the voluntary market.[32]

In summary, blue carbon ecosystems have the potential to be both significant sources of, and sinks for, CO_2, and should therefore form a central pillar of any governmental approach to climate change. This has become more realistic in recent years as scientific developments have enabled the carbon sequestration values of these ecosystems to be quantified.

III THE AUSTRALIAN LEGAL FRAMEWORK FOR CLIMATE CHANGE MITIGATION: A SYNOPSIS

Minister Hunt's announcement at COP21 perhaps signalled the beginning of a new era for coastal ecosystem protection in Australia, with their inclusion in broader climate change policy. Although Minister Hunt's announcement related mainly to counting blue carbon stocks in Australia's national inventory, he also alluded to the possibility of creating incentives for blue carbon management through the ERF.[33] Under the *Paris Agreement*, parties are required to undertake domestic mitigation efforts, reflecting their pledged nationally determined contributions.[34] The ERF represents the Australian government's

28 See ibid ch 4.

29 The Blue Carbon Initiative is a consortium of governments, academics and non-government organisations working in the blue carbon space, coordinated by Conservation International, the International Union for Conservation of Nature, and the United Nations Educational, Scientific and Cultural Organisation.

30 Jennifer Howard et al (eds), *Coastal Blue Carbon: Methods for Assessing Carbon Stocks and Emissions Factors in Mangroves, Tidal Salt Marshes, and Seagrass Meadows* (Manual, Blue Carbon Initiative, 23 March 2015) <http://thebluecarboninitiative.org/new-manual-for-measuring-assessing-and-analyzing-coastal-blue-carbon/>.

31 Verified Carbon Standard, 'Methodology for Tidal Wetland and Seagrass Restoration' (Methodology No VM0033 version 1.0, 20 November 2015) <http://database.v-c-s.org/methodologies/methodology-tidal-wetland-and-seagrass-restoration-v10>.

32 Lindsay Wylie, Ariana E Sutton-Grier and Amber Moore, 'Keys to Successful Blue Carbon Projects: Lessons Learned from Global Case Studies' (2016) 65 *Marine Policy* 76.

33 Hunt, above n 1.

34 Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Twenty-First Session, Held in Paris from 30 November to 13 December*

current approach to domestic climate change mitigation, and will therefore be the focus of this article.[35] Furthermore, development of an ERF methodology for mangroves has also been identified as a government priority for 2015–16,[36] so the time is ripe for an analysis of the role of blue carbon in the ERF regime.

To set the foundations, this Part will provide an analysis of the legislative regime underpinning the ERF before moving into a consideration of how blue carbon can be incorporated within it in Part IV. In undertaking this analysis, it is acknowledged that Australia's climate change laws are notoriously susceptible to change, and the ERF may not ultimately be the country's long-term approach to climate change mitigation, particularly in the event of a further change of government. Additionally, current forecasts suggest that the funds allocated to the ERF will be exhausted by the end of 2016,[37] which may lead the federal government to rethink their policy. That said, the particular issues relevant to blue carbon will also be problematic under a different type of regime, such as a carbon trading scheme, and this analysis will be of broader relevance should Australia's climate change policy be amended once again.

A Introduction to the Emissions Reduction Fund

Following its election in September 2013, the current Liberal–National Coalition government announced its intention to address climate change and greenhouse gas emissions via a Direct Action Plan, incorporating the ERF.[38] The ERF consists of a budget utilised by the government to purchase carbon abatement projects occurring at the lowest cost, described as a 'reverse auction' system.[39]

It should be noted that the ERF auction scheme is not the only potential outlet for sale of carbon credits generated by abatement projects within Australia; these credits may also be sold on the voluntary market. To this end, the underpinning legislative framework for the ERF consists of a two-stage process, beginning with registration of a project as an 'eligible offsets project'.[40] Accreditation as the

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2015 – Addendum – Part Two: Action Taken by the Conference of the Parties at Its Twenty-First Session, Dec 1/CP.21, UN Doc FCCC/CP/2015/10/Add.1 (29 January 2016) annex ('*Paris Agreement*') arts 3–4.

35 This article will not comment on the likely effectiveness of the ERF as a climate change strategy generally, as this is outside the scope of this article. However, it should be noted that the ERF has been criticised as it is unlikely to purchase sufficient abatement to meet Australia's international commitments: see, eg, Harry Clarke, Iain Fraser and Robert George Waschik, 'How Much Abatement Will Australia's Emissions Reduction Fund Buy?' (2014) 33 *Economic Papers* 315.

36 Department of the Environment and Energy (Cth), *Emissions Reduction Fund Methods: Development & Prioritisation* (21 August 2015) <http://www.environment.gov.au/climate-change/emissions-reduction-fund/methods/method-development>. Note that as of 25 September 2016, this had not yet been updated to reflect 2016–17 priority areas.

37 'Analyst Alert: Bidding Set to Begin at Second ERF Auction', on Research Insights, *RepuTex* (2 November 2015) <http://www.reputex.com/research-insights/analyst-alert-bidding-set-to-begin-at-second-erf-auction/>.

38 Department of the Environment (Cth), 'Emissions Reduction Fund: Green Paper' (Report, 2013) <http://www.environment.gov.au/system/files/resources/66237232-3042-4cd8-99a3-040705fead3b/files/erf-green-paper_1.pdf>.

39 Ibid 3–4.

40 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 27(2).

proponent of an 'eligible offsets project' allows that person to qualify to bid for ERF funds, but also gives the proponent an accredited product that may be recognised in other schemes.

The second part of the ERF framework is the establishment of the auction process, which allows the proponent of an eligible offsets project to submit a competitive bid to secure funds from the ERF.

B Legislative Framework

The legal regime underpinning the ERF and generation of carbon credits generally consists of the following legislative instruments:

- *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ('the Act');
- *Carbon Credits (Carbon Farming Initiative) Regulations 2011* (Cth) ('the Regulations'); and
- *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) ('the Rule').[41]

The Act and Regulations were enacted by the previous (Labor) government as the framework underpinning its Carbon Farming Initiative ('CFI'). Rather than repeal and replace this legislation, the Coalition government chose to amend the existing framework, which has provided continuity for projects already registered under the CFI regime.[42]

The CFI had a particular emphasis on land sector projects, and the ERF continues to allow for these projects to be accredited. In particular, 'sequestration offsets projects' may be accredited, including projects for the removal of CO_2 from the atmosphere by sequestration in living biomass, dead organic matter or soil, or a project involving both sequestration and avoided emissions from living biomass, dead organic matter or soil.[43] However, the ERF is broader in scope than the CFI, and it applies to a range of energy efficiency projects in addition to the more land-sector based projects considered by the CFI.[44]

Methodologies developed in relation to particular sectors also form a key part of the ERF framework. A methodology determination will specify how carbon abatement is to be calculated from a particular type of project.[45] A number of methodologies have already been developed, covering projects in the agriculture, energy efficiency, mining, transport, vegetation management, and waste sectors.[46] Specifically in relation to biosequestration, available methodologies include a

41 This article will broadly refer to this suite of legislative instruments as the 'ERF legislation'.

42 Australian Government, *Emissions Reduction Fund: White Paper* (2014) 58.

43 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 54.

44 The CFI applied to agricultural emissions avoidance projects, landfill legacy emissions avoidance projects, introduced animal emissions avoidance projects and sequestration offsets projects: Department of the Environment and Energy (Cth), *Activities – Eligible and Excluded* (11 July 2014) <http://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/activities-eligible-excluded>.

45 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 106(1).

46 Department of the Environment and Energy (Cth), *Emissions Reduction Fund Methods: Finalised Methods* (3 September 2014) <http://www.environment.gov.au/climate-change/emissions-reduction-fund/methods>.

methodology for reforestation and afforestation projects,[47] one for human-induced regeneration,[48] and one for avoided deforestation.[49]

1 Eligibility and Application

A person may apply to the Clean Energy Regulator ('the Regulator') for a declaration that an offsets project is an 'eligible offsets project'.[50] The application must be in writing and in the approved form, and must include information prescribed by the Regulations and Rule.[51] This prescribed information is listed in rule 13, and includes: contact details, a description of the project, and the applicable methodology determination. The proponent must also include information to identify the location of the offset site. It may be 'area-based', in which case the proponent must include a geographical description, the street address, and a lot-on-plan description. If the boundary cannot be defined by reference to location, the proponent must include details as to how the boundary will be defined.[52]

The proponent must also provide information demonstrating their legal right to carry out the project,[53] information to prove that the project is sufficiently new, and not required to be carried out under an existing law, or unlikely to be carried out under an existing regime ('additionality'),[54] and if the proposed project is a sequestration project, the proponent must nominate a permanence period of 25 or 100 years.[55] The most relevant of these elements will be discussed in further detail.

2 Legal Right to Carry Out the Project

The legislation does not explicitly define what a 'legal right' is, but it is clear that the proponent need not own the relevant land, and a legal right can be established contractually.[56] In these instances, a declaration that a project is an 'eligible offsets project' will be conditional upon the written consent of any relevant 'eligible interest' holder (such as the landholder) being obtained.[57] Alternatively, the proponent can seek to obtain a more formalised legal interest in

47 *Carbon Credits (Carbon Farming Initiative – Reforestation and Afforestation 2.0) Methodology Determination 2015* (Cth).

48 *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest – 1.1) Methodology Determination 2013* (Cth).

49 *Carbon Credits (Carbon Farming Initiative – Avoided Deforestation 1.1) Methodology Determination 2015* (Cth). Avoided deforestation is only permitted to be declared as an eligible offsets project in circumstances where a consent for clearing of vegetation had been granted: at s 10.

50 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 22.

51 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ss 23(1)(a)–(c).

52 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) rr 13(1)(a)–(c), (g)–(i).

53 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 13(1)(l).

54 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 13(n)(iii); *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 27(4A)(a).

55 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 23(1)(g).

56 Clean Energy Regulator (Cth), *Legal Right* (4 March 2016) <http://www.cleanenergyregulator.gov.au/ERF/Want-to-participate-in-the-Emissions-Reduction-Fund/Planning-a-project/Legal-right>.

57 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 28A. 'Eligible interest' is defined at ss 43–45A.

the land. If a person holds a carbon sequestration right that is either registered or recorded on the land title, this is an 'eligible interest' for the purpose of the legislation.[58] All Australian states have enacted or amended legislation to provide for registrable or recordable carbon rights over the carbon stored in terrestrial vegetation,[59] which may be used to establish a legal right. Even if a proponent does not have a formal legal interest in the carbon sequestered, a state or territory land titles registrar may still make appropriate notations on title. This notation would alert searchers of the existence of the project, the fact that requirements may arise under the federal legislation, and any carbon maintenance obligations.[60] However, the federal government has no jurisdiction over state-based land title registers, and cannot mandate that these notations be made.[61]

3 Permanence

The concept of 'permanence' within the context of carbon offsets does not necessarily reflect the orthodox definition of the term 'permanent'. Carbon sequestered in vegetation, by nature of the process, cannot be guaranteed to have been removed from the atmosphere indefinitely because it may be returned to the atmosphere through deliberate or inadvertent deforestation.[62] The concept of 'permanence' within the context of carbon sequestration instead refers to the longevity of the carbon stock.[63] In the scientific literature, 'permanence' generally contemplates that a project will sequester carbon for more than 100 years.[64]

The ERF requires projects to have a degree of permanence, although proponents can choose either a 100-year or a 25-year permanence period.[65] If a proponent chooses a 25-year permanence period, the number of credits issued is discounted by 20 per cent[66] to account for possible failure of the project in the future.[67] Furthermore, in both cases a 'risk of reversal buffer' will apply, and units will be discounted by 5 per cent.[68] This is also intended to be a safeguard against the risk of failure.[69]

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58 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ss 43(1A)–(3).

59 *Conveyancing Act 1919* (NSW) pt 6 div 4; *Land Title Act 1994* (Qld) pt 6 div 4C; *Forest Property Act 2000* (SA); *Forestry Rights Registration Act 1990* (Tas); *Climate Change Act 2010* (Vic) s 3B, pts 4–5; *Carbon Rights Act 2003* (WA).

60 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ss 39–40.

61 Explanatory Memorandum, Carbon Credits (Carbon Farming Initiative) Bill 2011 (Cth) 72.

62 Charles Palmer, 'Property Rights and Liability for Deforestation under REDD+: Implications for "Permanence" in Policy Design' (2010) 70 *Ecological Economics* 571, 571.

63 Smith et al, above n 14, 832.

64 Ian Noble et al, 'Implications of Different Definitions and Generic Issues' in Robert T Watson et al (eds), *Land Use, Land-Use Change, and Forestry* (Cambridge University Press, 2000) 53, 87–8 [2.3.6.3].

65 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ss 86A–87.

66 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 16(2).

67 Explanatory Memorandum, Carbon Farming Initiative Amendment Bill 2014 (Cth) 66.

68 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 16(2).

69 Explanatory Memorandum, Carbon Credits (Carbon Farming Initiative) Bill 2011 (Cth) 64.

4 Declaration as an Eligible Offsets Project

The Regulator is empowered to declare a project as an eligible offsets project,[70] but only if satisfied that, amongst other things, the project is covered by a methodology determination, and it meets the additionality requirements.[71] The additionality requirements are that:

- the project has not begun to be implemented (the 'newness' requirement);
- the project is not required by law (the 'regulatory additionality' requirement); and
- the project would be unlikely to be carried out under another government project or scheme (the 'government program' requirement).[72]

Once a project is declared as an eligible offsets project, the proponent has certain obligations with regard to reporting. The timeframes for reporting give the proponent some flexibility, with a requirement to report no more than once every six months, but no less than once every five years for sequestration projects.[73] The report must include, amongst other things, the amount of carbon abatement that has occurred.[74]

5 Variation and Revocation of an Offsets Project

The physical location of an offset site may be varied, provided that the requirements of section 27 of the Act are still met.[75]

An offsets project may also be revoked, either voluntarily or unilaterally. The procedure for voluntary revocation depends on whether carbon units have been issued for the project. In either case, the proponent must first apply for revocation.[76] If units have been issued, the Regulator must be satisfied that the proponent has relinquished their carbon units.[77]

The Regulator may unilaterally revoke a project in circumstances including where regulatory approvals have not been obtained, the consent of eligible interest holders has not been obtained, or the project does not meet the additionality requirements.[78]

6 Issue of Carbon Credits

Once declared, the proponent will commence the abatement project. The crediting period for sequestration projects is 25 years, unless another period is

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70 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 27(2).
71 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 27(4).
72 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 27(4A). A project has begun to be implemented when, eg, a final investment decision is made, an asset has been leased, construction has commenced, or soil preparation has commenced: at s 27(4C).
73 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ss 76(1)–(2).
74 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 70(2)(d).
75 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 23(1).
76 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) rr 29(2), 30(2).
77 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 29(1).
78 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 32(1).

specified in a methodology determination.[79] This means that a project can generate credits over a 25-year period. Once the project has resulted in eligible carbon abatement, the Regulator must issue Kytoto Australian Carbon Credit Units ('ACCUs'),[80] which can then be traded or sold.

7 *Bidding in Auctions and Purchase of Carbon Credits*

Once declared, a proponent of an eligible offsets project is eligible to bid in auctions. Under the auction format, the Regulator will call for bids as a price per tonne of emissions reductions. The sole criterion for choosing successful projects will be price, as the eligibility phase essentially ensures that other criteria are already met.[81]

If an auction bid is successful, the Regulator may enter into a contract with the proponent,[82] which will provide for the purchase of their eligible ACCUs.[83] A standard-form contract is used in all transactions, and the proponent will have to have consented to the standard terms when qualifying to bid in an auction.[84] Generally, a contract will not have a duration greater than seven years, unless the project crediting period will be longer than this.[85] However, the contract length should still not exceed ten years.[86] After the project has resulted in eligible carbon abatement and carbon credit units have been issued, payment will then be made to the proponent as per the contractual arrangements.

C Conclusion

This brief description of the legislative framework underpinning the ERF has isolated some of the key features that must be present in order for a project to qualify as an eligible offsets project. Indeed, these are rather generic factors which are present in many carbon offset schemes.[87] The features of the ERF which are relevant for the purposes of this article are as follows:

- an applicable methodology;
- an identified offset site;
- a legal right to carry out the project on that offset site;
- additionality of the project;

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79 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 69(2).

80 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 11(2). If the project has not resulted in eligible carbon abatement, the Regulator must issue non-Kyoto Australian carbon credit units: s 11(3).

81 Australian Government, above n 42, 42.

82 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 20C.

83 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 20B.

84 Clean Energy Regulator (Cth), *Understanding Contracts* (4 April 2016) <http://www.cleanenergy regulator.gov.au/ERF/Want-to-participate-in-the-Emissions-Reduction-Fund/Step-2-Contracts-and-auctions/understanding-contracts>.

85 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 20CA(2).

86 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 10(c).

87 See, eg, Anja Kollmuss, Helge Zink and Clifford Polycarp, 'Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards' (Report, World Wildlife Fund Germany, March 2008) 14 ff <http://d2ouvy59p0dg6k.cloudfront.net/downloads/vcm_report_final.pdf>.

- ability to generate credits during the contracting and crediting period; and
- permanence.

Furthermore, another factor crucial to the ERF is the cost of the project. Cost is relevant to all emissions reduction schemes, but it is currently the sole determining factor for choosing a project under the ERF auction process.

Methodologies have been developed for biosequestration in the terrestrial realm,[88] and a number of vegetation projects have been awarded funds in previous ERF auctions.[89] This certainly indicates a promising potential to integrate blue carbon projects into the existing framework. However, the fundamental distinctions between terrestrial and marine ecosystems mean that a single legal framework may not necessarily be sensitive to the biophysical differences between these ecosystems.[90] Whilst the ERF framework has been successfully applied to terrestrial vegetation projects, the factors isolated above may not be satisfied quite so easily when applied to blue carbon projects. The next Part of this article will analyse these factors and difficulties, and consider how these can be addressed in order to effectively integrate blue carbon into Australia's domestic climate change strategy.

IV INTEGRATING BLUE CARBON INTO AUSTRALIA'S APPROACH TO CLIMATE CHANGE

Although Minister Hunt has indicated some appetite for the integration of blue carbon projects into Australia's climate strategy, it must first be determined whether the current framework can in fact accommodate these projects. The legal issues associated with incorporating blue carbon projects into a climate change strategy generally, and the ERF specifically, are not entirely unique. Some of these issues have arisen, and have been effectively analysed and addressed, in the context of biosequestration in terrestrial vegetation. This analysis provides a useful frame of reference here.

This foundational emphasis on terrestrial carbon sequestration projects has translated into international and domestic law being developed with reference to terrestrial ecosystems. This is not necessarily an impenetrable barrier to applying these concepts in the marine environment; in fact, there are other concepts and conservation strategies which developed in the terrestrial realm that have since been transplanted into the marine context, like protected area reserves

88 See, eg, *Carbon Credits (Carbon Farming Initiative – Reforestation and Afforestation 2.0) Methodology Determination 2015* (Cth).

89 See Clean Energy Regulator (Cth), *Emissions Reduction Fund Project Register* (23 September 2016) <http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register>.

90 See, eg, Justine Bell et al, 'Legal Frameworks for Unique Ecosystems – How Can the *EPBC Act* Offsets Policy Address the Impact of Development on Seagrass?' (2014) 31 *Environmental and Planning Law Journal* 34.

and biodiversity offsets.[91] However, any comparison and application must be carefully made as there are fundamental and significant distinctions between terrestrial and marine ecosystems which may affect the success of any transplanted legal instrument. First, tenure and ownership structures related to land are much simpler in the terrestrial than in the marine environment, and are more amenable to the existence of exclusive rights. Second, marine ecosystems are susceptible to a differing range of threats and impacts compared to terrestrial vegetation, which may impact on the success of sequestration projects. Marine ecosystems exist within an aquatic medium, which makes these systems more 'open', and therefore vulnerable to processes occurring on a much greater scale.[92] For example, coastal marine ecosystems like seagrass may suffer negative effects as a result of activities at an upstream source, which impacts on water quality downstream. Therefore, an area of marine vegetation cannot be considered in isolation from its broader context as it may potentially be impacted by activities occurring even hundreds of kilometres away.

This Part will consider these issues in the context of the ERF factors isolated above in Part III, although there is some overlap.

A An Applicable Methodology

In order to be registered as an eligible offsets project, there must be a methodology determination in place, and the project must meet the requirements specified within that determination.[93]

The procedure for creating a methodology is set out in the Act. The Minister is empowered to make a determination that:

(a) is expressed to apply to a specific kind of offsets project; and

(b) sets out requirements that must be met for such a project to be an eligible offsets project; and

(c) provides that … the carbon dioxide equivalent net abatement amount for the project … is taken, for the purposes of this Act, to be equal to the amount ascertained using a method specified in … the determination.[94]

However, the Minister must have regard to certain factors in making a determination, including whether it complies with the 'offsets integrity standards',[95] which are enumerated in section 133 of the Act, and include that:

- the application of the methodology should result in carbon abatement that is unlikely to occur in the ordinary course of events;
- the removal, reduction or emission of greenhouse gases should be measurable and capable of being verified; and
- the methodology must be supported by clear and convincing evidence.[96]

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91 See Mark H Carr et al, 'Comparing Marine and Terrestrial Ecosystems: Implications for the Design of Coastal Marine Reserves' (2003) 13 (Special Issue) *Ecological Applications* S90; Bell et al, above n 90.

92 Carr et al, above n 91, S92.

93 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) ss 27(4)(b)–(c).

94 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 106(1).

95 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 106(4)(a).

96 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 133(1).

To date, methodology determinations have been created for a number of sectors, with biosequestration-specific methodologies available for reforestation and afforestation projects,[97] human-induced regeneration,[98] and avoided deforestation,[99] as well as a methodology for carbon sequestration in soil.[100] However, these methodologies would not be applicable to blue carbon projects due to their definitional application.[101] These methodologies could potentially be amended to expand their application to blue carbon projects, and their collective application to vegetation and soil could possibly make this feasible.

That said, this approach would involve transplanting methodologies intended for the terrestrial realm into an entirely different context, and the transplant may not necessarily be sensitive to the unique characteristics of marine ecosystems. This issue has been considered in the biodiversity offsetting literature, with commentators advocating for separate policies for terrestrial and marine ecosystems due to their fundamental biophysical differences.[102]

Separate methodologies for terrestrial and marine carbon sequestration projects may also be prudent due to distinctions between these ecosystems. The current ERF reforestation and afforestation methodology requires the establishment of new plantings.[103] In contrast, conservation activities in the marine realm focus more broadly on 'restoration' or 'rehabilitation'. Restoration of a habitat refers to returning a degraded ecosystem to as close an approximation as possible of its former condition,[104] or 'the process of assisting the recovery of

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97 *Carbon Credits (Carbon Farming Initiative – Reforestation and Afforestation 2.0) Methodology Determination 2015* (Cth).

98 *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest – 1.1) Methodology Determination 2013* (Cth).

99 *Carbon Credits (Carbon Farming Initiative – Avoided Deforestation 1.1) Methodology Determination 2015* (Cth). Avoided deforestation is only permitted to be declared as an eligible offsets project in circumstances where a consent for clearing of vegetation had been granted: at s 10.

100 *Carbon Credits (Carbon Farming Initiative – Estimating Sequestration of Carbon in Soil Using Default Values) Methodology Determination 2015* (Cth).

101 Projects under the reforestation and afforestation methodology must include eligible land, defined as land that, in the five years prior, was used for grazing or cropping, or fallow between grazing or cropping, or a combination of these activities: *Carbon Credits (Carbon Farming Initiative – Reforestation and Afforestation 2.0) Methodology Determination 2015* (Cth) s 10. The human-induced regeneration methodology refers to the regeneration of native vegetation on land in circumstances where there has been, among other things, livestock: *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest – 1.1) Methodology Determination 2013* (Cth) ss 4–5. The avoided deforestation methodology applies to 'native forests', with this definition specifically referring to an area of 'land': *Carbon Credits (Carbon Farming Initiative – Avoided Deforestation 1.1) Methodology Determination 2015* (Cth) ss 5 (definition of 'native forest'), 10. The soil carbon sequestration method is directed towards the agricultural sector, and a project must involve sustainable intensification, stubble retention, or conversion to pasture: *Carbon Credits (Carbon Farming Initiative – Estimating Sequestration of Carbon in Soil Using Default Values) Methodology Determination 2015* (Cth) s 9(1).

102 See, eg, Bell et al, above n 90, 39; Melissa Bos, Robert L Pressey and Natalie Stoeckl 'Effective Marine Offsets for the Great Barrier Reef World Heritage Area' (2014) 42 *Environmental Science & Policy* 1, 5.

103 *Carbon Credits (Carbon Farming Initiative – Reforestation and Afforestation 2.0) Methodology Determination 2015* (Cth) s 11.

104 Eric I Paling et al, 'Seagrass Restoration' in Gerardo M E Perillo et al (eds), *Coastal Wetlands: An Integrated Ecosystem Approach* (Elsevier, 2009) 687, 687.

an ecosystem that has been degraded, damaged, or destroyed'.[105] Restoration activities may be active (eg, planting seedlings) or passive (eg, removal of stressors such as poor water quality or disruption to normal hydrology).[106] 'Rehabilitation' of an ecosystem refers to 'the replacement of structural or functional characteristics of an ecosystem that have been diminished or lost'.[107] Direct replanting of new plants is therefore only one of a number of approaches which may benefit coastal ecosystems, and the fact that ecosystems like mangrove forests have the capacity to self-repair once particular stressors have been corrected is a relevant factor to consider.[108] By way of example, one successful blue carbon project reported in the literature involved construction of a breakwater seaward of mangroves, which prevented erosion and allowed additional sediment to be deposited.[109] This type of activity can provide a suitable environmental condition for mangrove seedlings to naturally re-establish themselves. Importantly, these more passive restoration activities may, in some circumstances, also have a much lower cost than active replanting.[110] A standalone methodology for coastal blue carbon projects should adopt a broad approach to abatement activities, permitting proponents to develop projects that are most likely to produce effective outcomes and that expand coastal blue carbon sinks at the least cost. This is especially important for these projects to be competitive, given that the sole criterion for ERF projects in the auction process is cost.

In summary, a methodology will need to be amended or developed prior to the inclusion of blue carbon projects within the ERF framework, and particular thought should be given to development of a standalone methodology or methodologies. This is certainly not insurmountable in light of recent international work, with the IPCC *Wetlands Supplement*,[111] and the Verified Carbon Standard methodology for restoration activities[112] providing blueprints for development. Furthermore, although directed at an entirely different sector, the existing methodology for human-induced regeneration activities recognises the potential for activities apart from replanting to contribute to the development of carbon stores.[113] This may indicate a willingness on the part of the Department of

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105 Society for Ecological Restoration International Science & Policy Working Group, 'The SER International Primer on Ecological Restoration' (Report, Version 2, October 2004) 3.

106 Elisa Bayraktarov et al, 'The Cost and Feasibility of Marine Coastal Restoration' (2016) 26 *Ecological Applications* 1055, 1056.

107 Ibid.

108 Roy R Lewis III, 'Ecological Engineering for Successful Management and Restoration of Mangrove Forests' (2005) 24 *Ecological Engineering* 403, 406.

109 Babak Kamali and Roslan Hashim, 'Mangrove Restoration without Planting' (2011) 37 *Ecological Engineering* 387.

110 See, eg, Roy R Lewis III, 'Mangrove Restoration – Costs and Benefits of Successful Ecological Restoration' (Paper presented at Mangrove Valuation Workshop, Universiti Sains Malaysia, Penang, 4–8 April 2001) 1; cf Bayraktarov et al, above n 106, 1061.

111 Hiraishi et al, above n 27.

112 Verified Carbon Standard, above n 31.

113 *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest – 1.1) Methodology Determination 2013* (Cth) s 7.

the Environment and Energy to take a more holistic view of emissions reduction activities.

Finally, it should be noted that development of a methodology related to protection and restoration of mangroves to support sequestration and carbon storage has been identified as a priority area for the Department of the Environment and Energy for the 2015–16 period.[114] This will be an important preliminary step towards allowing some blue carbon projects to be accredited as eligible offsets projects.

B An Identified Offset Site

The ERF legislation offers two ways that a proponent may identify an offset site: through a geographical description, street address, and lot-on-plan description ('area-based'), or through the provision of details of how the boundary will be defined if this is not feasible.[115]

Area-based site identification based on lot-on-plan descriptions will not be applicable to marine-based ecosystems for obvious reasons, but defining a boundary through an alternative means is also not a straightforward exercise in the marine environment. Whilst spatial planning of land has been occurring across the globe for quite some time, marine spatial planning is a newer discipline.[116] Marine spatial planning has been defined as 'a public process of analysing and allocating the spatial and temporal distribution of current and future human activities in marine areas, to achieve ecological, economic, and social objectives that usually have been specified through a political process'.[117]

Like terrestrial land use planning, marine spatial planning has arisen out of the increasing recognition that unregulated development can have serious impacts on these areas.[118] Marine spatial planning can address potential overlaps between activities and competing use objectives, and also promote conservation of marine areas.[119] Although there is scope to apply spatial planning to marine areas and therefore facilitate the delineation of blue carbon project boundaries, most coastal areas have not yet been comprehensively mapped.

That said, we do not need to search too far for a useful case study. One of the best-known examples of marine spatial planning worldwide exists within Australian waters: the Great Barrier Reef Marine Park ('GBRMP').[120] The

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114 Department of the Environment and Energy (Cth), *Emissions Reduction Fund Methods: Development & Prioritisation*, above n 36. As noted above, as of 25 September 2016, this had not yet been updated to reflect 2016–17 priority areas.

115 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 13.

116 See, eg, Fanny Douvere, 'The Importance of Marine Spatial Planning in Advancing Ecosystem-Based Sea Use Management' (2008) 32 *Marine Policy* 762.

117 Vanessa Stelzenmüller et al, 'Practical Tools to Support Marine Spatial Planning: A Review and Some Prototype Tools' (2013) 38 *Marine Policy* 214, 214.

118 Sue Kidd and Geraint Ellis, 'From the Land to Sea and Back Again? Using Terrestrial Planning to Understand the Process of Marine Spatial Planning' (2012) 14 *Journal of Environmental Policy & Planning* 49, 52.

119 Douvere, above n 116, 762–3.

120 Although it should be noted that most of the ecosystems considered in this article fall outside the GBRMP designation.

GBRMP has been spatially zoned since 1981 in accordance with the Park's governing legislation enacted in 1975.[121] The current zoning plan, released in 2003, consists of eight different types of zones for the following purposes: general use, habitat protection, conservation park, buffer, scientific research, marine national park, preservation, and Commonwealth Islands.[122] The zoning plan, by reference to latitudinal and longitudinal coordinates, identifies the applicable zone for the entirety of the waters contained within the marine park.[123] This zoning allows for access to the most vulnerable parts of the park to be restricted, whilst less vulnerable locations can be used for commercial and recreational activities. There is considerable evidence that zoning has benefited species within the GBRMP, with higher populations of vulnerable fish species found in protected zones within the park.[124]

The benefits of applying marine spatial planning processes to blue carbon ecosystems are twofold: first, it identifies an area for protection; and second, it facilitates abatement projects by giving proponents a defined area to refer to. To date, marine spatial planning approaches have not been explicitly used for the purpose of isolating areas for carbon sequestration functions, although the GBRMP experience certainly demonstrates the viability of marine spatial planning within the Australian context. Given the expressed government support for the recognition of blue carbon sinks,[125] it is not inconceivable that a similar approach could be applied to other areas of the coast. This approach would also be consistent with research that has urged governments to integrate protection of coastal carbon sinks into broader decision-making processes surrounding coastal protection.[126] This is an area worthy of further analysis within the Australian context, especially given the pressures on coastal ecosystems from competing activities.[127]

C A Legal Right to Carry Out the Project

Once potential blue carbon sequestration project boundaries have been defined, the next step will be to establish rights to the sequestered carbon. Under the ERF legislation, a project proponent must have a legally enforceable right to the carbon sequestered within the identified offset site. This reflects general conservation practice, as clearly defined legal or property rights are considered essential to the operation of incentive-based conservation programs.[128] Carbon

121 *Great Barrier Reef Marine Park Act 1975* (Cth).

122 *Great Barrier Reef Marine Park Zoning Plan 2003* (Cth) s 2.1.1.

123 *Great Barrier Reef Marine Park Zoning Plan 2003* (Cth) sch 1.

124 Laurence J McCook et al, 'Adaptive Management of the Great Barrier Reef: A Globally Significant Demonstration of the Benefits of Networks of Marine Reserves' (2010) 107 *Proceedings of the National Academy of Sciences of the United States of America* 18 278, 18 279.

125 Hunt, above n 1.

126 Dorothée Herr, Emily Pidgeon and Dan Laffoley, *Blue Carbon Policy Framework 2.0* (International Union for Conservation of Nature, 2012) 25 ff.

127 For example, proposals for dredging in the GBRMP will impact on seagrasses: see, eg, Bell et al, above n 90, 36, 41.

128 Adam P Hejnowicz et al, 'Harnessing the Climate Mitigation, Conservation and Poverty Alleviation Potential of Seagrasses: Prospects for Developing Blue Carbon Initiatives and Payment for Ecosystem

sequestration programs must be underpinned by clearly defined land tenure arrangements, which are secured for the duration of the project.[129]

Depending on the location of the offset site, the land tenure and corresponding legally secure right may be relatively straightforward. A property owner generally has ownership rights over vegetation on their land,[130] although their ability to clear vegetation may be altered by statute.[131] Carbon is also sequestered in soil, and a property owner has rights to soil beneath their property, at least to a reasonable depth below ground.[132] It is unlikely that carbon will be sequestered deep enough in the soil to raise any ownership issues, and it would not currently come within the definition of 'mineral', in which case ownership would vest in the Crown.[133] If a single entity is both a landholder and the proponent of a carbon sequestration project upon that land, their right to the vegetation and soil, and in turn, the sequestered carbon, is secured by virtue of their ownership.

The situation is more complex where a third-party entity seeks to undertake works on land owned by another. Effectively, this requires the recognition of a third-party right in an intangible resource located on privately owned land. This problem has been largely resolved in the terrestrial context through the enactment of state legislation which allows for the right to carbon sequestered in vegetation to be severed from the ownership of land, and granted to another party, with this right registered or recorded as a separate right on land title.[134] In some states the existing profit à prendre mechanism is used to secure a right to sequestered carbon, whereas other states have developed standalone carbon rights. This inconsistency has been the subject of criticism, and it has been argued that these rights should be statutorily verified as a new and novel interest in land in all jurisdictions.[135] The lack of uniformity across the states in terms of definitions and specification of the right arguably presents a barrier to the trade of these interests on any national or international market,[136] but despite these internal

Service Programmes' (2015) 2 *Frontiers in Marine Science*, 9, 14–15 <http://dx.doi.org/10.3389/fmars.2015.00032>.

129 Lisa Naughton-Treves and Kelly Wendland, 'Land Tenure and Tropical Forest Carbon Management' (2014) 55 *World Development* 1

130 See, eg, *Masters v Pollie* (1620) 2 Roll Rep 141; 81 ER 712, cited in Peter Butt, *Land Law* (Thomson Reuters, 6th ed, 2010) 68.

131 See, eg, *Native Vegetation Act 2003* (NSW); *Vegetation Management Act 1999* (Qld).

132 Butt, above n 130, 14 ff.

133 See, eg, *Mineral Resources Act 1989* (Qld), which defines 'mineral' as a substance normally occurring naturally as part of the earth's crust, or dissolved or suspended in water or within the earth, or that may be extracted from these substances: at s 6(1). It also lists substances declared to be minerals, including clay, coal seam gas, limestone, and marble: at s 6(2).

134 *Conveyancing Act 1919* (NSW) pt 6 div 4; *Land Title Act 1994* (Qld) pt 6 div 4C; *Forestry Rights Registration Act 1990* (Tas); *Climate Change Act 2010* (Vic) s 3B, pts 4–5; *Forest Property Act 2000* (SA); *Carbon Rights Act 2003* (WA).

135 Samantha Hepburn, 'Carbon Rights as New Property: The Benefits of Statutory Verification' (2009) 31 *Sydney Law Review* 239.

136 Marianna Parry, 'A Property Law Perspective on the Current Australian Carbon Sequestration Laws, and the Green Paper Model' (2010) 36(1) *Monash University Law Review* 321, 332.

inconsistencies, Australia has been recognised as a world leader for the legislative recognition of carbon rights in terrestrial vegetation.[137]

Securing a right over carbon stored in coastal ecosystems is much more complex due to the location of these ecosystems. Mangroves and saltmarshes are distributed close to the shore, growing in the intertidal zone.[138] Seagrasses are submerged coastal plants, generally growing in shallow areas of the ocean near to shore.[139] If these areas of the coast happen to be privately owned, then there is no reason in principle why the legislative carbon rights discussed above cannot be applied to them.

However, it is more likely that these ecosystems will fall outside the boundaries of privately owned land, as the general common law rule is that the boundary of private property extends seaward to the mean high-water mark,[140] which generally corresponds with the upper limit of mangrove forests and saltmarshes. Furthermore, the inherently nebulous nature of the term 'mean high-water mark' has led to litigation in Australia to clarify property boundaries,[141] which has been the impetus for legislative reform in some jurisdictions. For example, legislative amendments were passed in Queensland in 2010 to clarify the extent of a 'tidal boundary' when land is surveyed.[142] The tidal boundary will always be surveyed on the landward side of mangroves, seagrasses and saltmarshes,[143] meaning that these marine plants will not fall within private land ownership.

In a situation where coastal ecosystems are distributed seaward of the high-water mark and therefore outside of private ownership structures, government responsibility becomes the next relevant issue for consideration. State governments have jurisdiction to three nautical miles seaward of the high water mark, with Commonwealth jurisdiction extending beyond that to 12 nautical miles.[144] As mangroves, saltmarsh and seagrass all grow in shallow water, they are most likely to be distributed within the state government jurisdictional area, thereby giving state governments the responsibility for regulation. That said, the Commonwealth government may still have some jurisdiction by virtue of the

137 Pamela O'Connor et al, 'From Rights to Responsibilities: Reconceptualising Carbon Sequestration Rights in Australia' (2013) 30 *Environmental and Planning Law Journal* 403, 406.

138 K Goudkamp and A Chin, 'Mangroves and Saltmarshes' in A Chin (ed), *The State of the Great Barrier Reef On-line* (Great Barrier Reef Marine Park Authority, 2006) 1, 1 <http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/666/1/State-of-the-Reef-Report-2006-Mangroves-and-saltmarshes.pdf>. The intertidal zone is the area above water at low tide, and under water at high tide.

139 Green and Short, above n 11, 5–7.

140 *Attorney-General v Chambers* (1854) 4 De G M & G 206; 43 ER 486, cited in Butt, above n 130, 28. This rule has been incorporated into legislation in some states: *Land Act 1994* (Qld) s 9.

141 See, eg, *Svendsen v Queensland* [2002] 1 Qd R 216.

142 This is defined as a boundary identified with reference to water subject to tidal influence (eg, high-water mark, mean high water springs): *Survey and Mapping Infrastructure Act 2003* (Qld) s 70, as inserted by *Natural Resources and Other Legislation Amendment Act 2010* (Qld) s 215.

143 *Survey and Mapping Infrastructure Act 2003* (Qld) s 72(2).

144 Geoscience Australia, *Maritime Boundary Definitions* (15 May 2014) <http://www.ga.gov.au/scientific-topics/marine/jurisdiction/maritime-boundary-definitions>.

Environment and Biodiversity Conservation Act 1999 (Cth); for example, in the Great Barrier Reef World Heritage Area.[145]

If a private entity wishes to undertake a blue carbon sequestration project, it will therefore likely need to negotiate some arrangement with the relevant state government to ensure that its interest in the sequestered carbon is legally secure. The various statutory carbon rights discussed above will not be applicable in this context as those rights exist in relation to land. In fact, there is no directly applicable right to carbon stored in marine ecosystems.

That said, there have been novel rights created to secure other types of interests in the marine context. One example which could have useful comparative value here is aquaculture leases.[146] Although not as well developed as land-based property rights, there has been an emergence of individual rights in ocean resources in the wake of the *Convention on the Law of the Sea*.[147] These rights have emerged particularly in the fisheries industry, with property rights developed to secure sites for aquaculture.[148] Aquaculture is the practice of farming fish, shellfish and aquatic plants, and is a rapidly growing industry globally.[149] The aquaculture industry in Australia has an estimated value of $1 billion, with most production occurring in Tasmania and South Australia (salmon and tuna, respectively).[150] Other jurisdictions have facilities for farmed oysters, barramundi and prawns.[151] To facilitate aquaculture operations, all Australian coastal jurisdictions have enacted or amended legislation to secure rights. Unfortunately, like the state-based regimes for terrestrial carbon rights, the various statutory entitlements to state waters for aquaculture purposes vary from state to state.

South Australia and Tasmania's legislation grant the most explicit and expansive rights to aquaculture operators. The *Aquaculture Act 2001* (SA) sets out the process for obtaining an aquaculture lease, and states that the lessee has a

145 The *Environment and Biodiversity Conservation Act 1999* (Cth) permits the Commonwealth to undertake an environmental impact assessment process in relation to matters of 'National Environmental Significance' ('NES'). Declared matters of NES include Ramsar wetlands (ss 16–17B), and the Great Barrier Reef Marine Park (ss 24B–24C).

146 Although it should be noted that aquaculture is in fact detrimental to the very ecosystems this article is concerned with, and a major cause of loss of mangroves in particular: see, eg, Edward B Barbier and Mark Cox, 'Does Economic Development Lead to Mangrove Loss? A Cross-Country Analysis' (2003) 21 *Contemporary Economic Policy* 418; Nesar Ahmed and Marion Glaser, 'Coastal Aquaculture, Mangrove Deforestation and Blue Carbon Emissions: Is REDD+ a Solution?' (2016) 66 *Marine Policy* 58. Regardless, the law as it has developed to secure aquaculture rights is of useful comparative value here.

147 *United Nations Convention on the Law of the Sea*, open for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994); Katrina M Wyman, 'The Property Rights Challenge in Marine Fisheries' (2008) 50 *Arizona Law Review* 511, 512.

148 Ibid.

149 Smith et al, above n 14, 834.

150 Australian Bureau of Agricultural and Resource Economics and Sciences, *Australian Fisheries and Aquaculture Statistics 2014* (2015) 13.

151 Ibid.

right of exclusive possession over the 'marked-off area' of the lease.[152] The *Marine Farming Planning Act 1995* (Tas) allows the Minister to grant a lease for 'marine farming' activities,[153] and the lease confers on the lessee exclusive possession of the area specified in the lease.[154]

In Western Australia, New South Wales, and the Northern Territory, a person may be granted an aquaculture lease.[155] However, in Western Australia and New South Wales, these leases only grant exclusive rights over fish resources, and not necessarily exclusive possession of an area.[156] The Northern Territory legislation explicitly states that exclusive possession is not automatically granted by virtue of a lease, although a condition may require or authorise the lessee to mark out all or part of the area as access restricted or prohibited.[157]

Queensland does not have specific aquaculture leases, and entitlements are granted via the usual development approval process under the *Sustainable Planning Act 2009* (Qld). Access rights are non-exclusive.[158] In Victoria, a generic Crown lease may be granted.[159] Crown lease areas within aquaculture fisheries reserves are not accessible by the public, and leaseholders are required to mark the boundaries of their area.[160]

Like terrestrial carbon sequestration rights, the biggest variation across the Australian state jurisdictions is the specification of the right: some states have created a specific aquaculture licence, whereas other states rely on existing legal instruments, such as Crown leases. The other distinction is the extent of the right: some states confer on the right-holder an exclusive right of occupation of the aquaculture area, others confer an exclusive right to fish stocks only, whilst others do not confer exclusive rights at all.

Exclusivity may be a more important issue to consider in the blue carbon context as compared to terrestrial vegetation. If a project proponent or a purchaser acquires a right in the carbon stored in terrestrial vegetation on private land, the potential risks to the vegetation are quite limited. Whilst the landholder will have access to the vegetation, any interference with the carbon stocks will most likely be covered by contractual arrangements. It is not inconceivable that a third party may access the site, but this interference would be captured by

152 *Aquaculture Act 2001* (SA) s 45. 'Marked-off area' is defined as 'an area of the lease with boundaries that are marked off or indicated in the manner required under the conditions of the lease or a corresponding licence': at s 3 (definition of 'marked-off area').

153 *Marine Farming Planning Act 1995* (Tas) s 59(1). 'Marine farming' is defined to include 'the farming, culturing, ranching, enhancement and breeding of fish or marine life for trade, business or research': at s 3 (definition of 'marine farming').

154 *Marine Farming Planning Act 1995* (Tas) s 59(2)(a).

155 *Fish Resources Management Act 1994* (WA) s 97(1); *Fisheries Management Act 1994* (NSW) s 163; *Fisheries Act 1988* (NT) s 55(2).

156 *Fish Resources Management Act 1994* (WA) s 97(3); *Fisheries Management Act 1994* (NSW) s 164.

157 *Fisheries Act 1988* (NT) s 55(4).

158 The Centre for International Economics, 'Comparative Review of Aquaculture Regulation' (Final Report, January 2014) 19.

159 *Land Act 1958* (Vic) s 134.

160 Victorian Government, *Victorian Recreational Fishing Guide 2016: Restricted Areas – Aquaculture Reserves* (9 December 2015) <http://agriculture.vic.gov.au/fisheries/recreational-fishing/restricted-fishing-locations/restricted-areas-aquaculture-reserves>.

legal action in trespass. Other potential risks to the carbon stocks, such as fire, may be insured against.[161] In contrast, a marine area may be publicly accessible, increasing the vulnerability of carbon stocks to potential harm. Granting an exclusive right to a proponent may in turn reduce the risks posed to the carbon sequestration project. This is an issue worthy of further consideration as part of any strategy to incorporate blue carbon into Australia's climate change approach, and the legal mechanisms to secure aquaculture leases provide a useful comparative case study. Additionally, the criticisms of the disparate nature of the state-based legal rights to sequestered carbon on land should be borne in mind by law-makers.

D Additionality

The concept of additionality is a central consideration for decision-makers responsible for the accreditation of projects. Essentially, it must be shown that a proposed offset project is 'additional' to the status quo. The additionality question has been explained as follows: 'Would the activity have occurred, holding all else constant, if the activity were not implemented as an offset project? Or more simply: Would the project have happened anyway? If the answer to that question is yes, the project is not additional'.[162] If a project is not additional, any payment for it will not be contributing to a reduction in emissions.

At present, biosequestration projects under the ERF may consist of afforestation, reforestation, human-induced regeneration, or avoided deforestation. Under the ERF legislation, any proposed eligible offsets projects must be additional through meeting the 'newness', 'regulatory additionality', and 'government program' requirements.[163]

A new seagrass, saltmarsh or mangrove planting project would likely satisfy these requirements, but there are particular challenges with implementing these projects in the marine context. As outlined above in relation to methodologies, a more appropriate activity in the marine realm may be a passive restoration activity, which is a human activity that allows for natural regeneration of an ecosystem. Regardless of whether new plantings grow successfully as a result of direct planting or an activity aimed at reducing stressors, a carbon sink will be established. Provided that a proponent can establish that the regeneration occurred as a result of their actions, this should be able to satisfy the additionality requirement. It would be prudent for this to be addressed in the methodology.

The removal of threats or stressors is also a possible activity which may achieve additionality. In the context of REDD+,[164] it has been suggested that

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161 See, eg, Insurance Facilitators, *Carbon* (2016) <http://www.if.net.au/carbon>. This is the first Australian product to cover forestry sequestered carbon against the risk of re-emission.

162 Kollmuss, Zink and Polycarp, above n 87, 15.

163 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 27(4A). See discussion above in Part III(B). A project has begun to be implemented when, eg, a final investment decision is made, an asset has been leased, construction has commenced, or soil preparation has commenced: at s 27(4C).

164 REDD+ ('Reducing emissions from deforestation and forest degradation…') is a mechanism to involve developing countries in forest management, both as a measure to mitigate the impacts of climate change

actions to reduce the risk of forest fires should be recognised as an approved activity, because fire causes a significant loss of carbon dioxide stores.[165] Proving additionality in this context is not difficult, as fires can be easily observed, and leave very particular impacts (eg, burn scars).[166] In contrast, it may be difficult to prove the links from upstream conservation activities, to improved water quality downstream, through to the resultant regeneration of blue carbon ecosystems. A methodology may need to be sensitive to the difficulties with proving causation and allow a proponent to meet an abatement requirement if proof of regeneration can be shown.

The ERF also allows for avoided deforestation projects to be accredited, provided that they meet the additionality criteria. Under the existing methodology, this requires that a clearing consent has already been issued for the vegetation.[167] There is no reason in principle why a similar approach could not also be extended to marine vegetation in circumstances where development approvals have been granted.

E Crediting and Contracting

The general rule under the ERF legislation is that a contract will not have a duration greater than seven years unless the project crediting period will be longer than this.[168] However, the contract length should still not exceed 10 years.[169] Additionally, a biosequestration project can generate credits over a 25-year period, unless another time period is specified in the methodology.[170] While it is recognised through these timescales that biosequestration projects may take longer to deliver abatement than other types of projects, projects in the marine realm may take a significantly longer time than terrestrial projects to reach their full sequestration potential.

Mangrove restoration can result in a fairly quick increase in coverage (three to five years), but it will take much longer for these plants to grow to the height and biomass of a mature forest stand, with soil carbon stocks taking even longer

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through reducing deforestation and as a measure to realise the myriad other benefits and ecosystem services associated with protecting and managing forests. The early foundations of REDD+ as a policy approach are found in the Bali Action Plan, the key outcome of COP13 in 2007. In addition to encouraging all states to voluntarily reduce emissions from deforestation, the Plan required parties to give consideration to: policy approaches and positive incentives for reducing emissions from deforestation and degradation in developing countries; and conservation, sustainable management of forests, and enhancement of forest stocks in developing countries: Conference of the Parties, United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007 – Addendum – Part Two: Action Taken by the Conference of the Parties at Its Thirteenth Session*, Dec 1/CP.13, UN Doc FCCC/CP/2007/6/Add.1 (14 March 2008) para 1(b)(iii).

165 Jos Barlow et al, 'The Critical Importance of Considering Fire in REDD+ Programs' (2012) 154 *Biological Conservation* 1.

166 Ibid 5.

167 *Carbon Credits (Carbon Farming Initiative – Avoided Deforestation 1.1) Methodology Determination 2015* (Cth) s 10.

168 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 20CA(2).

169 *Carbon Credits (Carbon Farming Initiative) Rule 2015* (Cth) r 10(c).

170 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 69(2).

to establish.[171] In fact, mangroves may take as long as 20–25 years to reach full maturity.[172] This is reflected in a 20-year study of a site in Florida where it was found that the rate of carbon soil accumulation after 20 years was similar to that of natural wetlands.[173]

Seagrass restoration projects also have the potential to store large amounts of carbon dioxide, although this potential may not be realised in the short term, as seagrass growth is an exponential process.[174] For example, estimating the carbon sequestration capacity of a seagrass project three to four years after commencement may produce disappointing results, and even 10 years after commencement may grossly underestimate its potential. However, modelling suggests that there is substantial sequestration potential after 50 years.[175] Blue carbon project proponents may need a longer time period in order to demonstrate that a project has been successful,[176] and thereby generate credits.

Saltmarsh restoration projects have focused around 'managed realignment', which involves allowing an area of previously reclaimed land to be inundated by the sea once again.[177] Again, time scales are extremely long; it may take approximately 100 years for the restored site to accumulate the same amount of carbon dioxide as a natural site.[178]

The ERF legislation does allow for a methodology to specify an alternative crediting period, and it may be prudent for this to be considered in the context of marine ecosystems, as abatement may not occur within the usual timeframes. It may also be necessary to consider longer contracting periods.

However, this issue also needs to be considered in the context of feasibility of projects and investment more generally: a proponent may be more amenable to investing in terrestrial carbon sequestration projects with a faster rate of return, rather than a blue carbon project which may take a significantly longer time for returns to be generated. Governments should consider ways to overcome this potential bias toward terrestrial sequestration projects, perhaps through the use of subsidies, or more generous crediting processes, for blue carbon projects.

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171 M F Adame et al, 'Carbon Stocks and Soil Sequestration Rates of Tropical Riverine Wetlands' (2015) 12 *Biogeosciences* 3805, 3806. See also Lewis, above n 110.

172 Bayraktarov et al, above n 106, 1068.

173 Michael J Osland et al, 'Ecosystem Development after Mangrove Wetland Creation: Plant–Soil Change across a 20-Year Chronosequence' (2012) 15 *Ecosystems* 848, 864.

174 Duarte, Sintes and Marbà, above n 21, 1342; Jill T Greiner et al, 'Seagrass Restoration Enhances "Blue Carbon" Sequestration in Coastal Waters' (2013) 8(8) *PLoS One* e726491 <http://journals.plos.org/plosone/article/asset?id=10.1371/journal.pone.0072469.PDF>.

175 Duarte, Sintes and Marbà, above n 21, 1344–6.

176 Susan S Bell, Michael L Middlebrooks and Margaret O Hall, 'The Value of Long-Term Assessment of Restoration: Support from a Seagrass Investigation' (2014) 22 *Restoration Ecology* 304, 309.

177 Peter W French, 'Managed Realignment – The Developing Story of a Comparatively New Approach to Soft Engineering' (2006) 67 *Estuarine, Coastal and Shelf Science* 409, 411.

178 A Burden et al, 'Carbon Sequestration and Biogeochemical Cycling in a Saltmarsh Subject to Coastal Managed Realignment' (2013) 120 *Estuarine, Coastal and Shelf Science* 12.

F Permanence

Another crucial issue to consider in the context of blue carbon project design and accreditation is permanence. The general rule relating to sequestration projects is that it will be regarded as 'permanent' if it will sequester carbon for more than 100 years.[179] At first sight, this is not especially problematic: Part II of this article outlined the capability of coastal vegetation to store carbon dioxide for long timeframes. However, coastal vegetation may be subject to a broad range of threats, which in turn could affect the permanence of a project. Whilst the main threats to terrestrial carbon sequestration projects are direct impacts (eg, bushfire, unauthorised clearing), marine vegetation may be affected by indirect and geographically distant activities. For example, seagrass may be influenced by reduced water clarity from dredging and agricultural run-off upstream.[180]

This creates particular difficulties for marine vegetation restoration projects, as the risk of failure can be high. Mangrove restoration is feasible, and has been done on a large scale across the globe.[181] That said, most efforts to restore mangroves have failed, either completely or partially,[182] although the understanding of how to achieve successful restoration is increasing rapidly.[183] Similarly, although restoring seagrass meadows is also technically feasible,[184] the success of restoration projects is often compromised by the dynamic environment that seagrasses are located within.[185] A recent study attempted to quantify success rates from reported data, and it found that the median survival rate for restoration projects was 38.0 per cent for seagrass, 51.3 per cent for mangroves, and 64.8 per cent for saltmarshes.[186] These statistics raise obvious concerns from a permanence perspective.

This challenge can potentially be overcome through careful project design, with particular regard to the sensitivities of the marine plants in question. Mangrove restoration projects are dependent upon very careful site selection, with a particular focus on suitable hydrology as well as long-term monitoring of projects.[187] Proponents should also take care to select restoration sites in locations that support natural recruitment.[188] Seagrass restoration projects are also prone to failure through poor site selection, such as by planting seagrass shoots in high-energy wave environments.[189] Selection of a site with more favourable water conditions would be appropriate to address this. Genetic diversity amongst plant

179 Noble et al, above n 64, 87–8 [2.3.6.3].

180 See, eg, Bell et al, above n 90, 36.

181 Lewis, 'Ecological Engineering', above n 108, 414.

182 Roy R Lewis III, 'Methods and Criteria for Successful Mangrove Forest Restoration' in Gerardo M E Perillo et al (eds), *Coastal Wetlands: An Integrated Ecosystem Approach* (Elsevier, 2009) 787, 787.

183 Bayraktarov et al, above n 106.

184 See, eg, Mark S Fonseca, Brian E Julius and W Judson Kenworthy, 'Integrating Biology and Economics in Seagrass Restoration: How Much is Enough and Why?' (2000) 15 *Ecological Engineering* 227.

185 Marieke M van Katwijk et al, 'Global Analysis of Seagrass Restoration: The Importance of Large-Scale Planting' (2016) 53 *Journal of Applied Ecology* 567, 576.

186 Bayraktarov et al, above n 106, 1060.

187 Lewis, 'Methods and Criteria', above n 182, 798.

188 Bayraktarov et al, above n 106, 1060.

189 Ibid.

species is another contributor to success.[190] Additionally, a recent study regarding seagrass restoration found that large-scale projects over a large area are more likely to be successful as they are spread over a range of different environmental conditions, and are therefore more likely to find an area of suitable conditions for growth.[191] This indicates that scale should be a factor to consider in possible blue carbon projects. Finally, saltmarsh survivorship depends on the species selected, with locally-sourced species more likely to survive than imported ones.[192]

It is crucial that a blue carbon methodology addresses these challenges to ensure that projects have the highest possible chance of success. The sole criterion for the ERF auction process is cost, so the methodology must be able to provide a preliminary screening process. Additionally, the ERF legislation currently includes a 'risk of reversal buffer', whereby the number of units generated by a project will be discounted by 5 per cent[193] as recognition that some projects may fail due to impacts outside the control of the proponent. It may be prudent to consider whether 5 per cent is a sufficient buffer for blue carbon projects, or whether a different buffer may be required. However, this would need to be managed in a manner that does not decrease the attractiveness of blue carbon projects to proponents, otherwise investment in this space may not occur.

G Cost of Projects

The cost of a project is critical if a proponent seeks to participate in the ERF auction process as the sole criterion for this scheme is price. This may put marine restoration projects at an immediate disadvantage as they are often more expensive than terrestrial biosequestration projects.[194] Furthermore, even within the marine context, some coastal ecosystems may be cheaper to restore than others.

Most of the literature regarding the cost of coastal restoration has focused on mangroves, and recent studies have provided advice on how to select the most cost-effective sites for mangrove restoration.[195] Compared to other coastal ecosystems, mangroves may be the least expensive to restore.[196] That said, much of the data concerning the costs of mangrove restoration may be difficult to put in a comparative context to other marine ecosystems as a large amount of restoration work has been done in developing countries and with high volunteer involvement.[197]

Seagrass restoration projects have historically been extremely expensive, with some example projects costing up to A$166 000 per hectare,[198] although

190 Elizabeth A Sinclair et al, 'A Genetic Assessment of a Successful Seagrass Meadow (*Posidonia australis*) Restoration Trial' (2013) 14 *Ecological Management & Restoration* 68.

191 Van Katwijk et al, above n 185, 574.

192 Bayraktarov et al, above n 106, 1063.

193 *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) s 16(2).

194 Bayraktarov et al, above n 106, 1067.

195 M F Adame et al, 'Selecting Cost-Effective Areas for Restoration of Ecosystem Services' (2015) 29 *Conservation Biology* 493, 494.

196 Bayraktarov et al, above n 106, 1067.

197 Ibid.

198 D A Lord & Associates Pty Ltd, 'Seagrass Rehabilitation: An Overview' (Report, October 2005) 17.

more recent studies have shown that some restoration projects may be more economically justifiable.[199] Again, given that the sole criterion for selection of ERF projects is price, it may be difficult for more expensive restoration projects to compete with other ERF projects.

If the federal government retains cost as the sole criterion for choice of ERF projects, blue carbon projects are at an immediate disadvantage. To encourage investment, the government may wish to consider whether some incentives are needed. Although an economic analysis of this is obviously beyond the scope of this article, the following options may be worthy of exploration. One potential option is the introduction of quotas for the ERF, or separate ERF programs, with funds consciously distributed amongst different sectors. Alternatively, blue carbon projects could be given a higher weighting in the auction process. This would make them more competitive whilst not completely removing the cost criterion. Finally, the government could reintroduce a biodiversity fund, which was a previous government scheme which allowed proponents to access funding for improving native vegetation. Participants were permitted to access this fund in conjunction with the Carbon Farming Initiative.[200] In such a scheme, participants could access funding to commence a blue carbon project which would in turn lower the cost of abatement per tonne of CO_2. This article does not endorse any of these approaches, but recommends that government consider their merits.

H Summary of Actions Needed to Integrate Blue Carbon Projects into Australia's Climate Change Framework

The foregoing analysis has demonstrated blue carbon projects likely can be integrated into the ERF, but there are some threshold issues which the government must first consider. In summary, these issues are:

1. a new methodology or methodologies is or are needed for blue carbon projects encompassing the whole spectrum of restoration activities. In particular, passive restoration activities must be included because in some circumstances they may be more successful and cheaper;
2. potential blue carbon project sites should be selected and spatially planned so proponents can identify their offset area. This spatial planning could occur as part of a broader decision-making process regarding the coast. This is especially important given that some potentially valuable blue carbon stocks are threatened by competing uses;
3. the government should explore how to legally secure a blue carbon project site. This could be done through spatial planning (eg, similar to access-restricted areas in the GBRMP) in conjunction with the

199 Abigayil Blandon and Philine S E zu Ermgassen, 'Quantitative Estimate of Commercial Fish Enhancement by Seagrass Habitat in Southern Australia' (2014) 141 *Estuarine, Coastal and Shelf Science* 1, 7.

200 Department of the Environment (Cth), *Biodiversity Fund: Frequently Asked Questions* (18 July 2013) <http://www.environment.gov.au/cleanenergyfuture/biodiversity-fund/faqs.html>.

aquaculture lease model. In any case, exclusive possession of an area should be a priority;

4. a methodology or methodologies for blue carbon must be sensitive to additionality issues. Additionality may be proven through regeneration, and it may be difficult to prove beyond doubt that regeneration was a direct result of the proponent's actions;
5. blue carbon projects may take longer to deliver outcomes than other abatement projects including terrestrial carbon sequestration projects, and this should be considered in the methodology and contracting process;
6. the government should consider the use of some sort of incentive to encourage investment in blue carbon projects, given that it may take longer for a proponent to receive a return on their investment;
7. a methodology or methodologies should be carefully drafted to ensure proponents are selecting appropriate sites and appropriate marine plants in order to reduce the risk of failure and increase the permanence of a project;
8. the government should consider including buffers to account for the potentially higher risk of project failure in the marine context, but this should be done in a manner that does not disadvantage blue carbon proponents; and
9. blue carbon projects are more expensive than other abatement projects, and proponents may therefore struggle to compete in an ERF process based entirely on cost. The government should consider the possibility of various incentive schemes to reduce this bias against blue carbon.

V CONCLUSION

The convergence of scientific knowledge and burgeoning political will means that the time is ripe to integrate blue carbon into mainstream climate change policy in Australia. This article has considered whether blue carbon can be integrated into the Australian government's current climate change approach, which is the ERF. It has concluded that, subject to some legal finessing, this is feasible. The successful resolution of these issues will pave the way for the inclusion of blue carbon ecosystems in the ERF. In turn, this should enhance carbon sequestration and protect these vitally important components of our natural environment from further decline.

Some of the issues canvassed in this article will not be particularly onerous to resolve. For example, preparation of methodologies for blue carbon projects can draw upon the now extensive international progress in this area. The issues surrounding legal security may be somewhat more challenging to resolve. That said, this article has demonstrated that there is already a wealth of experience within Australia that can be drawn on to facilitate these changes, including legal mechanisms for biodiversity offsets, marine spatial planning, and exclusive ocean rights for activities such as aquaculture.

Once these legal security issues have been considered and addressed, attention must turn towards the machinery of the ERF. Legislative or policy amendments may be required to allow for longer contract periods, larger buffers, and potentially some sort of financial incentive scheme to encourage investment in blue carbon projects.

Successful resolution of these issues would not only deliver benefits domestically, but also position Australia as a world leader in this sphere. Blue carbon is beginning to emerge as a potential source of projects under the United Nations Framework Convention on Climate Change regimes such as REDD+, and early scientific studies have examined the feasibility of pilot projects.[201] However, there has not yet been any significant analysis of the legal machinery required to appropriately operationalise and secure blue carbon projects. Although a number of these legal issues will be highly jurisdictionally specific, the Australian experience may serve to inform legal and policy analysis in other countries.

201 See, eg, Wylie, Sutton-Grier and Moore, above n 32.