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Bundling and stacking in bio-sequestration schemes: Opportunities and risks identified by Australian stakeholders

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ABSTRACT

The stacking and bundling of ecosystem services credits has emerged as mechanisms to promote the conservation of biodiversity in carbon sequestration schemes. Globally, apart from a few certification standards in the voluntary market, little genuine action has eventuated, but actors in these markets are continuing to examine the idea of combining carbon and biodiversity credits. This paper provides the first empirical analysis of the opportunities and barriers of bundling and stacking carbon and biodiversity credits as articulated by policymakers and academics, in Australia. Corporate social responsibility (CSR) acts as a driving force for business interest in the co-benefits of carbon plantings; however, uncertainty in the market and policy settings act as barriers for both buyers and sellers. Interviewees highlighted substantial benefits of both bundling and stacking, including easing transaction costs for landholders, reduced monitoring costs for regulators. Nevertheless, there is a risk that stacking can affect the perceived additionality of carbon plantings, which has the potential to erode the integrity of carbon markets. Obstacles to the establishment of stacked/bundled markets include the lack of standards to show that co-benefits are real, dealing with the additionality rule, and designing scenarios to achieve genuine outcomes for both biodiversity conservation and carbon abatement.

1. Introduction

Increasing public concern about climate change has generated a market for greater investment in bio-sequestration projects (the capture and storage of atmospheric carbon through tree planting; (Bekessy and Wintle, 2008; Venter et al., 2009a, 2009b; Crossman et al., 2011)). Payment for ecosystem services enables landholders to reap the benefits of two or more services on the one piece of land while also providing benefits to the public (Deal et al., 2012). Biodiverse plantings for carbon sequestration, where a diversity of tree species are planted, is an example of a potentially synergistic service whereby greenhouse gas emissions are sequestered and biodiversity is conserved. To encourage participation in biodiverse plantings for carbon sequestration, private landholders and investors should be able to take advantage of both ecosystem service markets (the carbon market and biodiversity market) on the one piece of land (Bekessy and Wintle, 2008). These two global ecosystem service markets have the potential to help private landowners generate income while benefiting both climate change abatement and biodiversity conservation (Venter et al., 2009a, 2009b).

High transaction costs in establishing carbon plantings (Cacho et al., 2013) and carbon market uncertainty among landholders (Kragt et al., 2014; Maraseni and Dargusch, 2008) are likely to reduce the uptake of carbon planting schemes. At the start of any new scheme (e.g., the Carbon Farming Initiative in Australia (Australian Government, 2011)), obtaining information is a costly first step, and is followed by establishment costs (labour, seedlings), project approval, monitoring and ongoing related costs (Cacho et al., 2013; Crossman et al., 2011; Galik et al., 2012). Under higher carbon price scenarios, the opportunity cost for landholders to plant trees instead of grazing or cropping will impact their decisions (Cacho et al., 2013). However, if the price of carbon is insufficient to cover all of the transaction costs, landholders will need additional incentives to cover their expenses and encourage them to participate (Crossman et al., 2011).

To better incentivise landholders for the biodiversity outcomes of carbon plantings, standards and a process for monitoring biodiversity outcomes are needed (Carswell and Burrows, 2006). This was confirmed in a Victorian Department of Sustainability and Environment investigation of the biodiversity outcomes of bio-sequestration schemes by surveying a selection of Australian offset providers (Kapambwe and Keenan, 2009). The study revealed that offset providers involved in bio-sequestration are concerned about a lack of incentives and a clear set of standards for biodiversity

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outcomes of bio-sequestration projects (Kapambwe and Keenan, 2009). Once developed, such standards would require consideration of the restoration outcomes of biodiverse plantations (compared to a "reference ecosystem benchmark") to achieve the delivery of large-scale conservation co-benefits (Standish and Hulvey, 2014, p.27).

Bundling and stacking credits from different ecosystem services are concepts gaining global attention (EPRI, 2011; Robertson et al., 2014; Van der Biest et al., 2014). Both bundling and stacking have the potential to be utilised as mechanisms to better incentivise landholders and to provide improved options for buyers in ecosystem services markets (Deal et al., 2012). *Stacking* ecosystem service credits refers to multiple credits generated from one piece of land being sold separately in the relevant markets (Robertson et al., 2014). For example, biodiversity gains, controlling water regimes and carbon sequestration benefits from biodiverse plantations can be stacked (Deal et al., 2012). Carbon and biodiversity credits could be sold in their respective markets separately (unstacked) to meet specific regulatory requirements. Stacking could provide incentives for landholders to deliver higher quality projects; for example, in addition to planting riparian vegetation, wetlands could be restored to provide multiple ecosystem services credits (water quality, wetland restoration, biodiversity conservation) (Cooley and Olander, 2011). However, care must be taken to ensure that these services are discrete and additional to avoid the common concern of regulatory bodies for the potential for 'double-dipping' (Woodward, 2011).

Bundling credits refers to selling multiple ecosystem services from one piece of land (i.e. biodiverse carbon credits) as a combined 'ecosystem credit'; it is up to the structure of the market to allow such transactions (Deal et al., 2012). Bundled credits cannot be sold separately in their respective markets. An example of bundled credits is 'premium carbon' whereby buyers pay a higher price for carbon that is sequestered with the co-benefit of biodiversity conservation.

Schemes for encouraging bundling and stacking credits for ecosystem services need to be designed carefully to achieve the desired ecological outcomes (Bryan, 2013; Venter et al., 2009a, 2009b). This is partly because of the complexity of trade-offs between different ecosystem services (Baral et al., 2014; Bryan, 2013). In the case of carbon and biodiversity, it is possible that greater amounts of carbon could be sequestrated with monoculture plantations, but biodiversity conservation objectives would not be met (Kanowski and Catterall, 2010). However, biodiverse plantings for carbon sequestration could increase the biodiversity co-benefits and indeed have the potential to sequester equivalent carbon when uncertainties surrounding fire, drought and pests are considered (Bekessy and Wintle, 2008; Lin et al., 2013) . Kinzig et al. (2011, p. 604) also argued that in the case of producing multiple ecosystem services from one piece of land, "paying for only one service can be as damaging as paying for none". This is because paying for multiple ecosystem services could increase the likelihood of environmentally beneficial outcomes (e.g. wetland restoration instead of riparian revegetation) (Cooley and Olander, 2011). The dynamic between different ecosystem services (e.g., biodiversity and biomass (Kirchner et al., 2015) requires careful consideration for designing the incentives to manage those services without jeopardising one while achieving the others (Fargione et al., 2008; Horan et al., 2008; Kolinjivadi et al., 2015). However, Kirchner et al. (2015) argued that despite the trade-offs, opportunities exist to promote synergies between ecosystem services.

Electric Power Research Institute (EPRI) conducted a survey in the USA to capture opinions about bundling and stacking credits. Credit buyers and sellers (wetlands, water, species and carbon credits), academics and policymakers in the field (wetland and species credits) active in the markets for ecosystem services participated in the survey (EPRI, 2011). More than 40 per cent of survey respondents believed that stacking will deliver positive ecological outcomes and 42 per cent that the positive ecological outcomes depend on the details of the stacking scenario (EPRI, 2011). However, in North Carolina, stacking credits for water quality improvement and wetland biodiversity have been criticised by academics and policymakers for 'double-dipping' and not achieving the net gain in restoration (Kenny 2010 in Robertson 2012). In this study we qualitatively explore the perspectives of experts on stacking/ bundling ecosystem services credits and discuss practical issues (e.g. market and policy) in design and implementation of such policies.

Corporate social responsibility (CSR) (Di Giuli and Kostovetsky, 2014) and mandatory requirements (Freedman et al., 2009; Tvinnereim, 2014) act as drivers for businesses to invest in bundled credits for ecosystem services (Bekessy and Wintle, 2008). Bundled credits have the potential to be seen as a 'public good'. Bundling and stacking should also appeal to private landholders seeking additional revenue sources to cover the establishment and transaction costs of biodiverse plantings for carbon sequestration. However, market and political uncertainty could reduce the attractiveness of such investments (Kragt et al., 2014). Political certainty attracts buyers and sellers, creates a better functioning market, and drives research and practical innovation towards bundling and stacking ecosystem services (Watson et al., 2014); the ultimate consequences could be novelty in the market for ecosystem services and diversity of credits generated from those services provided by natural resources.

This paper explores the opportunities and risks of bundling and stacking carbon and biodiversity credits from the perspectives of policy experts and academics in Australia. We provide the first empirical analysis in this context, interviewing stakeholders who are involved in guiding or implementing these schemes on the ground. Our research builds on the survey results of EPRI (2011) and other theoretical analyses (Robertson et al., 2014) to gain a deeper understanding of the opportunities and risks of bundled and stacked ecosystem service markets. We conclude with some recommendations for the development of stacked/bundled markets. Australia presents a valuable case study because it has an established history of voluntary biodiverse plantings for carbon sequestration and has recently introduced a range of regulated markets under the Emission Reduction Fund (Commonwealth of Australia, 2014). Lessons learnt in the Australian context will have international relevance as similar market and policy issues are of global concern.

2. Materials and methods

2.1. Current carbon and biodiversity policy settings

There are two key policy instruments relevant to the management of carbon and biodiversity on private land in Australia: The Carbon Farming Initiative (CFI) and biodiversity offsetting.

2.1.1. Carbon Farming Initiative (CFI)

The CFI was legislated in the Australian Federal Parliament in August 2011 with the aim of reducing emissions and establishing tradeable carbon credits (Australian Carbon Credit Units (ACCUs) through enhanced land management practices (Australian Government, 2011). Since the repeal of the Carbon Tax in July 2014, the scheme has been supported through the Emission Reduction Fund (ERF) as part of the Direct Action policy to tackle climate change and achieve Australia's carbon abatement target (Commonwealth of Australia, 2013). Since the start of the scheme, 4,226,090 ACCUs