

# The Australia clause and REDD: a cautionary tale

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**Abstract** If a binding agreement can be reached on a post-2012 international climate regime, it is likely to include the phased introduction of a market-linked mechanism for reducing emissions from deforestation and forest degradation in developing countries (REDD). Under such a scheme, countries that reduce net REDD emissions below a pre-set baseline would receive credits that could be sold in carbon markets and used by purchasing nations to meet their international mitigation obligations. This paper draws on the Australian experience with deforestation to identify some of the issues that might obstruct progress on REDD. For the past 20 years, Australia has had the highest rate of deforestation in the developed world; ~416,000 ha of forests were cleared annually between 1990 and 2009, resulting in the emission of almost 80 MtCO<sub>2</sub>-e/yr. It is also the only developed country that will rely on reduced deforestation emissions as the primary way of meeting its quantified emissions target under the Kyoto Protocol. Australia's approach to deforestation issues provides valuable insights into the difficulties an international REDD scheme might encounter.

## 1 Introduction

At the thirteenth session of the Conference of the Parties (COP13) to the United Nations Framework Convention on Climate Change (UNFCCC), the parties agreed to undertake negotiations on incorporating mechanisms in the post-2012 international climate regime to reduce emissions from deforestation and forest degradation (REDD), and enhance forest sinks, in developing countries (collectively known as 'REDD-plus').<sup>1</sup> Since then,

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<sup>1</sup>Decision 1/CP.13 (FCCC/CP/2007/6/Add.1).

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considerable progress has been made in developing a framework for REDD-plus, with notable decisions at both the Copenhagen (COP15) and Cancun (COP16) Climate Conferences.<sup>2</sup> While uncertainty remains about the nature of the post-2012 international regime, it appears that, if an agreement is reached, it is likely to include the phased introduction of a market-linked REDD mechanism. The essence of this mechanism is that it would enable developing countries that reduce net REDD emissions below a pre-set baseline (or reference level) to receive credits that could be sold in carbon markets and used by purchasing nations to meet their international mitigation obligations. As offsets, these credits would not normally result in a net reduction in global emissions; they would merely redistribute them. The primary aim of the scheme would be to lower abatement costs and promote sustainable development in developing countries, not unlike the Kyoto Protocol's Clean Development Mechanism (CDM).

The pros and cons of market-linked REDD schemes have been extensively debated in the literature (Karousakis and Corfee-Morlot 2007; Skutsch et al. 2007; Eliasch 2008; Humphreys 2008; Fry 2008; Neeff and Ascui 2009; Collett 2009; Angelsen et al. 2009). Supporters have focused on the potential for these schemes to lower abatement costs, promote sustainable development, and generate complementary environmental benefits (e.g. biodiversity conservation, improved air quality, reduced land degradation). Advocates also contend that only a market-linked scheme would have the capacity to generate sufficient resources to significantly reduce REDD emissions. The case against market-linked schemes is based primarily on their capacity to undermine the environmental integrity of the international climate regime by generating credits that do not represent genuine abatement. Concerns have also been raised about the risk that a market-linked scheme could stall abatement in other sectors (often described as 'market flooding'), cause poverty and dislocation, adversely affect the interests of Indigenous peoples and local communities, and threaten the sovereignty of developing countries.

Several recent studies have stepped beyond the debate about the advantages and disadvantages of a market-linked scheme and concentrated instead on the practical obstacles that such a scheme might encounter (Potvin et al. 2008; Corbera et al. 2010). Following this line of research, this paper draws on the Australian experience with deforestation to identify some of the issues that could hinder progress on an environmentally effective international REDD scheme. The relevance of Australian deforestation is related to two factors. First, for the past 20 years, Australia has had the highest rate of deforestation in the developed world (UNFCCC Secretariat 2011). Between 1990 and 2009, the average rate was 416,000 ha/yr, of which 55% was forest conversion and 45% reclearing (UNFCCC accounting). This deforestation generated 1.5 gigatonnes (Gt) of carbon dioxide equivalents (CO<sub>2</sub>-e), or an average of almost 80 million tonnes (Mt) CO<sub>2</sub>-e/yr (ADCCEE 2011a,b).<sup>3</sup> The vast majority of this deforestation was agriculture-related (clearing for grazing and cropping) (QDERM 2011; ADCCEE 2011a). Australia's efforts to control deforestation provide useful lessons for the design and implementation of a REDD scheme. Second, Australia is the only developed country that will rely on reduced deforestation emissions as the primary way of meeting its quantified emissions target under the Kyoto Protocol. Australia's approach to deforestation issues under the Protocol highlights the types of issues that a REDD scheme might encounter in the future.

The paper is set out as follows. Section 2 describes how deforestation is treated under the Kyoto Protocol and explores Australia's involvement in the negotiation of the relevant

<sup>2</sup> Decision 4/CP.15 (FCCC/CP/2009/11/Add.1); and Decision 1/CP.16 (FCCC/CP/2010/7/Add.1). See also the *Copenhagen Accord*, reproduced in Decision 2/CP.15 (FCCC/CP/2009/11/Add.1).

<sup>3</sup> Deforestation emissions estimates are 'net' (they include removals from regrowth on deforested land units) unless otherwise stated.

provisions of the Protocol. Section 3 provides a history of deforestation reform in Australia and analyses how effective the reform process has been. Section 4 identifies a number of REDD-related lessons that can be drawn from the Australian experience with deforestation. Section 5 provides a conclusion.

## 2 Australia, deforestation and the international climate regime

In the dying moments of the Kyoto Protocol negotiations in 1997, the Australian Government threatened not to sign the Protocol unless amendments were made to the rules regarding land use, land use change and forestry (LULUCF) to accommodate Australia's interests (Hamilton and Vellen 1999; Hamilton 2001,2007; Pearse 2007). Australia's primary request was for deforestation (or land use change (LUC)) emissions to be included in its base year (1990) because these emissions had fallen by ~50% over the period 1990 to 1997 (Electronic Supplementary Material, Fig. S1) (ADCCEE 2011a,b). As is explained in greater detail in Section 3, the fall in deforestation emissions was primarily due to market and climatic factors rather than policy changes. Notwithstanding this, Australia was aware that, if it was allowed to include deforestation emissions in its base year, it would receive credit for the reductions that had already occurred. These credits could then be used to offset emission increases in other sectors during the first commitment period, 2008 to 2012.

Desperate to reach agreement, the international community acceded to Australia's demands. The resulting amendment to Article 3.7 of the Kyoto Protocol, known as either Article 3.7(2) or simply the 'Australia clause', allows countries with net emissions from LULUCF in 1990 to include deforestation emissions in their base year emissions estimate. Australia is one of eight developed countries in the Annex I block to satisfy the conditions attaching to this clause (UNFCCC Secretariat 2008). Two of these (Denmark and Iceland) had no deforestation emissions in the base year and Russia has chosen not to claim the benefits of Article 3.7(2). Four others, Ireland, the Netherlands, Portugal and the United Kingdom, all members of the European Community, have included deforestation emissions in their base years. However, the effect on these countries' mitigation obligations is negligible as their combined deforestation emissions in 1990 were 1.4 MtCO<sub>2</sub>-e (UNFCCC Secretariat 2008). In contrast, Australia's deforestation emissions in 1990 were 132 Mt CO<sub>2</sub>-e and the capacity to include them in its base year will give Australia an 'offset' worth ~80–100 MtCO<sub>2</sub>-e/yr during the first commitment period (Electronic Supplementary Material, Fig. S1) (ADCCEE 2010a,2011a).

The application of Article 3.7(2) to Australia is analogous to the way avoided deforestation credits would operate under a market-linked REDD scheme. The 132 Mt CO<sub>2</sub>-e of deforestation emissions included in Australia's 1990 base year emissions is comparable to an avoided deforestation baseline. During the first commitment period, Australia has effectively been provided with offset credits equal to this baseline minus its actual net deforestation emissions. When deforestation is excluded, Australia's net emissions rose by 25% between 1990 and 2009, well in excess of the 108% target set under the Kyoto Protocol. If the accounting practices that apply to most other Annex I countries are used, whereby deforestation emissions are excluded from the base year but included in subsequent years, Australia's net emissions rose by 35% over this period. Article 3.7(2) is Australia's saving grace. When deforestation emissions are included in Australia's base year, net emissions rose by only 3% over this period, raising the prospect of Australia having surplus credits from the first commitment period (Electronic Supplementary Material, Fig. S2) (ADCCEE 2010a,2011a). In the absence of Article 3.7(2), Australia would have to import a substantial number of overseas credits to meet its Kyoto obligations.

The Australia clause could be defended on the grounds that, unlike other developed countries, at the time of the Kyoto negotiations a significant proportion of the potentially productive agricultural lands in Australia were still undeveloped. Accordingly, it is only fair that the Protocol should take into account Australia's unique position and provide an incentive for it to avoid deforestation. If this line of reasoning is followed, the deforestation emission estimate that was included in the base year should have constituted a projection of likely deforestation emissions over the first commitment period in the absence of measures designed to address climate change, otherwise it would result in the generation of 'hot air' credits (credits that do not represent actual abatement).

While this argument is not completely devoid of merit, it does not represent the content of the Australia clause nor the basis on which it was negotiated. Most analysts recognise that the clause is nothing more than a loophole designed to lower Australia's emissions target in a way that lacks transparency (Hamilton and Vellen 1999; Hamilton 2007; Pearce 2007). This is evident from the fact that the Australian Government was aware at the time of the negotiations that Australia's deforestation emissions in 1990 were historically high and that they had fallen sharply since that time. If the Australian Government was bona fide about being given credit for policy-induced reductions in deforestation emissions, it would have made some effort to ensure that the emissions that were included in the base year bore some resemblance to a projection of future emissions in the absence of climate policy measures.<sup>4</sup> On the contrary, the Australia Government knew that deforestation emissions in 1990 did not provide a sound basis for a 'without climate policy measures' projection yet it insisted on their inclusion in Australia's base year estimate as a condition for signing the Kyoto Protocol.<sup>5</sup>

### 3 Deforestation reform in Australia

#### 3.1 A short history of deforestation control

Australia is a federation comprised of six states, two self-governing mainland territories, and a collection of external territories. Traditionally, environmental and land use matters have been the domain of the states and self-governing territories. For much of the 20th century, these jurisdictions had contradictory policies on deforestation (or land clearing as it is known in Australia), with measures to conserve native vegetation existing alongside regulatory and policy programs that promoted deforestation (Australian State of the Environment Advisory Council 1996; Young 1996; AGO 2000). Reform of these structures began in the mid-1980s when significant changes were made to the land clearing regulations in South Australia and Western Australia. The Australian Government also removed tax deductions for the capital costs of land clearing and launched a number of information and voluntary 'beneficiary pays' measures (where the government pays landholders to alter their practices), including the National Tree Program in 1982 and the One Billion Trees and Save the Bush programs in 1989.

<sup>4</sup> This type of scenario is usually described as 'business-as-usual' (BAU). In the context of deforestation emission projections, the Australian Government defines BAU differently; as emissions in the absence of any policy measures (i.e. not only those motivated by climate concerns). To avoid confusion, the Australian Government's definition of BAU has been adopted in this article.

<sup>5</sup> Other countries employed similar tactics in relation to mitigation targets and the LULUCF accounting rules. See Löschel and Zhang 2002; Babiker et al. 2002; McKibbin and Wilcoxon 2002; Fry 2002; and Höhne et al. 2007.

While an important first step, the reforms of the 1980s did little to curb the national rates of deforestation. Clearing laws remained lax in most jurisdictions, particularly in the states facing the greatest deforestation pressures—Queensland and New South Wales (Australian State of the Environment Advisory Council 1996; Australian State of the Environment Committee 2001). Similarly, the non-regulatory programs may have generated localised benefits but they were not on a scale that was capable of driving significant changes in nationwide land use practices (Australian State of the Environment Advisory Council 1996; Toyne and Farley 2000; Australian State of the Environment Committee 2001; ANAO 1997).

The turning point for deforestation policy came in 1995. On 10 August of that year, the New South Wales Government introduced an approvals process (the *State Environmental Planning Policy No.46—Protection and Management of Native Vegetation Policy* (SEPP 46)) for the clearing of native vegetation in the eastern parts of the state. After a controversial two year period (Lee et al. 1998), SEPP 46 was replaced with the *Native Vegetation Conservation Act 1997* (NSW), which in turn, was replaced by the *Native Vegetation Act 2003* (NSW). The *Native Vegetation Act 2003* (NSW) commenced in 2005 and was supposed to end broad-scale clearing of remnant vegetation.

In Queensland, 1995 also marked the start of a regulatory reform process that is still ongoing. Late in the year, the Queensland Government issued guidelines to control broad-scale tree clearing on leasehold land, the dominant form of land tenure in Queensland's rangelands (Australian State of the Environment Advisory Council 1996; Rolfe 2000; Rolfe et al. 2000).<sup>6</sup> Since then, there have been three rounds of significant regulatory changes. In 1999, the *Vegetation Management Act 1999* (Qld) was passed, which extended the vegetation clearing restrictions to freehold land. Flaws in the regime ensured that high rates of clearing continued after the *Vegetation Management Act* came into operation. Due to this, the Queensland Government placed a moratorium on clearing applications in May 2003 and, a year later, a new regime commenced that aimed to end broad-scale clearing of remnant vegetation by 31 December 2006 (McGrath 2007; Kehoe 2006,2009).

While the changes of 2003–2004 were extremely significant, they left room for continued vegetation clearing. Of concern was the fact that regrowth vegetation remained vulnerable to widespread removal. This was partially addressed in April 2009 when a moratorium was placed on the clearing of high-value regrowth vegetation and native vegetation adjacent to regrowth watercourses in the so-called 'priority' Great Barrier Reef catchments (Burdekin, Mackay-Whitsundays and Wet Tropics). These interim arrangements were superseded by permanent changes that took effect on 8 October 2009.

The other notable change of the mid- to late-1990s was that the Australian Government increased its involvement in environment and land use programs. Most relevantly, in 1997 it launched a major natural resource management initiative—the Natural Heritage Trust, a AU \$2.8 billion, 10-year program that aimed to promote improved land management practices, biodiversity conservation, and the protection and replanting of native vegetation. This was followed by the National Action Plan for Salinity and Water Quality in 2000 (AU\$1.4 billion over seven years) and, in 2008, the Natural Heritage Trust and National Action Plan were replaced by Caring for Our Country (AU\$2 billion over five years). In 1999, the

<sup>6</sup> Australian land law is based on the doctrine of tenure, under which the government (or Crown) is the ultimate owner of all land and grants interests to private citizens from this underlying 'radical title'. These interests can be either freehold (typically assumed to be the equivalent of full ownership) or leasehold (usually time limited and requiring the payment of periodic rent) estates. In Queensland, leasehold dominates in western agricultural areas, while freehold is the primary form of tenure in eastern agricultural and urban areas.

Australian Government also passed the *Environment Protection and Biodiversity Conservation Act*, which, on paper at least, imposed regulatory restrictions that could control deforestation in areas containing ‘matters of national environmental significance’ (e.g. forests containing threatened species and ecological communities).

### 3.2 How successful has Australia been in controlling deforestation?

As discussed in Section 2, Australia’s deforestation emissions have fallen significantly since 1990 (Electronic Supplementary Material, Figs. S1 and S2). The Australian Government and others have attributed this to government action. For example, the Australian Minister for Climate Change and Water, Penny Wong, has argued that ‘State Governments have introduced vegetation management laws designed to protect natural resources and deliver climate change outcomes [and the] result has been that the area of remnant vegetation cleared annually has fallen from about 450,000 hectares in 1990 to approximately 200,000 hectares in 2005’ (Wong 2008a: 7).<sup>7</sup> Similarly, the *Garnaut Climate Change Review* asserts that ‘land clearing has slowed significantly since 1990, primarily due to regulatory controls’ (Garnaut 2008: 535).

The claim that the decline in deforestation is attributable to government policy measures is misleading, or at least incomplete. As Fig. S1 in the Electronic Supplementary Material shows, the sharpest fall in deforestation emissions occurred over the period 1990–1995, and ~80% of this decline came from Queensland and New South Wales (ADCCEE 2011b). The regulatory and policy regimes that were in place during those years were incapable of producing these trends. The best explanation is that during the late 1980s and early 1990s there was above average rainfall and high commodity prices, the combination of which triggered historically high rates of deforestation in agricultural areas (Rolfe 2000). With the onset of the global recession in the early 1990s and the 1991–1995 drought that struck parts of Australia, these drivers subsided and deforestation rates fell (ABARE 2004,2009; ABOM 2010,2011).

The impact of the reforms that have occurred since the mid-1990s is more debatable. In New South Wales, the regulatory regimes introduced prior to 2005 (SEPP 46 and the *Native Vegetation Conservation Act 1997*) failed to significantly reduce deforestation (Lee et al. 1998; Bartel 2003; NSW Auditor-General 2006; ADCCEE 2011b). The rate of deforestation (ha/yr) fell sharply between 1990 and 1995, then fluctuated between 61,000 ha/yr and 108,000 ha/yr over the period 1996–2005 (Electronic Supplementary Material, Fig. S3). The forest conversion rate (essentially the clearing of remnant forests), which the regulatory system was specifically designed to address, only declined slightly between 1995 and 2003 (by a total of 5,200 ha/yr).

The *Native Vegetation Act 2003* (NSW) commenced in December 2005 and was widely heralded as ushering in a new era in vegetation management (Cosier 2004). Yet, in the lead up to its introduction and its early years, deforestation trends worsened (NSWDECCW 2009,2010; ADCCEE 2011b). In 2004, deforestation intensified as landholders sought to pre-empt the legislative changes. This drove the deforestation rate to its highest level since 1990 and the forest conversion rate to its highest level since 1994. Deforestation remained high in 2005 then surged again in 2006, the first year of the new regime. Despite severe drought conditions across most of the state, the rate reached a 20-year high of 121,583 ha/yr

<sup>7</sup> The Australian Government’s line on this issue has not been consistent. In some instances, it has attributed the decline solely to government action, in others it has acknowledged the role of climatic and market forces (see AGO 2005a,22006a; ADCC 2008a,b,c; Wong 2008a,b; ADCCEE 2011a).



in 2006.<sup>8</sup> The majority of this was due to an increase in reclearing but the forest conversion rate was almost 30,000 ha/yr, the second highest level seen since 1994. The most recent data show that, while reclearing was relatively high in 2009, there was a notable decline in forest conversion, with the rate falling to 16,772 ha/yr; 29% below the 15-year average over the period 1995–2009 (Electronic Supplementary Material, Fig. S3). It is unclear at this stage to what extent this decrease is attributable to the new regime. Other factors, particularly the 2000s drought (which only eased in late 2009), 2008–2009 economic slowdown, and legacy of the pre-emptive clearing of the previous years, may also have contributed to the decline, raising the prospect of a rebound in deforestation rates as conditions for farmers improve.

Mirroring the trends seen in New South Wales, the early period of deforestation law reform in Queensland produced disappointing results. The 1995 laws failed. Deforestation rates did not decline in response to the reforms (Electronic Supplementary Material, Fig. S4). The changes even failed to significantly reduce the rate of vegetation clearing on leasehold land, which was its primary objective (QDERM 2009,2011). The ineffectiveness of the 1995 regime was due to two main factors: clearing on freehold land was largely unregulated in most agricultural areas and the regime that applied to leasehold land contained numerous exemptions. The regulatory regime that was introduced in 1999 encountered similar problems. As occurred in New South Wales over the period 2004–2006, there was widespread pre-emptive clearing before the 1999 laws commenced and a high deforestation rate in the regime's first full year of operation (Kehoe 2009; ADCCEE 2011b). Much of the pre-emptive clearing was due to the fact that there was a sizeable delay between the time the relevant legislation was first passed (8 December 1999) and when it commenced (15 September 2000). Deforestation rates fell in 2002 and 2003 but only back to the average seen in the mid- to late-1990s. This decrease coincided with an acute drought in eastern and southern Australia (ABOM 2003,2004,2010). The high rates of deforestation that occurred over the period 1999–2001 probably also contributed to the decline in the early 2000s by bringing forward future clearing.

In contrast to its predecessors, the land-clearing regime that was introduced by the Queensland Government in 2003–2004 has been extremely effective in curbing deforestation. Over the period 2005–2009, the deforestation rate fell by 64%, from 317,007 ha/yr to 112,608 ha/yr (Electronic Supplementary Material, Fig. S4). The 2009 result was 55% below the 15-year average over the period 1995–2009 of 252,649 ha/yr. Declining forest conversion was a major contributor to these overall trends; the forest conversion rate fell by 72% between 2005 and 2009 and the 2009 result was 67% below the 15-year average. Several non-regulatory factors, including the drought, flooding rains in parts of central and western Queensland in the latter part of 2009 and the economic slowdown, probably played a part in this decrease. However, the magnitude and sustained nature of the reduction and the fact that it coincided with the phase-out of broad-scale remnant vegetation clearing strongly suggest that the primary driver was the clearing laws.

While there is evidence of progress at the state level, the Australian Government's regulatory and non-regulatory initiatives since 1997 appear to have had little impact on deforestation. There is limited data on the environmental effectiveness of the Government's information and beneficiary pays programs but what are available suggest that their impact on deforestation has been negligible. This is probably due to relative under-investment in deforestation control, lack of capacity in regional and rural areas, and poor design and

<sup>8</sup> Eastern and southern Australia experienced drought conditions for much of the 2000s and 2006 was a particularly dry year in New South Wales (ABOM 2007a,b,2010).

administration (Australian State of the Environment Advisory Council 1996; Toyne and Farley 2000; Hassall and Associates Pty Ltd 2005; Australian State of the Environment Committee 2001,2006; ANAO 1997,2004,2007,2008). The evidence on the federal regulatory regime (the *Environment Protection and Biodiversity Conservation Act*) is categorical however; it has had almost no impact on deforestation. Between July 2000 and July 2008, the regulatory regime was applied to a total of 10 agricultural-related land clearing projects involving the removal of a mere 6,200 ha of vegetation, less than 0.2% of total national deforestation (ha) over the period (Macintosh 2009; ADCCEE 2011b).

#### 4 Drawing lessons from the Australian experience

The literature on REDD contains extensive discussion of the main climate-related risks of market-linked schemes, namely: additionality, measurement, leakage, and permanence. There is also a growing literature on the practical limits of an international REDD scheme and how on-ground issues may hinder progress on reducing REDD emissions (Skutsch et al. 2007; Potvin et al. 2008; Fry 2008; Neeff and Ascui 2009; Corbera et al. 2010; Skutsch and McCall 2010). The history of deforestation reform in Australia and Article 3.7(2) of the Kyoto Protocol illustrate how real these risks are and the need for vigilance in the design and administration of any REDD scheme. Four lessons from the Australian experience are worth highlighting:

- the risks associated with politically negotiated baselines;
- the complexity in setting baselines;
- measurement challenges; and
- the domestic obstacles to reducing deforestation and forest degradation and the steps that can be taken to overcome them.

##### 4.1 Risks associated with politically negotiated baselines

The loophole that Australia has exploited under Article 3.7(2) of the Kyoto Protocol is essentially a faulty baseline. A number of other countries also manipulated the LULUCF processes to the detriment of the environmental credibility of the Protocol (Höhne et al. 2007). These experiences suggests that, if REDD baselines are negotiated, there is a risk they will be overly generous and result in the production of hot air credits. This risk is particularly acute because of the incentives that both developed and developing countries have to agree on inflated baselines. In order to lure developing countries into the REDD scheme, developed countries may have to agree to baselines that make it relatively easy for developing countries to earn credits. At the same time, the generation of credits that are of dubious environmental value may suit some developed countries as it could drive down the international carbon price, thereby lowering the cost of meeting mitigation obligations.

##### 4.2 Complexity in setting baselines

Since the Kyoto Protocol was negotiated, the Australian Government has published a number of ‘business-as-usual’ (BAU) and ‘with measures’ (WM) deforestation emissions projections.<sup>9</sup>

<sup>9</sup> BAU is defined for these purposes as emissions in the absence of any policy measures. ‘With measures’ refers to emissions taking into account any policies that have an impact on emissions trends.



The Government's BAU projections have generally been derived by extrapolating from historical trends, a method that is supported by some parties in the international negotiations as a way of setting REDD baselines. In order to generate WM projections, the Government has tended to subtract an estimate of the anticipated abatement from the state land clearing reforms of 2003–2005 from the BAU estimate.<sup>10</sup> Fig. S5 in the Electronic Supplementary Material compares Australia's most recent reported deforestation emissions (covering the period 1990–2009) to the WM projections for the period 2003–2012, which were published between 2004 and 2010.<sup>11</sup>

As Fig. S5 in the Electronic Supplementary Material shows, the Australian Government's WM projections have suffered from considerable inaccuracy, even over short timeframes. Actual emissions over the period 2003–2008 were significantly above all of the projections, in some years by as much as 84%. The projections of 2009 emissions ranged in accuracy. The oldest projection from 2004 was the most accurate (actual emissions were 3% above the projection), and the newest projection from late 2010 was the least accurate (actual emissions were 17% below the projection). Even when emissions are aggregated over five years to mimic the Kyoto commitment period, large discrepancies remain—the aggregate actual emissions for five year periods for which data are available are between 32–63% higher than the equivalent projections.

The problems that the Australian Government has encountered in predicting deforestation emissions reflect the difficulty of the task. It is challenging to measure deforestation emissions and even harder to predict how they will change over time (DeFries et al. 2007; Brown et al. 2007; Skutsch et al. 2007; Eliasch 2008; Herold et al. 2008; Huettner et al. 2009; Griscom et al. 2009; Collett 2009). For the Government to have accurately predicted emissions, it would have had to foresee changes in commodity prices, rainfall and other relevant social and economic factors. This is made difficult by the variability and unpredictability of these types of underlying drivers (Brown et al. 2007; Herold et al. 2008).

#### 4.3 Measurement problems

Australia has one of the most advanced satellite-based systems for monitoring deforestation emissions in the world—the National Carbon Accounting System (NCAS). The NCAS program was established in 1997 in order to inform policy and account for LULUCF emissions and removals under the international climate regime (Howard 1997; AGO 2003). Over its first twelve years, approximately AU\$50 million was spent on the project (Hill 1997,1998,1999,2000,2001; Kemp 2002,2004; Richards 2004). Through this investment, the Australian Government has created a world-leading land-base emissions monitoring system.<sup>12</sup>

The Australian Government has expressed a high level of confidence in the accuracy of NCAS's emission estimates. In 2003, it rated the uncertainty level as 'low', or less than 20% (AGO 2005b). By 2006, the Government had classified the level of uncertainty with

<sup>10</sup> The Government has not justified the different treatment of the pre- and post-2003 clearing laws in its projections. One possible explanation is that it does not believe the pre-2003 reforms had any impact on deforestation.

<sup>11</sup> The 1990, 2008 and 2009 deforestation emissions estimates in Fig. S5 are from Australia's Kyoto accounts. For the period 1991–2007, UNFCCC reported deforestation emissions were adjusted downward by 10% to account for the differences between UNFCCC and Kyoto accounting (ADCCEE 2011a,b).

<sup>12</sup> NCAS was chosen by the Clinton Climate Initiative for its forest carbon measurement program and was awarded the 2008 Australian Museum Eureka Prize for Environmental Research and the 2008 CSIRO Partnerships Excellence Award.

the underlying deforestation activity data (ha/yr deforested) as zero and the emission factor uncertainties as 10% for CO<sub>2</sub> and 20% for both CH<sub>4</sub> and N<sub>2</sub>O (AGO 2006b). These uncertainty estimates have remained constant since 2006 (ADCC 2008d,e,2009; ADCCEE 2010b,2011a).

The published uncertainty ranges suggest Australia's deforestation emissions estimates are reasonably accurate. Other data indicate that the Government's confidence in the accuracy of its estimates may be overstated. Fig. S6 in the Electronic Supplementary Material shows the NCAS deforestation activity data (conversion and reclearing (UNFCCC accounting)) that was published over the period 2002–2011.<sup>13</sup> These estimates have varied considerably, in some years by in excess of 50%. The minimum difference between the highest and lowest estimates for a single year was 71,000 ha/yr; the maximum was 204,000 ha/yr. Even in the two most recent datasets (published in 2010 and 2011), the single year differences ranged from a low of 18,625 ha/yr to a high of 144,668 ha/yr.

NCAS's deforestation emissions estimates have also fluctuated. Fig. S7 in the Electronic Supplementary Material shows the CO<sub>2</sub> deforestation emissions that were reported by the Australian Government (UNFCCC accounting) over the years 2003 to 2011.<sup>14</sup> The minimum difference between the highest and lowest estimates for a single year was 2%; the maximum was 58%. The 1990 estimate has varied by up to 16%. Since 2006, there has been less variability but differences of up to 28% have still been recorded.

In addition to the extent of the year-on-year variability, there are apparent anomalies between the NCAS deforestation and emissions outputs. For example, in 2010, the Australian Government reported that cumulative deforestation and CO<sub>2</sub> deforestation emissions over the period 2000–2006 were 2.5 million ha and 488 MtCO<sub>2</sub> respectively. A year later, it reported that cumulative deforestation over the same period was 3.1 million ha, 25% higher than the previous estimate. Despite this increase, cumulative CO<sub>2</sub> deforestation emissions for 2000–2006 were reported as 492 MtCO<sub>2</sub>, a mere 1% higher than the equivalent estimate from 2010.

Further questions about NCAS have arisen because of differences between its activity data and the rates of woody vegetation change reported by state monitoring programs. Since 1995, the Queensland Government has run a satellite-based woody vegetation change monitoring program called the Statewide Landcover and Trees Study (SLATS). Like NCAS, SLATS is highly regarded both in Australia and internationally and it now forms an integral part of Queensland's natural resource management policy framework (QDERM 2009,2011). The success of the SLATS program resulted in its replication in New South Wales in the mid-2000s (NSWDECCW 2010).

There are differences between the deforestation that is monitored by NCAS and the woody vegetation clearing that is tracked by the Queensland and New South Wales Government programs (Macintosh 2007a; QDERM 2011). Deforestation is defined in Australia's greenhouse accounts (and NCAS) as the conversion of any area of land of  $\geq 0.2$  ha with crown cover of  $\geq 20\%$  with woody vegetation with the potential to reach 2 m or more in height to a non-forest use and any subsequent reclearing of regrowth forests (Australian Government 2008; ADCCEE 2011a). The New South Wales program monitors all decreases in woody vegetation with greater than 20% crown cover. Queensland's SLATS program adopts a similar approach, tracking the loss of perennial woody vegetation that can

<sup>13</sup> Preliminary estimates (typically covering the most recent two years) have been removed to provide a more accurate picture of the variability in the published estimates.

<sup>14</sup> The 2003 estimate was excluded because it is the same as the 2004 estimate. Preliminary estimates have been removed.

be identified using satellite imagery. With current technology, SLATS is able to detect woody vegetation change to a minimum threshold of approximately 8% foliage projective cover (FPC) (roughly 16% crown cover) (QDERM 2009,2011). However, SLATS also publishes woody vegetation change data confined to vegetation with a FPC of  $\geq 10$ –12%, which approximates the  $\geq 20\%$  crown cover definition that is used for the purposes of NCAS (QDNRM 2003,2005,2006; QDNRW 2008; QDERM 2009,2011).

Although the data from NCAS and the state government programs are not directly comparable, given the nature of the vegetation changes that the programs monitor, they should generate similar outputs (Macintosh 2007a,b). This is not reflected in the published data. Fig. S8 in the Electronic Supplementary Material compares the NCAS deforestation activity data for Queensland to the  $\geq 10$ –12% FPC woody vegetation clearing data published by SLATS for the period 1990 to 2009. The SLATS estimates range from being 148% higher to 33% lower than the NCAS results. The estimates from the New South Wales Government's program are between 52% and 85% below the NCAS results throughout the period 1990–2009 (Electronic Supplementary Material, Fig. S9).

An adequate explanation has not been provided for the observed differences between the NCAS outputs and those from the SLATS and New South Wales programs. One hypothesis is that they reflect the nature of the vegetation change that the programs monitor (Macintosh 2007b; QDERM 2009,2011). The Australian Government, for example, has suggested that SLATS monitors clearing of sparse woodlands that does not constitute UNFCCC/Kyoto deforestation and, due to this, 'it is to be expected that the areas of land clearing reported by [SLATS in Queensland] are higher than the areas of deforestation reported by NCAS' (Macintosh 2007b: 4). Another possible cause is NCAS's conservative approach to forest classification, under which a high probability threshold is used for the inclusion of areas as forest (AGO 2003). This results in the exclusion of areas where it is unclear whether the crown cover is  $\geq 20\%$  and the vegetation is  $\geq 2$  m. The adoption of a high probability threshold is designed to avoid false positives and is justified on the grounds that a lower threshold could artificially inflate the base year estimate of Australia's deforestation emissions (AGO 2003; Macintosh 2007a,b). The use of a conservative approach to forest classification may have resulted in NCAS excluding a significant amount of vegetation clearance that is picked up by SLATS and the New South Wales Government program (Macintosh 2007a,b). While these two factors may explain some of the discrepancies between the federal and state government datasets, if they were the primary causes the NCAS estimates would be consistently lower than those generated by the other programs. This is not the case. All of the New South Wales Government's estimates are below those generated by NCAS. Similarly, 40% of the SLATS estimates for the period 1990–2009 are below the equivalent NCAS estimates.

Attempts to properly evaluate the reasons for the differences in the federal and state government datasets, and the underlying drivers of the variability in NCAS outputs, have been hindered by a lack of transparency in the operation of the NCAS program. For much of the 2000s, the Australian Government did not release detailed NCAS outputs and rejected calls for the program to be independently reviewed. The refusal to release NCAS data hindered research efforts and was a source of concern amongst non-government organisations, opposition political parties and state government agencies (Macintosh 2007a, b; Parliament of Australia Senate 2009,2010a,b).<sup>15</sup> In March 2010, 13 years after NCAS was established, the Australian Government finally released fine-scale data on forest cover

<sup>15</sup> Transparency issues associated with NCAS have also been noted in reviews of Australia's inventory submissions under the UNFCCC and the Kyoto Protocol (UNFCCC Secretariat 2009a,b).

and land use change. The information was released under a return-to-order motion made by the Australian Greens and supported by the conservative Liberal-National Party Coalition in the Australian Senate. At the time of writing, this information was being analysed by independent researchers to identify the causes of some of the irregularities that have been detected.

The Australian experience with the measurement of deforestation emissions illustrate the types of problems that could arise with a REDD scheme. While there are several programs underway to establish or refine satellite-based monitoring systems in developing countries, including the World Bank's Forest Carbon Partnership Facility, the measurement of deforestation and forest degradation emissions will continue to be subject to significant uncertainty, at least in the short- to medium-term. These measurement difficulties could easily result in the over- or under-estimation of REDD abatement. This could be a product of deliberate manipulation of the data or inadvertent errors that arise as a result of the inherent difficulties associated with measuring deforestation and degradation emissions. The complexity of measuring these emissions naturally reduces transparency, a situation that can be aggravated by a reluctance on behalf of governments to divulge data and details of their monitoring systems.

#### 4.4 Obstacles to reducing deforestation and forest degradation

Australia is a developed country with advanced technological capabilities and, by global standards, mature and stable governance and institutional arrangements for the implementation of legal and policy measures. Poverty levels are low, literacy and education levels are high, and government budgetary pressures are slight in comparison to those faced by other countries. Despite these factors, and sustained public pressure for at least 20 years, Australia has struggled to control deforestation. Recently, significant progress has been achieved, particularly in Queensland. In 2009, the deforestation rate was 270,000 ha/yr, of which 90,000 ha/yr was forest conversion. This is 35% below the 1990–2004 average (and a 64% improvement for forest conversion) but is still the highest rate of deforestation in the developed world (UNFCCC 2011). Deforestation remains an issue in Australia.

There are several factors that have impeded deforestation reform. Foremost amongst them has been political resistance to change. Many farmers believe their interests in land are the equivalent of absolute ownership, embodying a right to use and develop land largely free from government restriction (HRSCEH 2001; Macintosh and Denniss 2004). Drawing on this Libertarian conception of property, farmers have argued that any attempt by government to prevent the removal of vegetation for public purposes constitutes a taking or acquisition of property that should be fully compensated (HRSCEH 2001; SFPAC 2010). Farm lobby groups campaigned throughout the late 1990s and 2000s on the basis of this 'property rights' position, arguing against the clearing reforms and urging both federal and state governments to create a statutory right to compensation for farmers whose interests in land are abrogated for public good environmental purposes (HRSCEH 2001; NFF 2002; AgForce Queensland 2003; Productivity Commission 2004; Macintosh and Denniss 2004; SFPAC 2010).<sup>16</sup>

The farm lobby received a sympathetic hearing from, and at times the full support of, the conservative Liberal-National Party Coalition in Queensland and New South Wales

<sup>16</sup> The sense of grievance felt by farmers over the land clearing laws was magnified by native title reforms of the 1990s and a water reform process initiated in 1994, both of which were perceived by farmers as eroding their interests in land and water resources.

(Armstrong 1998; Souris 2002; Gay 2003; O'Malley 2000; Greber 2001; Kehoe 2009). This can be partly explained by the electoral situation: the Liberal-National Coalition generally holds the majority of rural and regional electorates in these states and was keen to defend the interests of its constituents. The Liberal and National Parties are also ideologically predisposed to Libertarian views on property, especially when the property in question is agricultural land. The Labor Party (a centrist union-affiliated party) was in power in Queensland and New South Wales for most of the deforestation reform period, from 1995 to 2010. The resistance these state Labor governments faced from the farm lobby and the Liberal-National Coalition narrowed the scope for reform and resulted in concessions being granted that undermined the effectiveness of the laws. It has also been suggested that political pressures have influenced administration and enforcement to the detriment of environmental outcomes (Bartel 2003).

The role of the Australian Government added to the political complexity of the reform process. From 1996 to 2007, the Liberal-National Coalition was in office federally. Over this time, the Australian Government was reluctant to use its regulatory powers to directly curb the rates of deforestation (Macintosh and Wilkinson 2005; ANAO 2007; Macintosh 2009). While it recognised the importance of reducing clearing for protecting biodiversity and achieving Australia's Kyoto target, the Coalition Government appears to have been concerned that if it used its regulatory powers it would lead to conflict with the farm lobby (Grattan 2001; ABARE and BRS 2003; Kemp 2003a,b; Macintosh and Wilkinson 2005). Due to this, and possibly the Coalition's ideological preferences, the Australian Government concentrated primarily on ineffective beneficiaries pays programs to deal with deforestation for most of the late 1990s and 2000s.

When the Queensland clearing reforms of 1999 and 2003–2004 were initiated, the Australian Government engaged in negotiations with the Queensland Government over the design of the laws and financial assistance for affected landholders (Queensland Government 1999,2000; Beattie 2003). On both occasions, the negotiations were acrimonious and unsuccessful (Queensland Government 2000; Kehoe 2009). The dispute between the Federal and Queensland Governments over these issues resulted in the watering down of the 1999 laws and contributed to the delay in their commencement (Queensland Government 2000; Roberts 2000; Kerin and Altman 2001; Productivity Commission 2004; Kehoe 2009). The failure to reach an agreement also left the Queensland Government solely responsible for the provision of assistance to affected landholders. Due to this, no direct assistance was provided in relation to the 1999 reforms, which added to the resentment associated with their introduction (Borbidge 2000; Seeney 2003). In contrast, a AU\$150 million state government package accompanied the introduction of the 2003–2004 laws, comprising AU\$130 million for structural adjustment, AU\$12 million for a vegetation retention and management incentive program and AU\$8 million for a farm lobby group called AgForce to promote improvements in environmental management (QRAA 2005; Kehoe 2006,2009). While this package assisted with the transition, it by no means eliminated the opposition to the reforms and there were ongoing complaints about the administration and design of the funds and amounts provided to affected landholders (Kehoe 2006,2009; SFPAC 2010).

In New South Wales, no direct assistance was offered to landholders following the introduction of the 1990s reforms (Productivity Commission 2004). However, negotiations between the federal and state governments over the *Native Vegetation Act 2003* (NSW) led to the creation of a AU\$436 million joint funding package aimed at restructuring the state natural resource management system and helping landholders adjust to the changes (Kemp and Truss 2003; New South Wales Government 2005). As happened in Queensland, the

package smoothed the introduction of the reforms but many landholders were aggrieved by the amount of assistance available and remain strongly opposed to the laws (SFPAC 2010). The extent of the resentment felt by some landholders is best illustrated by Peter Spencer, a New South Wales farmer who has sought compensation before Australia's Federal and High Courts for the effects of the clearing laws on his property rights and staged a high profile, 52-day hunger strike on a communications tower to protest against his treatment (Maiden 2010).<sup>17</sup>

To the political obstacles to reform must be added the practical. Deforestation in Australia occurs over a vast area of land, with much of the recent clearing occurring in relatively remote areas in central and western Queensland and New South Wales. These characteristics create difficulties for regulatory design, information dissemination, monitoring and enforcement. The Queensland Government was quick to recognise the role that satellite monitoring and spatial mapping could play in overcoming these issues, establishing its SLATS program in 1995 and undertaking a state-wide mapping exercise to identify remnant and regrowth vegetation, and regional ecosystems, which was then used to underpin the regulatory system (Wilson et al. 2002; McGrath 2007). The data provided by both programs played a critical role in the reform process, providing an information base for implementation, enforcement and legislative improvements. An essential element of the SLATS program's success has been the transparent manner in which it has been administered, with regular reports being published and the program allowing access to detailed datasets. In New South Wales, a similar program was not established until the mid-2000s, which may help explain some of the problems encountered in its deforestation law reform process.

The issues that have hindered deforestation reform in Australia, and the steps that have been taken to overcome them, are of direct relevance to the proposed international REDD scheme. Due to budgetary constraints, path dependencies and relative administrative ease, Australian governments have relied heavily on regulatory instruments to achieve deforestation outcomes (Rolfe 2002; Productivity Commission 2004; SFPAC 2010). This has created conflict with landholders and associated groups, which in turn, has undermined the political will for reform. The provision of financial assistance to affected groups has aided the reform process but problems have remained. These events reinforce the findings of the likes of Corbera et al. (2010) about the difficulties of reducing deforestation and forest degradation. Economic instruments or regulatory measures tied to international REDD funding could be used as a way of reducing political opposition to change and promoting cost-effective outcomes. However, care will be needed to minimise corruption and ensure that the associated financial resources are distributed appropriately—a challenging task in countries with underdeveloped governance structures. Although the events in Australia illustrate the types of obstacles that could impede reform, they also point to the wisdom of some of the measures being taken to support the creation of the international REDD scheme. For example, the satellite monitoring and spatial mapping programs introduced in Australia highlight the importance of the efforts of the World Bank, Clinton Climate Initiative and others, including the governments of Australia, Brazil, India, Indonesia and Papua New Guinea, to establish similar programs in developing countries. Likewise, the evolution of the Queensland and New South Wales deforestation regimes suggest that a market-linked REDD scheme should be phased in over a period of time, as has been proposed in the international negotiations.

<sup>17</sup> *Spencer v Commonwealth of Australia* [2010] HCA 28.



## 5 Conclusion

It is difficult to draw direct parallels between the Australian experience with deforestation and the proposed REDD schemes. The political environment has changed since the Kyoto Protocol and its rules were negotiated and history may not be a good guide to how the international climate regime will evolve in the coming years. The economic, social and governmental environment in Australia is also different from that in tropical developing countries. Notwithstanding these considerations, the Australian experience does provide insights into the risks associated with a market-linked REDD scheme, especially the obstacles to success and the potential for the scheme to undermine the environmental credibility of the international climate regime.

Skutsch et al. (2007: 330) have described deforestation as ‘a hard nut to crack’. The history of deforestation regulation and reform in Australia highlights just how hard the task is. Fifteen years of government action has yielded variable results. It took a full decade of failed measures and half attempts before concerted steps were taken to reduce native vegetation clearing. There are now signs of progress but deforestation continues to be an issue of concern—all this in a developed country with few of the governance, institutional and technical problems that stand in the way of progress in developing countries.

More than simply highlighting how difficult reducing REDD emissions in developing countries is likely to be, the Australian experience is a reminder of how the environmental credibility of an international REDD scheme could be undermined. The success of any future market-linked REDD scheme will hinge on how well the baselines approximate emissions in the absence of additional policy measures, the accuracy of emissions estimates and the capacity to identify drivers of emissions trends. Despite having considerable institutional and technical capabilities, Australia has struggled with all three. Its deforestation baseline under the Kyoto Protocol was deliberately manipulated. In domestic policy processes, the Australian Government has found it difficult to formulate accurate deforestation emissions projections. And while it has one of the most advanced satellite monitoring systems in the world, the Australian Government’s deforestation emission estimates have been subject to considerable uncertainty and lacked transparency.

There has been a tendency in some circles to exaggerate the benefits of a market-linked REDD scheme and downplay the risks and limitations. This paper has deliberately highlighted the latter in an attempt to provide a more realistic picture of what an international REDD scheme might be able to achieve. A well-designed REDD (or REDD-plus) scheme has the potential to generate significant benefits for all participants; however, progress on REDD will take time and the benefits will not be realised without considerable effort to ensure that any future scheme is designed and administered in a transparent and environmentally robust manner.

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