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Abstract

Australia's biodiversity is in decline for a variety of reasons. Aspects of the observed changes in Australia's natural systems have already been linked to climate change. In addition to climate change pressures, Australian Governments have failed to appropriately correct for the market's failure to value biodiversity.

The risks from climate change, and policies to address them, have been subject to extensive analysis and discussion in Australia, most prominently through the 2008 Garnaut Climate Change Review. I was recently commissioned by the Government to update the Review.

The 2008 Review posed one central question. "What extent of mitigation, with Australia playing a proportionate part, provides the greatest excess of gains from reduced risks of climate change over costs of mitigation?"

In answering this question, I proposed a decision-making framework that identified four types of benefits or gains from the reduced risks of climate change. One of these types of benefits related to non-market benefits. These are benefits not reflected in the usual measures of economic value and include the benefits of biodiversity and preserving the natural estate.

The Review found that there is considerable potential for biosequestration to contribute to national mitigation efforts.

The update to the Review will include a discussion of abatement opportunities in the land sector. Adopting a carbon price will correct the negative externality associated with greenhouse gas emissions. It will provide incentives for increased biosequestration activities. This will generally be helpful to biodiversity directly, as well as through its indirect effect on the global effort on climate change.

However, a carbon price does not incorporate the value of biodiversity. The expansion of other mechanisms for supporting biodiversity can overlay incentives for carbon sequestration, and maximise the value of the co-product. This will require careful design of incentives.

The likelihood that future generations will value non-market benefits such as biodiversity ever more than today's, further motivates the need for us to develop policies that not only correct the world's greatest market failure related to the external costs of greenhouse gas emissions but also the related but different failure to appropriately value the natural estate and biodiversity.

Introduction

Climate change is a global problem that requires a global solution. Greenhouse gas emissions have grown rapidly in the early twenty-first century, and will continue to grow rapidly in the absence of effective mitigation. From an economic perspective, as Stern so clearly described it, climate change is the greatest example of market failure that the world has seen (Stern 2007, p25).

Just as greenhouse gas emissions represent a market failure, the decline in Australia's biodiversity can also be attributed at least in part to a failure to correct through public policy for market processes' failure to value the natural estate. Land clearing, the introduction of new plants and animals, redirection of waterways and other landscape modifications since European settlement have caused extinctions and changed ecosystems. Around 50 vertebrate species and a similar number of plant species have become extinct in the last 220 years, and Australia's record over this period for mammalian extinction and decline is worse than any other country (Steffen et al. 2009, p41). At least 1,700 species and ecological communities are said to be threatened and at risk of extinction (DSEWPaC 2010).

As Ken Henry, Secretary to the Australian Treasury, recently noted: "In a world with readily available market measures of things like income and employment, the lack of a similarly accepted measure of the value of the environment creates the risk that government policies and project approval processes will fail to get the balance right" (Henry 2010).

Economists can define mechanisms like a carbon price to more accurately reflect the costs to society of greenhouse gas emissions, and they can also identify market-based solutions to benefit biodiversity.

Climate change is a major additional significant stressor on biodiversity in Australia. With unmitigated climate change, it would be likely to become an overwhelmingly important stressor in the course of this century. It affects ecosystems and biodiversity by shifting, reducing and eliminating natural habitats. Many Australian species of flora and fauna are at risk from climate change because of their restricted geographic and climatic range. Where ecosystems and species have low tolerance for change, altered climatic conditions can trigger irreversible outcomes such as species extinction.

Australia is subject to risks of greater damage from climate change than any other developed country. It therefore should have a greater interest in strong mitigation than other developed countries. As I pointed out in the Garnaut Climate Change Review (the Review), Australia is already hot and dry, so variations in climate are especially damaging to us.

The significant risks that Australia faces from climate change and hence, the significant benefits that arise from climate change mitigation were a central theme for the 2008 Review. The Review considered four different types of climate change mitigation benefits. One of these was non-market benefits,

which include biodiversity. We know that many people value non-market benefits and would be prepared to sacrifice some consumption of goods and services to retain them. Furthermore, as incomes and material consumption rise over time, people are observed to place greater value on non-market benefits.

Adopting a carbon price could correct the negative externalities associated with greenhouse gas emissions. The effects of a carbon price will include incentives to reduce greenhouse gas emissions through biosequestration. The Review concluded that there is considerable potential for biosequestration to contribute to Australian mitigation efforts.

Biosequestration activities aid biodiversity indirectly by contributing to mitigation of climate change. In addition, biosequestration activities can deliver direct biodiversity benefits, for example by providing wildlife habitat and corridors. This is likely to be most important when the biosequestration is achieved through conservation and restoration of natural woodlands and forests.

However, a carbon price does not directly correct the failure to value biodiversity. Therefore, additional incentives need to be developed specifically to encourage biodiversity, as is recognised in a number of Commonwealth and State programs. This is separate from climate change mitigation policy, but the interaction of incentives to reduce greenhouse gas emissions (the carbon price) and incentives for biodiversity may enhance both the carbon sequestration and the biodiversity effects.

It is too late for mitigation to prevent all damaging climate change. Thus, in addition to measures to mitigate climate change it is also necessary to assist the adaptation of many natural systems. This is another area in which there are complex interactions between biodiversity and other objectives of policy.

I have been commissioned by the Government to conduct an independent update of the 2008 Garnaut Review, and to report by 31 May 2011. My update will cover areas where there have been significant changes or new knowledge since the work done for the 2008 Review. My focus will be on changes or improvements in knowledge that have significant implications for the Review's key findings and recommendations. The update will include a discussion of abatement opportunities in the land sector, which will inevitably raise their relationships with biodiversity.

This morning I will discuss the role of biosequestration in Australia in lowering emissions, and in potential adaptation to climate change. I will also discuss possible incentives for biodiversity that take advantage of the biosequestration opportunities associated with a carbon price. However, I will begin with a brief discussion of Australia's biodiversity and the pressures from climate change.

Australia's biodiversity in a changing climate

You are all aware that Australia's biodiversity is globally significant. Between 7 and 10 per cent of all species on Earth live in Australia (Steffen et al. 2009). More than 90 per cent of Australia's flowering plants, reptiles and frogs, 87 per cent of mammals and 45 per cent of birds are found nowhere else (Chapman 2009).

Governments have only relatively recently acted to coordinate biodiversity conservation efforts. The first national biodiversity conservation strategy was developed in 1996. A new strategy, released in October this year, credits the initial strategy with driving development of new policies, programs and legislation to protect biodiversity. However, it also recognises that biodiversity has continued to decline, and at the same time governments have had considerable difficulty agreeing on a set of national objectives and targets for biodiversity conservation (Natural Resource Management Ministerial Council 2010).

Climate change will be one of the big challenges for sustaining biodiversity into the next 50 years, and beyond. The Millennium Ecosystem Assessment found that: "By the end of the twenty-first century, climate change and its impacts may be the dominant direct driver of biodiversity loss and changes in ecosystem services globally" (Millennium Ecosystem Assessment 2005). I would like to acknowledge Professor Hal Mooney's contribution to this landmark report.

The effects of climate change on biodiversity and ecosystems are already being seen. An expert group commissioned by Commonwealth, State and Territory natural resource management ministers and chaired by Professor Will Steffen reported in 2009 that: "The impacts of climate change on Australia's biodiversity are now discernible at the genetic, species, community and ecosystem levels across the continent and in our coastal seas" (Steffen et al. 2009, p180).

Future impacts of climate change on Australia's biodiversity are expected to be severe. Biodiversity was assessed by the Intergovernmental Panel on Climate Change in its 2007 Fourth Assessment Report to be the most vulnerable 'sector' in Australia (IPCC 2007). 'Sector' is a strange word in this context, but I will follow the IPCC usage to make the point. While many Australian sectors are subject to significant potential impacts, the IPCC's assessment was that our natural ecosystems are more vulnerable because they have less capacity to adapt than sectors such as energy, infrastructure and human health. The IPCC found that Australia's natural ecosystems will become vulnerable at a temperature increase of less than two degrees, whereas energy security has a greater adaptive capacity, becoming vulnerable once temperature increases approach four degrees. The vulnerability of our biodiversity reflects the pressures from human modification of natural systems as well as Australia's physical characteristics—for example, on this flat continent many cool climate species will not be able to move to higher altitudes as temperatures rise.

These assessments of Australia's vulnerability point to a need for an enhanced research effort on climate change impacts on biodiversity and adaptation options. The Government's announcement last Friday of a new national plan and associated funding for research into adaptation for terrestrial biodiversity is a significant step.

The Review's framework for climate change policy decision-making

The 2008 Review's assessment of the benefits of climate change mitigation sought to draw attention to non-market values such as those associated with environmental conservation. Let us look at conservation in the context of the decision-making framework presented in the Review.

The Review posed one central question. "What extent of mitigation, with Australia playing a proportionate part, provides the greatest excess of gains from reduced risks of climate change over costs of mitigation?"

The question was asked from the perspective of the Australian national interest. This was a different perspective around a different question, to that asked in other studies on the extent to which mitigation was justified (Stern 2007; Nordhaus 2007; Cline 1992). These studies addressed the question of whether mitigation action was justified for the world as a whole, which turns out to be an easier question than whether mitigation action is justified from the point of view of an individual country.

An assessment of whether mitigation is justified for an individual country must deal with all of the complexities that Stern addressed for the world as a whole—plus one. And that additional source of complexity is perhaps the most difficult of all.

The relevant mitigation is global. A single country's action is relevant only in its direct and indirect contribution to global mitigation. Each country's evaluation of whether some mitigation action of its own is justified depends on its assessment of the interaction between its own decision and those of others.

It is not viable for Australia—the developed world's largest emitter of greenhouse gases per head of population, and the developed country that was shown by the Review's analysis to benefit most from strong mitigation—to free ride on other countries. Australia has to do its proportionate part in a global mitigation effort.

In order to answer the central question of whether the substantial Australian costs of mitigation exceed the benefits, the most detailed, comprehensive and long-dated modelling exercise on the Australian economy was undertaken.

The benefits of mitigation are the avoided costs of climate change. The Review identified four distinct types of benefits of mitigation. Only one of these—Type 1—is amenable to standard quantitative analysis.

Type 1 benefits of mitigation comprise currently measurable market impacts of climate change—such as impacts on primary production, human health, infrastructure, tropical cyclones and international trade—which are avoided by specified degrees of mitigation.

Type 2 benefits of mitigation are similar in nature to Type 1, comprising economic costs of climate change and benefits of mitigation experienced through markets, and in principle amenable to quantitative analysis using standard modelling techniques. However, there is no satisfactory information available to calibrate the models, so that the analyst must rely on estimates embodying judgements about quantities. Type 2 benefits in the Review's modelling included avoided increases in costs of building construction and avoided declines in international tourism as a result of deterioration in natural assets such as Kakadu.

Type 3 benefits of climate change mitigation arise from risk and uncertainty about the impacts. Risk and uncertainty—the presence of a range of possible outcomes around the most likely—introduce the possibility of outcomes that are much more damaging than the mean would be. People are prepared to pay a premium for insurance against the unexpected but possibly severe outcomes. The Review did not seek to measure the value of Type 3 or insurance effects. Rather, it sought to draw attention to their high value.

Some economists see insurance against bad and possibly catastrophic outcomes (Type 3 effects) as the largest element of the case for mitigation (Weitzman 2009).

The final category of benefits of mitigation—Type 4—are impossible to measure, and more difficult even than Type 3 to bring to account in analysis. Nevertheless, most people attach huge importance to non-market benefits when they turn their minds to them. Biodiversity and preservation of the natural estate are Type 4 benefits.

For example, how much do Australians value the existence of the Great Barrier and Ningaloo Reefs, or the continuation of town and rural life in the heartland of old Australia in the Murray-Darling Basin? The inclusion of such considerations as Type 4 effects is not to say that there is no way to assign value to any of these types of services, but rather that such valuations are difficult and highly subjective.

Many Type 4 benefits are likely to be what economists call "superior goods". Superior goods are often relatively scarce and the relative value that people assign to these goods rises as incomes rise. The average incomes of Australians are expected to continue to rise through the twenty-first century. If this occurs, it follows that higher value will come to be placed on biodiversity

and the natural estate. People will be willing to trade increasing amounts of their incomes for improvements to biodiversity.

Climate change is expected to greatly diminish biodiversity and the natural estate. So despite improvements in our material wealth, future generations won't have the same access to environmental resources. As a result, since we will probably come to value these things more highly into the future, we can't be sure that the wellbeing of future generations will be greater than our own.

The costs and benefits of mitigation fall on and accrue to current and future generations differently. In general, the costs of climate change mitigation come early, while the benefits come later. An overall assessment of costs and benefits therefore requires us to look at how we value the future relative to the present. How to value impacts that occur at different times has been the subject of much debate. This is the debate over the choice of discount rate.

My 2008 Review focussed on this important issue in its introductory chapter. People living in the future are different to us in at least two respects. First, their preferences are not directly reflected in the decisions we take today; they rely on us to represent their interests. Second, they are likely to be richer than us in terms of consumption of material goods and services that are available through market exchange.

The financial markets intermediate between future and current savings and expenditure, and between people who want to save and people who want to spend more than they earn. The outcome of this intermediation is reflected in various interest rates. In addition to intermediation between savings and investment, and consumption and savings, market interest rates embody expectations about the risk that a loan will not be repaid, and the risk that the loan will be repaid in less valuable currency as a result of inflation.

Can we say that the choice of discount rate should merely reflect the decisions on savings and borrowing that people actually take in the real world? If we could, we would be treating the setting of the discount rate as a positive matter, and the policy task would be to find the appropriate market rate.

The Review concluded that the appropriate market interest rate in Australia would be the long term interest on Government debt, after adjusting for expectations of inflation.

Or should we be looking at what the rate of discount of future value for time should be? Should we be treating the discount rate as a normative matter?

The Review expressed the view that the discount rate was a normative issue. However, it calculated Type 1 and Type 2 benefits and costs of mitigation to the end of this century (the temporal limit of the reliability of the quantitative models) using both normative and positive discount rates. It happens that in Australia's case, the appropriate positive interest rate fell within the range of appropriate normative interest rates.

Determining the appropriate normative discount rate involves two choices. The first is a decision about whether we value the welfare of people living in future as highly as the welfare of people living today—putting aside how wealthy they are? The Review answered “yes”.

The second choice is how much to discount the wellbeing of future generations because they are likely to be richer than us in material terms. There is considerable disagreement here.

The Review accommodated strongly diverging views on how much should be spent now to benefit future, presumably richer generations. It did so by choosing two different discount rates. The first, lower discount rate valued one per cent of income today the same as one per cent of (higher) income in the future. This could be considered the lower bound of reasonable outcomes.

The upper bound, and a more radically egalitarian choice, valued one percent of income today as much as two percent of (higher) income in future. This upper bound to the discount rate implied a willingness to redistribute from future to the current generations that was well in excess of the extent to which our current income tax system taxes the rich proportionately more than the poor.

While the Review went to considerable trouble to consider the range of reasonable discount rates in calculating benefits and costs, it ultimately found that the conclusion did not depend on the choice of discount rate in the circumstances of Australia. The benefits of strong and early mitigation action are close to the costs, whatever the discount rate within the appropriate normative and positive discount rates, even if we only account for Type 1 and Type 2 benefits during the current century.

The Review’s modelling showed that with these two types of benefits this century alone, economic welfare was higher at the end of the century with mitigation than without.

We had hoped that the Review’s decision-making framework would have prompted a discussion on the Type 3 and 4 benefits such as biodiversity, in addition to the more readily measurable Type 1 and Type 2 benefits this century.

However, despite our best efforts to promote the importance of Type 3 & 4 benefits, much of the debate about the Review’s conclusions in the last two years or so has focussed mainly on the benefits that we could express quantitatively. There is a strong tendency for political discourse to value only or overwhelmingly those effects that are measured. I hope to be able to prompt some evening up of the balance through the Update.

Climate change policies and the role of biosequestration

Effective climate change mitigation requires an appropriate price on greenhouse gas emissions (a 'carbon price'). This can be achieved through a restriction on rights to emit greenhouse gases and the exchange of these rights in a market, or through the imposition of a tax on emissions. If achieved through an emissions trading system, the limit on emissions must be reduced over time to the level that, when combined with similar constraints in other countries, prevents any net accumulation in the atmosphere. If achieved through a carbon tax, the rate of tax will need to be varied over time to achieve the same result.

Given that even with our best efforts, this and generations to come will be living with climate change, a sound climate change policy response should embody mitigation together with adaptation.

The economy-wide carbon price, with credits for sequestration of greenhouse gases as well as debits for emissions, will achieve a given degree of mitigation at the lowest possible cost. Cost matters for the environment as well as the economy, as the community is likely to accept more mitigation if each degree of reduction of emissions is achieved at a lower cost. Within an economy-wide approach to mitigation, analysis presented in the Review showed a considerable potential for biosequestration to contribute to mitigation in Australia.

Biosequestration potential was assessed in two ways. First, the Review's modelling considered forestry in a world with effective global action on mitigating emissions, that is, stabilisation at 550 ppm CO_2-e or 450 ppm CO_2-e. Second, the potential for a range of new opportunities to substantially reduce emissions and increase greenhouse gas removals in the land sectors was assessed.

The modelling for forestry considered establishment of softwood and hardwood timber plantations and environmental plantings in response to a carbon price. It only covered new forests established since 1990 on non-forest land, which are included in Australia's national emissions target under current Kyoto Protocol rules. All land currently used for forestry and agricultural activities was treated as being potentially available for forestry. The extent of new land dedicated to forestry was determined by the relative value of forestry activities compared to the value of agricultural activities competing for the land.

The modelling did not explicitly consider possible restrictions on forestry expansion for conservation reasons, the potentially negative environmental impacts of forestry expansion (such as reduced water runoff), the potential implications arising from climate change, regional capacity constraints in timber processing, or landholder resistance to land conversion. The influence of such factors was embodied crudely in assumed restrictions on potential take-up rates.

The results showed a significant change between the scenarios of no-mitigation and effective global mitigation.

Emissions from forestry were highly responsive to a carbon price. In the absence of mitigation policies, the model had forestry emissions rising to the point where it is a net source of emissions in some years (see Garnaut 2008, Chapter 22).

The Review presented the results from modelling two mitigation scenarios. One embodied a carbon price that was high enough for Australia to play its full proportionate part in holding global emissions to 450 ppm. The other worked towards holding emissions to 550 ppm. Under both mitigation scenarios, forests are consistently a carbon sink, with increases in sequestration in the first part of the century and then a decline. More land becomes forest under the 450 scenario, because of a higher carbon price. The fluctuations over time are generated by assumptions regarding harvesting periods for timber plantations and the maturing of environmental plantations. Carbon plantations are assumed to reach maturity after 45 years, after which no further carbon removal occurs.

The modelling results show that after 2050, few new plantations are established due to rising land prices and competition with higher-value agricultural uses. By the end of the century, just over half of the new land under forestry is dedicated to carbon plantings (see Garnaut 2008, Chapter 22).

The second form of assessment reviewed outside the formal models the potential opportunities to reduce emissions and increase biosequestration through different approaches to land, forest, grasslands and woodlands management. Biosequestration options across planted and native forests and cropping and grazing land, including rangelands, offer large abatement potential. They could greatly reduce the cost of mitigation in Australia and transform the economic prospects of rural Australia, especially of remote areas.

Growing plantations for carbon sequestration receives greatest attention in Australia and elsewhere, and it alone was the focus of formal modelling. However, it is only one of the sources of potential biosequestration, and may not be the largest.

The Review raised the profile of biosequestration. It presented the technical potential for a range of options, while noting uncertainties and a need for substantial investment in proving and developing many of the options.

The CSIRO has subsequently conducted a detailed analysis for the Queensland Government based on these options (Eady et al. 2009). The CSIRO work included assessment of factors affecting attainability of technical abatement potential, and confirmed that a wide variety of land-based options could deliver substantial abatement. We will be carefully examining CSIRO's findings, as well as other recent analyses, in the Update of the Review.

Mitigation will, however, come too late to avoid substantial damage from climate change. Given that net biodiversity losses are currently occurring with only the initial effects of climate change, significant resources will be required to minimise future losses (Australian State of the Environment Committee 2001; Beeton et al. 2006).

Natural resource management networks and programs have been established in Australia to conserve our natural environments. With climate change, additional efforts will be required to build the resilience of the Australian environment. This can be achieved by reducing existing non-climatic stressors such as land-use change, overallocation of water, and pollution (Howden et al. 2003). Similarly, expanding the existing system of land reservation and exploring new methods for engaging private landholders will facilitate species migration, encourage conservation and promote resilience (Garnaut 2008, Chapter 15).

Maintaining viable, connected and genetically diverse populations increases their likelihood of survival (IPCC 2007; WWF–Australia 2008). Conserving Australia's ecosystems will also assist in greenhouse gas mitigation due to their large cumulative sequestration capacity (Garnaut 2008, Chapter 15). This underlines potentially positive interaction between climate change mitigation and adaptation, and policies to support biodiversity.

Large switches in land use for biosequestration purposes have additional consequences that might be positive or negative for biodiversity depending on particular circumstances. This is an externality that, via its encouragement of biosequestration, the creation of a carbon price may not address. I will now explore this externality.

Biodiversity co-benefits

Adopting a carbon price will correct the negative externality associated with greenhouse gas emissions. However, in encouraging biosequestration, a carbon price may not lead to improvements in biodiversity. While the conservation or restoration of a native forest or woodland might support the establishment of a rich and diverse ecosystem, the mass planting of a single species of tree would obviously not provide the same range of benefits to biodiversity. This is not to say that there is not a place for such forests, including plantations for timber or biomass energy. However, we need to value precisely and separately the sequestration and biodiversity effects.

A range of mechanisms are currently in place to protect biodiversity, at Commonwealth and State levels. The range of mechanisms includes grants, revolving funds, information programs, tax concessions and market-based instruments.

For example, Commonwealth and State biodiversity and threatened species legislation seeks to prevent actions that would harm biodiversity. The difficulty in assigning a market value on biodiversity suggests a role for regulatory intervention to protect against species loss and ecosystem decline. It is reasonable to expect that existing regulation will serve to limit clearing of native grassland with high conservation value for establishment of a forest to sequester carbon.

In addition to regulating to protect against negative impacts, there is a case for introducing other forms of incentive to encourage biodiversity co-benefits from biosequestration activities. Other existing biodiversity conservation incentive mechanisms could be explicitly adjusted to provide incentives for biodiversity in ways that add to incentives for carbon sequestration. There may be a case for expanding or adapting established incentives to complement the carbon price incentive. The least-cost solutions for encouraging co-benefits are likely to be market-based. For example, mechanisms such as auction programs can reveal the price private landholders will accept to conserve and restore ecosystems. Landholders make bids based on the costs of management actions, and bids are assessed against cost and environmental benefit criteria. Landholders whose bids deliver best value for money are offered contracts and then receive periodic payments. Biodiversity value for money would be enhanced if landowners were also claiming carbon sequestration credits.

It is generally accepted that getting value for money from biosequestration incentives depends on being able to deal with the risk that sequestered carbon could be lost or that a biosequestration activity will cause emissions elsewhere (known as leakage). Incentives for biodiversity may also need to deal with risks of loss, for example from fire or deliberate clearing, but leakage is unlikely to be a problem. Separate but complementary carbon and biodiversity incentives could be designed to accommodate these differences.

Pilot auction-based programs such as the BushTender program in Victoria (see Garnaut 2008, Chapter 15) have been successful in expanding conservation activities across private land and reducing the costs to government compared to other forms of financial incentive (DSE 2008).

These market-based mechanisms are still in the early stages of development. They can only work where the buyer and seller have good information about the ecosystem services and an ability to assess the value of those services. As is the case with carbon sequestration, success also depends on having some surety that biodiversity benefits will be sustained over time. Some landholders will be reluctant to accept long-term obligations for both carbon and biodiversity if they think it will hamper future management or sale of their land. Furthermore, as with any market, the existence of demand for the services is fundamental. The current government-run pilot schemes would ideally provide a platform for private investment over time.

The key point is that, while a carbon price has the potential to aid biodiversity via a number of channels, it will not be sufficient to maximise the benefits to

biodiversity. Doing so will require its own, complementary market-based measures.

Concluding thoughts on the global context

At the climate change negotiations occurring this week in Cancun, Mexico, a joint program of the 'Rio Conventions' is promoting the synergies between climate change mitigation and adaptation and the conservation, restoration and sustainable use of ecosystem services.

New steps to reduce deforestation in developing countries could reduce emissions as well as biodiversity decline. Deforestation in developing countries produces around 20 per cent of global emissions as well as severe biodiversity losses.

Reducing emissions from deforestation and forest degradation in developing countries, also known as REDD+, was first included in climate change negotiations three years ago in Bali. Progress has been made on these issues, and last year's Copenhagen Accord called for the immediate establishment of a mechanism to mobilise financing for REDD+.

Alongside the negotiations, developed countries including Australia are working with developing countries on demonstration projects, financing and governance systems. Developed countries have pledged US$4 billion towards this partnership, with the aim of quickly scaling up REDD+ activities. While the progress is positive, there is a long way to go. For example, monitoring regimes are needed to make sure emissions reductions are real and that protection of one area of forest does not simply result in clearing of another.

Australia must play a role in global action to mitigate climate change and halt the decline in biodiversity, and the role needs to be proportionate to our contribution to the problem and the benefits we will get from the solution.

Australia's role needs to be based on effective domestic policies for mitigation and adaptation. Placing a price on carbon will be central to domestic policy. Securing substantial low cost abatement opportunities in rural Australia should be part of the policy suite. And these policy innovations should be promoted internationally to assist global action.

While there is considerable potential for biosequestration to contribute to national mitigation efforts, there are also some concerns that biosequestration activities with an emphasis on carbon alone could have negative consequences for biodiversity and other environmental resources. Any two biosequestration activities could have identical effects on the atmosphere, but widely differing impacts on biodiversity. However, with appropriate frameworks and incentives in place, biosequestration activities could result in positive biodiversity

outcomes and at the same time enhance the adaptive capacity of Australia's ecosystems.

There are important lessons to be learned from biosequestration projects and pilot market-based programs that have already been implemented. The new turn of the climate change policy discussion in Australia presents an opportunity to develop effective mechanisms to improve biodiversity values that are complementary to emerging mitigation policies.

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