CHAPTER 7

CARBON AND THE LAND

Pilot land use, land use change and forestry projects that are designed to avoid emissions by reducing deforestation and forest degradation have produced marked environmental and socioeconomic co-benefits, including biodiversity conservation, protection of watershed and water resources, improved forest management and local capacity building, and employment in local enterprises.[1]

Introduction

7.1 The contribution of the land-based sectors to emissions and the potential of elements of the sectors to play a significant role in greenhouse gas abatement is one of the most complex, controversial and uncertain elements of the climate change debate. The objective of this chapter is to examine and provide recommendations on:

- the contribution of the land use change and forestry, and agricultural sectors to Australia's greenhouse gas emissions;
- the impact of current land management practices and policies on current and projected greenhouse emissions;
- action that is currently being undertaken to reduce emissions in these sectors and the potential for these sectors to contribute to greenhouse gas abatement; and
- the use of carbon sequestration through land-based sinks as a greenhouse response measure and the issues and uncertainties associated with accounting for their use.

The Global Carbon Cycle

7.2 Carbon is released into the atmosphere through natural means via plant respiration, soil respiration and diffusion from oceans, as well as by human activity such as burning fossil fuels for electricity production and transport, and deforestation. Human activity has disturbed the natural cycle resulting in an increase in the release of carbon annually bringing about an increase in atmospheric concentrations of greenhouse gases.[2]

7.3 Plants and soils are important components of the carbon cycle. Carbon is taken from the atmosphere by plants through photosynthesis, and is released again to

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1 Watson et al (Eds), *Land Use, Land-Use Change and Forestry: A Special report of the IPCC,* Cambridge University Press, 2000, p 327.

2 Australian Greenhouse Office, *National Emissions Trading: Crediting the carbon*, Discussion Paper No. 3, 1999, p 12.

the atmosphere through respiration, as part of life support processes. However, not all carbon is released as part of this process. Some carbon dioxide is converted with water into carbohydrate (which contains carbon) and oxygen. Plants utilise carbohydrate in cell tissues as they grow, and consequently some of the carbon from the atmosphere is transformed to the living system. Where photosynthesis exceeds respiration, the net carbon is stored (sequestered[3]) in the plant biomass (roots and above ground matter such as stems, tree crowns etc), thus creating a carbon sink[4] or store. Soils store carbon as organic matter - as a result of plant litter decomposition, and root material.[5]

7.4 The contribution of the land use, land use change, and forestry sector to the global carbon cycle is important. Globally existing terrestrial ecosystems are currently estimated to be acting as a small net sink for carbon dioxide. This carbon uptake occurs through vegetation and soils in terrestrial ecosystems and is much larger in soils than in vegetation.[6]

7.5 In Australia, the removal of vegetation for agricultural or other purposes has resulted in significant emissions. Other activities in the land use change and forestry sectors such as the growth and regrowth of native forests, establishment of plantations and environmental plantings provide an opportunity to offset these emissions and sequester additional carbon from the atmosphere. There are, however, considerable uncertainties about the long term potential of carbon sinks as an abatement measure and accounting for the carbon sequestered.

Greenhouse gas emissions from land use change and forestry, and agriculture

7.6 The land use change and forestry sector and the agricultural sector are both significant contributors to Australia's National Greenhouse Gas Inventory (NGGI). Each of these sectors is reported separately in the Inventory according to the international guidelines established under the UNFCCC. In addition, due to the uncertainty of current estimates from land clearing, these are not included in the national Inventory total but reported as a separate item.

7.7 According to the most recent estimates contained in the 1998 NGGI, the land use change and forestry sector (excluding estimates of land clearing) is estimated to

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3 Sequestration is the process of removing carbon dioxide from the atmosphere and retaining it in a carbon sink such as a forest.

4 A sink is defined as a process, activity or mechanism, which removes a greenhouse gas, an aerosol, or a precursor of a greenhouse gas from the atmosphere.

5 Australian Greenhouse Office, *National Emissions Trading: Crediting the carbon*, Discussion Paper No. 3, 1999, p 13.

6 Intergovernmental Panel on Climate Change, *Summary for Policy Makers: Land Use, Land-Use Change, and Forestry*, Canada, 2000, p 5.

have provided a net sink of -24.5 Mt CO_2-e or -5.4 per cent of net national emissions.[7] Factors considered in arriving at this estimate include:

- growth, harvesting and regrowth in managed native forests and plantations;
- wood products including production of fuelwood, paper, particle board, furniture and building frames that decay at varying rates; and
- prescribed burning, wildfires, and changes in land management practices such as pasture improvement and minimum tillage. [8]

7.8 Emissions in the forestry subsector as a result of commercial harvesting and fuelwood production equated to 38.9 Mt and 12.8 Mt, respectively. This is offset by the removal of greenhouse gases through carbon sequestration resulting from tree growth in managed forests of -73.4 Mt, resulting in a net sink of -21.6 Mt. A small amount of emissions were generated as result of prescribed burning and wildfires (1.4 Mt) and a small sink resulting from minimum tillage and pasture improvement practices (-4.2 Mt). The contribution of these areas to the Inventory provides an additional net sink of -2.8 Mt, bringing the total net sink for the subsector to -24.5 Mt.[9]

7.9 Emissions from harvesting have increased by 10.4 per cent over the period 1990 to 1998, and whilst the sink associated with forest growth has also increased over this period, it has not had the same rate of growth (2.9 per cent) thereby resulting in a reduction in the net forestry sink in this period.[10]

7.10 Projections undertaken in 1997 identified a potential increase in net sink capacity from forests to 32 Mt in 2010 with existing measures.[11] Dependent on the final treatment of sinks under the Kyoto Protocol this potential could increase significantly.

7.11 The interim estimate of emissions from land clearing in 1998 is 64 Mt. This is comprised of emissions of 81.5 Mt associated with land clearing and the removal of 17.5 Mt through sinks associated with the regrowth of grass and woody vegetation. Factors considered in arriving at this estimate are the burning and decay of aboveground biomass, regrowth on cleared lands, and changes in soil carbon from

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7 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, 2000, p A-28.

8 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 7, Forestry and Land Clearing, 2000.

9 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 7, Forestry and Land Clearing, 2000.

10 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, 2000, p A-28.

11 Australia's Second National Report under the United Nations Framework Convention on Climate Change, November 1997, p 6.

current and past events. Land clearing can cause emissions of carbon dioxide from the disturbed soil for 10 years or more after the event. [12]

7.12 The estimates for land clearing are highly uncertain and considered the most uncertain part of the Inventory. The uncertainty results from a lack of accurate statistics on:

- the rate of land clearing;
- biomass of vegetation cleared;
- regrowth of vegetation on cleared areas; and
- level and change of carbon through soil disturbance.[13]

7.13 To improve confidence in land clearing estimates and to meet future requirements of the Kyoto Protocol, a National Carbon Accounting System (NCAS) is under development. A key objective of this system is to provide by 2002 an estimate of the 1990 emissions from land clearing for inclusion in Australia's 1990 Kyoto Protocol baseline. It is also intended to provide substantially improved estimates of areas of clearing, areas of forest plantings, rates of growth in commercial and environmental plantings and emissions from soils, to increase confidence in post-1990 estimates and to meet future Kyoto Protocol accounting requirements for sources and sinks.[14]

7.14 Using the interim estimates available, it appears that land clearing activities were a *net source* of greenhouse gas emissions from 1990 to 1998 but there has been a considerable decline in emissions from this subsector in this period.[15] More recent reports of land clearing rates, particularly in Queensland, suggest an increase in emissions could be expected for 1999 and 2000.

7.15 When land clearing figures are included in the total for the land use change and forestry sector, total emissions for 1998 are estimated at 134.7 Mt with the removal of -95.2 Mt through sinks. This leaves a net emissions result of 39.5 Mt compared to the currently reported net sink of -24.5 Mt.[16]

7.16 The 1998 NGGI notes that:

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12 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 7, Forestry and Land Clearing, 2000.

13 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 7, Forestry and Land Clearing, 2000.

14 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 7, Forestry and Land Clearing, 2000.

15 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 7, Forestry and Land Clearing, 2000.

16 Australian Greenhouse Office, *National Greenhouse Gas Inventory Land Use Change and Forestry Sector 1990 to 1998*, 2000, p A-3.

> The uncertainty associated with estimates of emissions and removals from Forest and Grassland Conversion [land clearing] remains high. This is largely due to the use of incomplete data, preliminary rates of land clearing for some states and some years, inadequate methodology for calculation of regrowth sequestration, use of averaged pre-clearing biomass and soil carbon estimates not spatially linked to where clearing is occurring, and the use of default conversion factors for soil carbon change following clearing.[17]

7.17 The agricultural sector contributed 20.2 per cent or 92.2 Mt of total national net emissions in 1998 (excluding land clearing estimates). It is the most significant source of greenhouse gas emissions following the stationary energy sector, and the largest source of methane and nitrous oxide emissions. However, it also one of the more stable sectors with little change in emissions overall in the period 1990 to 1998. Sources of emissions in the agricultural sector are livestock (enteric fermentation and manure management), rice cultivation, agricultural soils, prescribed burning of savannas (for pasture management, fuel reduction, prevention of wildfires and traditional Aboriginal burning practices), and field burning of agricultural residues.[18]

7.18 There have been increases and decreases within this sector, most significantly in the agricultural soil subsector, which has seen an increase of 10.4 per cent overall in the period 1990 to 1998. The increase is due primarily to increase in nitrous oxide emissions from fertilised crops and pastures (representing an increase in the rate of artificial nitrogen fertiliser application). There has also been an increase in emissions resulting from the field burning of agricultural residues such as cereal stubble burning, and an increase in methane emissions due to increases in rice cultivation. Changes in livestock emissions over the period 1990 to 1998 can largely be attributed to increases and decreases in livestock numbers driven by economic factors such as wool prices, however, there has been an increase in nitrous oxide emissions due to increasing intensification of the livestock industries.[19]

7.19 Emissions projections undertaken in 1997 for the agricultural sector indicate growth of 7 per cent on 1990 levels by 2010 with current measures.[20] As noted above, there has been limited overall growth in the agricultural sector with current trends showing an overall 1.8 per cent increase in the period 1990 to 1998.[21]

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17 Australian Greenhouse Office, *National Greenhouse Gas Inventory Land Use Change and Forestry Sector 1990 to 1998*, 2000, p A-5.

18 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 4, Agriculture, 2000.

19 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 4, Agriculture, 2000; and Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, 2000, p A-26.

20 Australia's Second National Report under the United Nations Framework Convention on Climate Change, November 1997, p 6.

21 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, 2000, p A-23.

7.20 There are also considerable uncertainties about emissions estimates from the agricultural sector. The level of uncertainty is thought to be between 20 per cent and 80 per cent and is due to the diffuse sources of emissions in the sector, lack of understanding of some of the processes leading to emissions in the sector, lack of robust data, and the methods by which data has been compiled.[22]

Requirements under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol

7.21 As a party to the UNFCCC, Australia is committed to the promotion of sustainable development and promotion and cooperation in the conservation and enhancement of sinks and reservoirs of all greenhouse gases, including biomass, forests and oceans.[23] Australia is also required to produce and regularly update a NGGI that presents emissions on a gas by gas and sector by sector basis as determined by the reporting guidelines established by the IPCC.[24] This includes the land use change and forestry, and agricultural sectors.

7.22 Following the negotiation of the Kyoto Protocol, carbon sequestration through forestry sinks and other means has taken a more prominent role. Under Article 3 of the Kyoto Protocol, countries must count both sequestration and emissions from a limited set of land use change and forestry activities towards meeting their Kyoto Protocol target commitments. Sinks may also play a strong role in the implementation of the flexibility arrangements (Emissions Trading, Joint Implementation (JI), Clean Development Mechanism (CDM)) under the Kyoto Protocol. There are outstanding definitional, operational and measurement issues awaiting decision before the potential impact of these articles is fully known. A number of these are expected to be considered and resolved in the international negotiations at CoP 6 later this year.[25] The inclusion of, and parameters of, the Articles pertaining to sinks in the Protocol has been the source of much international and domestic debate, and a key focus of submissions to this inquiry. These issues are explored in greater detail in the sections on accounting for carbon, and the role of sinks, below.

Overview of current greenhouse action in the land use change and forestry, and agricultural sectors

7.23 Governments and industry have placed significant emphasis on the potential role of sinks in achieving Australia's Kyoto target. Governments view sinks as highly cost effective means of meeting the abatement task and point to a range of ancillary

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22 Australian Greenhouse Office, *National Greenhouse Gas Inventory 1998*, Fact Sheet 4, Agriculture, 2000.

23 Australian Greenhouse Office, *The National Greenhouse Strategy: Strategic Framework for Advancing Australia's Greenhouse Response*, 1998, p 101.

24 Australian Greenhouse Office, *The National Greenhouse Strategy: Strategic Framework for Advancing Australia's Greenhouse Response*, 1998, p 101.

25 Australian Greenhouse Office, *Greenhouse Sinks and the Kyoto Protocol: An Issues Paper*, 2000, pp 2-3.

benefits that can also be achieved with sink related programs, such as addressing issues of land degradation and enhancing biodiversity.

7.24 Under the National Greenhouse Strategy (NGS), efforts are being made to reduce land-based emissions and enhance greenhouse sinks through existing national forestry and revegetation programs such as Bushcare - the National Vegetation Initiative; and new programs such as Bush for Greenhouse, which aims to promote investment in the establishment of greenhouse sinks. Bush for Greenhouse was only declared 'open for business'[26] by the Government in April 2000, more than 2 years after its inception, and is not without its critics. For example, Southern Pacific Petroleum and Central Pacific Minerals reported:

> Our experience with the Bush for Greenhouse program has been disappointing mostly because there appears to be confusion within Government about this program's scope and objectives.[27]

7.25 Effort has also been expended in investigating the potential role of carbon sinks in a national emissions trading scheme; improving understanding of how relevant carbon pools are affected by management practices; and expanding capacity to measure and monitor changes in carbon stocks through the establishment of a NCAS.

7.26 Primary responsibility for the management of natural resources such as native vegetation rests with the states and territories, and has been the source of much tension in Commonwealth and state relations. A number of national strategies/ frameworks/policies have been agreed with the states and territories to encourage sustainable land management practices and greater protection for native vegetation. For example, the 1992 National Forest Policy Statement and more recently, the Australian and New Zealand Environment and Conservation Council (ANZECC) National Framework for the Management and Monitoring of Australia's Native Vegetation. The success of these strategies is reliant on action taken by the states and territories, with the Commonwealth often expected to facilitate action through the provision of funding or other support.

7.27 In addition, considerable focus has been given to the ongoing international negotiations related to sinks and the Kyoto Protocol. This point was reinforced by Mr Ralph Hillman, Australia's Ambassador for the Environment, who told the Committee:

> Sinks are of critical importance to Australia. The definition and rules to be adopted will impact on the size of our abatement task, as well as the cost. This will be a key issue for us at CoP 6.[28]

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26 Senator, the Hon Robert Hill, Bush for Greenhouse Open for Business, Australian Greenhouse Office, Media Release, April 13 2000, p 1.

27 Southern Pacific Petroleum and Central Pacific Minerals, Submission 172, p 1749.

7.28 State governments (most notably Western Australia and New South Wales) have embarked on a range of sink enhancement and investment projects. The potential for sinks has also been recognised in most state greenhouse strategies/action plans developed under the auspices of the NGS.

7.29 Industry is also increasingly seeking to offset emissions through the use of sinks. The Australian Greenhouse Office Greenhouse Challenge Program recognises the use of sinks as an offset in industry agreements and several state governments have entered into agreements with industry. Recent examples are the agreement between State Forests NSW and the Tokyo Electric Power Company to establish 10,000 to 40,000 ha of plantations in NSW to offset a portion of their emissions; and investment by BP AMOCO in reforestation projects in partnership with the Western Australian Department of Conservation and Land Management.

7.30 A commensurate amount of effort does not appear to have been taken by governments in reducing emissions from agricultural production. Module 6 of the NGS identifies a number of sustainable agricultural management practices to deliver reductions in greenhouse gas emissions, however, little evidence of the promotion of these practices at any level of government has been presented to this inquiry. Significant hopes appear to be pinned on the outcomes of rumen modifier research being conducted by CSIRO as the key measure for achieving emissions reductions in this area.

The future for the land use change and forestry, and agricultural sectors

7.31 The Committee canvassed a broad range of views when considering issues associated with the land use change and forestry, and agricultural sectors. These included: Federal and state government agencies, community advocacy groups, industry representatives, environmental groups, and farming interests. A wide range of views was presented and very few areas of concurrence amongst witnesses emerged. A key area of divergence was the potential role and contribution of sinks in meeting Australia's Kyoto Protocol commitments. The agricultural sector attracted few comments, although land clearing for agricultural and other purposes was perceived by most witnesses as a significant problem that needed to be addressed.

7.32 Common views and issues which emerged from evidence presented to the inquiry were:

- Sinks present a cost-effective means of abatement and have a number of positive ancillary environmental benefits. However, there is considerable concern over the permanence of sequestered carbon and the longer term impact of choosing this method over reduction of emissions at source.
- There were fears that a perverse outcome may result from the over-reliance on sinks as an abatement measure. The use of sinks as a primary response measure

28 *Official Committee Hansard*, Canberra, 9 March 2000, p 3.

could lead to an increase in actual emissions at source and potential reduction in investment in areas such as renewable energy, fuel switching and energy efficiency.

- There was criticism by a number of groups of the negotiating position the Government took to Kyoto, in particular the inclusion of Article 3.7 which enables Australia to include land clearing in its 1990 baseline and claim as a credit any reductions from the subsequent decrease in emissions as a result. Significant focus is now being given to the negotiating position the Government is taking to the CoP 6 negotiations.

- The allocation of carbon credits associated with sinks has a number of inherent risks and uncertainties that are yet to be overcome, including measuring and monitoring the carbon sequestered and establishing carbon property rights. These uncertainties have been viewed as stifling potential investment in sinks and concern was expressed that the longer the delay in their resolution, the less benefit such investment will be to meeting Australia's Kyoto target in the first commitment period. Other concerns relate to the potential for the misuse and false accounting of carbon sequestered.

- It was widely agreed that the need for credible and transparent accounting mechanisms for the land use change and forestry sector, to reduce current levels of uncertainty and meet future reporting requirements under the Kyoto Protocol, is an imperative.

- The negative impact of current land management practices, in particular land clearing, on Australia's emissions is high. There are many ancillary environmental and other benefits such as enhancement of biodiversity, soil conservation and water management, and low cost abatement to be achieved by reducing emissions in this sector. There is a common view that insufficient action is being undertaken in parts of Australia to reduce or halt land clearing and that further research and development in sustainable agricultural systems is required if emissions reductions in this sector are to be achieved.

7.33 To a large degree the future role and potential contribution of sinks to Australia's greenhouse abatement task will be determined by the outcome of the CoP 6 negotiations. Regardless of this uncertainty, a number of policy options have been put forward by witnesses (including suggestions for Australia's negotiating position on sinks), although there are divergent views on the best options. Suggestions included:

- A greater emphasis should be placed on reducing emissions at source in the land-based sectors by halting land clearing and ensuring more sustainable management practices in agricultural production. Sinks should only be viewed as part of a portfolio of responses in the land-based sectors not as the key response measure.

- Rather than focus on creating new sinks, greater efforts should be made to protect existing sinks, in particular old growth forest, by ceasing logging

activities in native forests. Government policy should favour the protection of ecologically diverse natural forest landscapes over the creation of plantations.

- As a greenhouse response measure, sinks should only be viewed as a short term or transitional option to buy additional time to identify and implement long term abatement solutions that reduce emissions at source.
- Priority should be given to a more precise definition of forest and forest related activities under the Kyoto Protocol, to ensure that priority is given to maintaining existing carbon sinks rather than creating new ones.
- Sequestration is a useful transitional strategy to employ until we have the solutions to go to more sustainable forms of energy usage.
- Australia should be actively promoting its sequestration opportunities beyond forests and should ensure that recognition in the form of carbon credits is also given in the Kyoto Protocol to revegetation activities.
- Investment in plantations and revegetation activities on already cleared land offers a low cost solution not only for greenhouse but also salinity and the delivery of regional ecologically sustainable development. To effectively achieve these outcomes property rights to carbon must be recognised at a Federal level and a uniform national framework put in place to enable trading of carbon credits between growers and industry to generate further investment. Such a trading system needs to be supported by a transparent and credible accounting framework.
- To best meet Australia's interests, the objective of the international negotiating position on sinks under the Kyoto Protocol should pursue as broad an interpretation as possible to enable all revegetation activities to be recognised and accepted as a sink.
- Government should provide leadership, funding and regulation to provide sufficient incentive for the development of appropriate biomass plantations to provide carbon sequestration and the added objective of addressing issues such as dryland salinity, wildlife habitat, soil erosion, liquid fuel production, wood products, and biomass for energy production.
- The management of land clearance and the pursuit of forestry and land rehabilitation programs that have economic and/or environmental benefits, as well as greenhouse abatement, should be a key priority for ongoing national greenhouse policy development.
- Government greenhouse policy in the land-based sector should also aim to benefit the long term viability and sustainability of rural communities and help to achieve broader natural resource management outcomes.
- Government should also be willing to develop and commit to cost sharing approaches for the management and retention of native vegetation, including

equitable compensation for landholders adversely affected by imposition of government controls on vegetation use and management.

- Government should be providing a greater level of support for research and development in reforestation and revegetation opportunities.

Greenhouse Sinks and the Kyoto Protocol

7.34 As noted earlier, the Kyoto Protocol makes allowances for the inclusion of sink activities as follows:

> *Article 3.3.* The net changes in greenhouse gas emissions by sources and removals from sinks resulting from direct human-induced land use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this article of each party included in Annex I. The greenhouse gas emissions by sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.
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> *Article 3.4.* Prior to the first session of the Conference of the Parties serving as the meeting of the Parties to this Protocol, each Party included in Annex I shall provide, for consideration by the Subsidiary Body for Scientific and Technological Advice, data to establish its level of carbon stocks in 1990 and to enable an estimate to be made of its changes in carbon stocks in subsequent years. The Conference of the Parties servings as the meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soils and the land use change and forestry categories shall be added to, or subtracted from, the assigned amounts for Parties included in Annex I, taking into account uncertainties, transparency in reporting, verifiability, the methodological work of the Intergovernmental Panel on Climate Change, the advice provided by the Subsidiary Body for Scientific and Technological Advice in accordance with Article 5 and the decisions of the Conference of the Parties. Such a decision shall apply in the second and subsequent commitment periods. A party may choose to apply such a decision on these additional human-induced activities for its first commitment period, provided that these activities have taken place since 1990.[29]

7.35 In addition, there is scope for sink activities to be included in the Protocol's flexibility mechanisms (JI, CDM and Emissions Trading).

7.36 The Kyoto Protocol did not provide definitions of land use change, forests, forestry activities including afforestation, deforestation, and reforestation, carbon

29 The Kyoto Protocol to the Convention on Climate Change.

stocks, human-induced and direct human-induced. Nor does the Protocol set out the rules for accounting for carbon stock changes, and for emissions and removals of greenhouse gases from land use and land use change and forestry activities, or how sinks may be incorporated in the flexibility mechanisms.

Articles 3.3 and 3.4

7.37 Internationally a significant effort has been put into clarifying and reaching agreement on issues associated with Articles 3.3 and 3.4. The Intergovernmental Panel on Climate Change (IPCC) was charged with the preparation of a special report concerning current understanding of land use, land use change, and forestry activities and their relationship to the Kyoto Protocol. The IPCC's *Summary for Policymakers* provides scientific and technical information to provide guidance to the Parties to the Protocol in their ongoing deliberations on these matters. The report notes that:

> There are many possible definitions of a 'forest' and approaches to the meaning of the terms 'afforestation', 'reforestation', and 'deforestation' (ARD). The choice of definitions will determine how much and which land in Annex I countries are included under the provisions of Article 3.3… . The amount of land included will have implications for the changes in carbon stocks accounted for under Article 3.3.[30]

> Countries have defined forests and other wooded lands for a number of national and international purposes, in terms of: (i) legal, administrative, or cultural requirements; (ii) land use; (iii) canopy cover; or (iv) carbon density (essentially biomass density). Such definitions were not designed with the Kyoto Protocol in mind and, thus, they may not necessarily suffice for the particular needs of Articles 3.3 and 3.4.[31]

7.38 The difficulties of defining terms such as forests was illustrated to the Committee by Professor Graham Farquhar of the Cooperative Research Centre for Greenhouse Accounting:

> If, for example, something that had 40 per cent [canopy] cover was called forest you could convert from 100 per cent cover down to 40 per cent cover and still have a forest. In taking that very strict definition the fear is that the Parties might not report the loss of carbon from forests. I am sure it was not the intent, but that is what people are debating about in terms of the usage of canopy covers and how it might play out if the people follow the letter rather than the spirit of the thing.[32]

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30 Intergovernmental Panel on Climate Change, *Summary for Policy Makers: Land Use, Land-Use Change, and Forestry*, Canada, 2000, p 5.

31 Intergovernmental Panel on Climate Change, *Summary for Policy Makers: Land Use, Land-Use Change, and Forestry*, 2000, p 5.

32 *Proof Committee Hansard*, Canberra, 6 September 2000, p 919.

7.39 The Special Report developed seven definitional scenarios, for lands that can be counted under Article 3.3, which combine different definitions of forests, and afforestation, deforestation, and reforestation. Each scenario reflecting the range of approaches that can be taken with them and an assessment of the implications. An example of some of the issues encountered include:

> Definitions of a forest, which are often based on a single threshold of canopy cover or carbon density may allow increases or decreases in carbon to remain unaccounted due to aggradation or degradation. To minimise this possibility multiple or sequential thresholds, or national, regional or biome-specific thresholds could be used, or the issues of aggradation and degradation could be covered under Article 3.4… .
>
> Some definitions of reforestation include the activity of regeneration after disturbance or harvesting, while disturbance or harvesting are not defined as deforestation. In these circumstances credits could be accounted for the regeneration without debits for disturbance or harvesting, this would lead to an accounting system where the changes in terrestrial carbon do not reflect the real changes in the atmosphere.[33]

7.40 Professor Farquhar advised the Committee that for Article 3.3 a key issue has been how to develop accurate and verifiable measures of changes in carbon stocks, particularly when some aspects such as soil carbon are difficult to measure:

> … the accounting system has to be cost effective as well as accurate, consistent, comparable, verifiable and efficient to record and report changes in carbon stocks and changes in emissions from land us, land use change and forestry activities. There is a variety of research methods to help here - statistical analyses, forestry inventories, remote sensing techniques, flux measurements, soil sampling and ecological surveys. We note that those terms 'afforestation' and 'reforestation' will probably not be terribly important in accounting terms in the sense that they would get treated the same way. The difference would refer to the time before the actual act of planting trees since trees were there before.[34]

7.41 Article 3.3 refers only to those activities (afforestation, reforestation and deforestation) which have taken place since 1990. The actual measurement does not occur until the first commitment period (2008-2012). Professor Farquhar advised the Committee the way this would work is:

> Under Article 3.3 one compares how much carbon is in an area affected directly by humans if there is a comparison between 2008 and 2012. In an area where there is deforestation, one looks at the carbon stock in 2008 and determines how much less there is in 2012, and there is a debit. In areas where there has been an activity since 1990 in terms of growing a new

33 Robert T Watson, Chair of the IPCC, *A Report on the Key Findings from the IPCC Special Report on Land Use, Land-Use Change and Forestry*, 12th session of SBSTA, Bonn, Germany, 13 June 2000.

34 *Proof Committee Hansard*, Canberra, 6 September 2000, p 921.

> forest, one looks once again at the change in carbon stock between 2008 and 2012. So the change in stock is measured over the first movement period, 2008-2012, only for those activities that relate to the period since 1990.
>
> Scientists would hope that there would be contiguous accounting periods because if you have a gap after 2012 before a second commitment period then all sorts of fun and games could go on if people were not following the spirit of the framework convention. I think most people agree that the second commitment period should be starting immediately in 2012.[35]

7.42 The interpretation of 'activities' that may be included as additional activities under Article 3.4 have posed similar problems for the method of carbon accounting and separating human-induced changes from naturally induced changes.

7.43 The Climate Action Network Australia (CANA)[36] has referred to the Kyoto Protocol as an 'accounting game' and expressed concern about when activities are reported under the Protocol and for how long. In reference to Article 3.4, Ms Anna Reynolds noted:

> If it was an entire system where you counted what was happening in 1990 with crop land management, pasture management and forest management, and you actually accounted for it also in the end year, there would not be as much of a loophole. It is used as a way for your accounts to show all these debits while your emissions actually increase. And 3.4 was rushed through in the last few hours of the Kyoto Protocol negotiations. It was not really discussed. There was not much transparency about what it could do to country targets. So no-one's targets have really accounted for the potential growth in emissions they can gain if they include pasture management and soil tillage improvement.[37]

7.44 In their Report, the IPCC has stated that:

> A well designed carbon accounting system would provide transparent, consistent, comparable, complete, accurate, verifiable, and efficient recording and reporting of changes in carbon stocks and/or changes in greenhouse gas emissions by sources and removals by sinks from applicable

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35 *Proof Committee Hansard*, Canberra, 6 September 2000, p 921.

36 The Climate Action Network Australia is comprised of the following organisations: Australian Conservation Foundation; Community Information Project on Sustainable Energy; Conservation Council of South East Region and Canberra; Environment Victoria; Friends of the Earth; Greenpeace Australia; Queensland Conservation Council; Sunshine Coast Environment Council; Total Environment Centre; World Wide Fund for Nature (Australia); Conservation Council of Western Australia; Urban Ecology, South Australia; New South Wales Nature Conservation Council; AidWatch; Pacific Bioweb; North Queensland Conservation Council; Institute for Sustainability and technology Policy; Tasmanian Conservation Trust; Institute for Sustainable Futures; Northern Territory Environment Centre; and Centre for Education Research in Environmental Strategies (CERES).

37 *Official Committee Hansard*, Canberra, 10 March 2000, p 48.

> land use, land use change, and forestry activities and projects under relevant Articles of the Kyoto Protocol.[38]

7.45 The IPCC has identified two possible accounting approaches towards meeting these requirements, a land-based approach and an activity-based approach, either of which or a combination of the two could be adopted. There are further uncertainties that need to be taken into account at this point including: measurement uncertainty; uncertainties in identifying lands under Article 3.3 and 3.4; and defining and quantifying baselines if any. It has been suggested that the best way to deal with these uncertainties is by using good-practice guidelines or by adjusting the carbon stock changes to understate the increases and overstate the decreases.[39]

7.46 The potential management of wood products and the permanence of carbon sinks are further issues to be considered in carbon accounting. For example, if the management of wood products is treated as an additional activity under Article 3.4, then it may be necessary to exclude wood products from accounting under other Article 3.3 and 3.4 activities to avoid double counting.

7.47 The permanence of carbon sinks has been a key issue internationally, and in submissions and evidence put to this inquiry, in the debate on their use as a greenhouse response measure. The enhancement of carbon sinks is potentially reversible as a result of human activities, disturbances or environmental changes including climate change. The solution that has been put forward by the IPCC to deal with this possibility is to ensure that any credit for enhanced carbon stocks is balanced by accounting for any subsequent reductions in carbon stocks.[40] On the issue of permanence, Professor Farquhar noted that:

> … the question has to be answered in two senses. It seems to me that from an accounting point of view it is not a problem, that is, you get debited if the sink is removed. From a national perspective, in terms of planning how a country meets its requirements, that is an issue that the countries will have to take note of. The underlying fear from some people might be that this might lead to inaction in other areas and that it all could come to a head if suddenly there were a climate change and all the forests were to burn down. I personally do not think that that is very likely. In the foreseeable future I see our ecosystems, as a whole, continuing to take up carbon dioxide. As the temperature rises we are likely to have impacts on those areas. I can see that there will be a threat to alpine ecosystems and so on, but I do not think that large scale impermanence is an issue.[41]

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38 Intergovernmental Panel on Climate Change, *Summary for Policy Makers: Land Use, Land-Use Change, and Forestry*, Canada, 2000, p 8.

39 Intergovernmental Panel on Climate Change, *Summary for Policy Makers: Land Use, Land-Use Change, and Forestry*, Canada, 2000, p 9.

40 Intergovernmental Panel on Climate Change, *Summary for Policy Makers: Land Use, Land-Use Change, and Forestry*, Canada, 2000, p 9.

41 *Proof Committee Hansard*, Canberra, 6 September 2000, p 928.

7.48 The Committee recognises the concerns raised by CANA regarding the permanence of sinks, and how they are accounted for under the Kyoto Protocol. The Committee also recognises that solutions have been put forward by Professor Farquhar and the IPCC that may address these concerns.

Greenhouse sinks and the Kyoto Protocol flexibility mechanisms

7.49 The potential inclusion of sink activities in the Kyoto Protocol flexibility mechanisms is also an area requiring resolution. Only the JI mechanism specifically allows for sinks, although it has been argued that Articles 3.1, 3.3 and 3.4 imply that credits from sink activities can also form part of Emissions Trading. Article 12 of the Kyoto Protocol, the CDM, does not explicitly refer to sinks and there is a strong push by a number of countries, including Australia, for their inclusion.

7.50 The Australian Government argues that the inclusion of sink activities in all three flexibility mechanisms is important to ensure that 'the flexibility mechanisms are used to their full potential including delivery of maximum economic and environmental benefits and participation by a wide range of Parties'.[42]

7.51 Others such as CANA, have argued that the inclusion of sink activities in the flexibility mechanisms, in particular their inclusion in CDM, should be limited, citing issues of permanence, potential carbon 'leakage', negative socioeconomic impacts, monitoring and verification and the potential impact their inclusion might have on action to reduce emissions at source. For example, Ms Carrie Sonneborn of the Australian Cooperative Research Centre for Renewable Energy, expressed the view that:

> The flexibility mechanisms… can promote sinks to the detriment of investment in renewable energy, and it can also fail to deter extensive new fossil fuel developments such as natural gas. If it had to be a carbon - a fossil fuel - you would want it to be natural gas, that is for sure. … if the widespread establishment of renewables is delayed as a result of flexibility mechanisms, it could result, at a domestic level, in Australia losing out on market share because it does not invest in this new growth industry sufficiently. At an international level it could delay a shifting to sustainable energy and therefore the addressing of the global warming issue at its source.[43]

7.52 With the exception of the issue of delaying the shift to more renewable forms of energy, the IPCC Special Report has gone to some lengths to examine and provide options for dealing with the issues associated with the flexibility mechanisms and sinks. The Report notes that with the exception of permanence, these issues are not unique to land use change and forestry activities.

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42 Australian Greenhouse Office, *Greenhouse Sinks and the Kyoto Protocol: An Issues Paper*, 2000, p 90.

43 *Proof Committee Hansard*, Perth, 17 April 2000, p 537.

7.53 With regard to potential socioeconomic impacts, the Special Report examined current projects occurring under the auspices of activities implemented jointly. The Special Report notes that:

> Pilot LULUCF [Land Use, Land Use Change and Forestry] projects that are designed to avoid emissions by reducing deforestation and forest degradation have produced marked environmental and socioeconomic co-benefits, including biodiversity conservation, protection of watershed and water resources, improved forest management and local capacity building, and employment in local enterprises.[44]

7.54 However, the Report also notes that:

> Projects that are designed to protect natural forests from land conversion or degradation could pose significant costs to some stakeholders if they restrict options for alternative land uses such as crop production. Such costs might be mitigated, however, by siting projects in regions where conservation measures are consistent with regional land use policies and by promoting sustainable agricultural intensification on associated lands.[45]

7.55 The potential impact of projects that encourage afforestation through plantations are just as variable. For example, plantations can help maintain and improve soil properties and provide a source for biomass fuels and other wood products, but may also have negative impacts on biodiversity if replacing native grassland or woodland, and negative socioeconomic impacts if projects displace valuable agricultural land.[46]

7.56 The IPCC Special Report suggests that a 'screening' test be applied to activities to ensure that projects do not have adverse socioeconomic or environmental effects and limiting the crediting of activities to those that pass such a test. The IPCC suggests that one option would be to adopt internationally recognised Environmental Impact Assessment standards and guidelines for carbon-offset projects.[47]

7.57 The Committee supports of the inclusion of sinks in the Kyoto Protocol flexibility mechanisms and is of the view that ultimately such activities will benefit developing nations to achieve sustainable development. However, the Committee also recognises the concerns of groups such as CANA, that sink activities may delay the shift to more sustainable forms of energy use, and may have negative socioeconomic and environmental impacts.

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44 Watson et al (Eds), *Land Use, Land-Use Change and Forestry: A Special Report of the IPCC,* Cambridge University Press, 2000, p 327.

45 Watson et al (Eds), *Land Use, Land-Use Change and Forestry: A Special Report of the IPCC,* Cambridge University Press, 2000, p 327.

46 Watson et al (Eds) *Land Use, Land-Use Change and Forestry: A Special Report of the IPCC,* Cambridge University Press, 2000, pp 327-28.

47 Watson et al (Eds), *Land Use, Land-Use Change and Forestry: A Special Report of the IPCC,* Cambridge University Press, 2000, pp 115-18.

Australia's international negotiating position on greenhouse sinks and the Kyoto Protocol

7.58 The Australian Government undertook a consultation process earlier this year to inform people about the land use change and forestry issues currently under consideration in the international climate change negotiations; and to inform the development of Australia's international negotiating position on greenhouse sinks and the Kyoto Protocol. Through this process written submissions were sought on an Australian Greenhouse Office (AGO) issues paper titled *Greenhouse Sinks and the Kyoto Protocol - An Issues Paper*.

7.59 At the same time, the Federal and Western Australian Governments hosted a closed international forum on greenhouse sinks with representatives from 30 countries. There were no public reports arising from the forum which has led to criticism about its restrictive nature and perceptions amongst the conservation movement 'that Australia is very clearly pushing an agenda of maximising the use of sinks under the Kyoto Protocol'[48] at the expense of real abatement action at source.

7.60 The conservation movement has expressed considerable concern about the provisions for sinks under the Kyoto Protocol due to their potential to be used as 'loopholes'. As noted above, an area of particular concern to the conservation movement is the inclusion of additional sink activities under Article 3.4, arguing that it is 'against the spirit of the Kyoto Protocol'.[49] In presenting evidence to the Committee the Australian Conservation Foundation (ACF) noted that:

> The second issue in terms of continuing negotiations is 3.4 of the Kyoto Protocol which is on additional activities, which include a range of activities potentially involving agricultural practices and so on. The definitions of those have not yet been finalised. To give an example of the potential impact of those definitions, the University of Colorado prepared a report for the World Wildlife Fund. They found that, with a particular definition of additional activities, emissions in the United States could increase by 10 per cent and the US would still meet its Kyoto target. Basically, a minus seven target could be met, on paper, with no extra activities, just by including sinks.[50]

7.61 The World Wildlife Fund (WWF) put forward a similar view stating that land use change and forestry activities would create 'loopholes' in national commitments:

> The reason I used the somewhat pejorative term 'loopholes' is that, because the detail of how this section could be used was left hanging, there is scope for the misuse of the land use change and forestry section to actually avoid actions to achieve the United Nations Framework Convention on Climate

48 Mr Shane Rattenbury, *Proof Committee Hansard*, 23 June 2000, Canberra, p 757.

49 Climate Action Network Australia, Submission 193, p 2035.

50 Mr Van Rood, *Official Committee Hansard*, Melbourne, 21 March 2000, p 195.

> Change goal which is, of course, to reduce atmospheric concentrations of greenhouse gases. We have coined the phrase 'carbon pardons' to describe these loopholes, because, essentially, many people are operating - and certainly many businesses are operating - very similarly to the Pardoner of Geoffrey Chaucer's time of selling pieces of paper giving absolution from climate sin with no real change to the actual activities going on.[51]

7.62 Following the release of the IPCC Special Report, and the conclusion of the Government's consultation process on sinks and the Kyoto Protocol, Australia recently (1 August 2000) put forward its submission to the UNFCCC on land use, land use change and forestry. The submission sets out Australia's views on how the sinks provisions (which includes afforestation, reforestation and deforestation in Article 3.3 and additional sinks activities under Article 3.4) should be implemented through decisions agreed at CoP 6.

7.63 In its 1 August submission, the Australian Government suggests that the key to implementing the land use, land use change and forestry provisions is the development of an overarching carbon accounting framework known as the 'Article 3.3/3.4 lands accounting approach'. The Article 3.3/3.4 lands accounting approach refers to land-based accounting which is directly linked to specific, eligible land use, land use change and forestry activities. Australia argues that the benefits of this approach are that it:

- provides a coherent framework for reporting eligible Article 3 activities;
- facilitates consistent and robust estimates of all relevant carbon pools;
- simplifies measurement and carbon accounting by removing the need to separate out emissions associated with human-induced processes (harvesting and replanting cycles) from natural processes (fire, CO_2 fertilisation); and
- ensures that measurement of changes in carbon stock and/or greenhouse gas emissions are in line with key requirements of the Protocol.

7.64 Key requirements for land use, land use change and forestry activities in the first commitment period include that:

- the activity is directly human-induced, or human-induced;
- the activity took place since 1990;
- measurement of changes in carbon stock or greenhouse gas emissions as a result of the activity is verifiable and transparent; and
- measurement uncertainties are taken into account.

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51 Mr Michael Rae, *Official Committee Hansard*, Sydney, 23 March 2000, p 440.

7.65 The Government's submission supports a set of definitions and rules for eligible Article 3.3 sink activities (afforestation, reforestation and deforestation) that they argue:

- reflect Australia's diverse national forest estate;
- winds elements of a definition of a forest into the definitions for afforestation, reforestation and deforestation;
- requires a change in land use for afforestation and reforestation activities, for example establishment of a plantation on land cleared for agricultural purposes, but does not apply a strict land use change test for deforestation, although harvesting is explicitly excluded (this is because the harvesting cycle is assumed to be in balance); and
- are consistent with the 1996 IPCC Revised Inventory Guidelines which govern monitoring and reporting for the first commitment period (Article 5.2).[52]

7.66 The Australian submission supports a narrow approach to the selection of additional activities under Article 3.4 in conjunction with land-based accounting and argues strongly for the inclusion of revegetation activities including:

- the establishment of woody vegetation to address sustainable land management;
- windbreaks and shelterbelts;
- environmental plantings or fencing off areas of native vegetation;
- agroforestry planting of trees or the development of new tree crops, such as tea tree oil, to encourage a more diversified and sustainable production system that leads to social, economic and environmental benefit for land users; and
- changes in stock management practices to encourage regeneration of vegetation.[53]

7.67 The submission does, however, leave open the question of further additional activities being put forward for inclusion, noting that Australia is working on methodologies to account for additional activities in the agricultural soils and forest management categories (including wood products).[54]

7.68 The Committee accepts that many of the issues surrounding the practical implementation and resolution of the inclusion of sinks in the Kyoto Protocol are highly technical in nature. However, in the Committee's view the Government can

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52 Australian submission to the UNFCCC on Land Use, Land-Use Change and Forestry - 1 August 2000: Implementation of Articles 3.3 and 3.4 of the Kyoto Protocol, pp 1-3.

53 Australian submission to the UNFCCC on Land Use, Land-Use Change and Forestry - 1 August 2000: Implementation of Articles 3.3 and 3.4 of the Kyoto Protocol, pp 1-3.

54 Australian submission to the UNFCCC on Land Use, Land-Use Change and Forestry - 1 August 2000: Implementation of Articles 3.3 and 3.4 of the Kyoto Protocol, p 13.

take greater steps to clarify and explain its position. A step in this direction would be public reporting of the outcomes of the Perth Sinks Forum. The Committee is concerned at continued perceptions of Australia attempting to maximise potential loopholes in these aspects of the Kyoto Protocol. While it is unclear that this is the case, the strength of these perceptions cannot be overlooked.

7.69 The Committee acknowledges that it is in the best interests of all Parties to the Kyoto Protocol to reach resolution on the inclusion of sinks in the Protocol, as soon as possible, to provide for greater certainty and facilitate ratification of the Protocol. However, the Committee is concerned that aspects of the science are still highly uncertain and the potential for loopholes to be exploited through the accounting system remain.

Recommendation 66

The Committee recommends that the approach taken by the Government to international negotiations on the inclusion of sinks should be based on the following principles:

- **that sinks activity in the Clean Development Mechanism should be consistent with the principles of ecological sustainability and that appropriate project guidelines be included to minimise potential adverse socioeconomic and environmental impacts;**
- **the sinks activity in the Clean Development Mechanism should complement other activities to reduce emissions at source;**
- **that the credibility of the use of sinks relies on the credible, verifiable, and transparent recording and reporting of changes in carbon stocks and/or changes in greenhouse gas emissions by sources and removals by sinks;**
- **that sink activities undertaken for climate change mitigation purposes should not result in native forests being cleared to establish plantations; and**
- **that it is desirable for the second commitment period to start immediately after the first commitment so that reporting on sink activities is contiguous.**

Accounting for the Carbon Domestically

7.70 The need for a credible, transparent and verifiable process for accounting in the land use change and forestry sector internationally and domestically has been acknowledged and called for by governments and interest groups alike. As part of the Prime Minister's 1997 Statement: *Safeguarding the Future: Australia's Response to Climate Change*, the establishment of a NCAS for Land Based Sources and Sinks was announced at a projected cost of $12.5 million. The Commonwealth submission to the inquiry notes that:

> Australia's greenhouse gas performance can only be measured through careful monitoring of sources and sinks. Reduction in uncertainty of current emissions estimations particularly the Land Use Change and Forestry sector, is essential as it is likely to form the basis for assessing emissions trends, abatement performance and compliance to commitments under the Kyoto Protocol.
>
> The National Carbon Accounting System (NCAS), announced by the Commonwealth in 1997 with funding of $12.5 million, aims to provide a complete accounting and forecasting capability for human-induced sources and sinks of greenhouse gas emissions from Australian land-based systems. The CRC for Greenhouse Accounting, supported by the AGO will assist in developing the fundamental science that underpins NCAS.[55]

7.71 In presenting evidence to the inquiry, the AGO noted that:

> We certainly would agree we need an internationally credible and transparent process of accounting in land use change and forestry. I think you will find that the approach that was commenced with our National Greenhouse Gas Inventory and is now flowing through to the National Carbon Accounting System does do that. There is a very strong focus on scientific excellence in terms of developing the approach through essentially workshopping and involving, through other devices, a whole range of expert input and review. For example, the draft implementation plan for the 1990 emissions baseline underwent an international scientific review amongst a good number of the world's leading scientists late last year. We have published that international review report and it is going on to our web site. We will basically continue that process and I think we have in place the arrangements to do that.
>
> We do expect that the international review provisions that will go with the compliance regime for the Kyoto Protocol will involve international scrutiny of all countries' national systems accounting for emissions and sinks, including land use change in forestry. Australia is taking a very active part in beginning to develop the international guidelines and codes for that. For example, Australia hosted the final expert workshop for IPCC good practice guidance provisions in Sydney last week. We have been actively supporting that and we will be actively supporting the good practice guidance work that will follow specifically on land use change and forestry.[56]

7.72 It is the Government's intent that the National Carbon Accounting System (NCAS) will:

- reduce scientific uncertainties surrounding land-based estimates of emissions and sinks in the Australian context;

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55 Australian Greenhouse Office on behalf of the Commonwealth Government, Submission 169, p 1700.

56 *Official Committee Hansard*, Canberra, 9 March 2000, p 23.

- provide the scientific and technical basis for international reporting under the UNFCCC and the Kyoto Protocol;
- provide a basis for emissions projections to assess progress towards meeting international emissions reduction targets;
- support emissions trading discussions; and
- underpin international negotiations on greenhouse sink activities. [57]

7.73 Clarifying the 1990 baseline is a critical issue for Australia as, at present, there is considerable uncertainty over what Australia's target of 108 per cent means in terms of actual megatonnes of emissions. This uncertainty is largely due to the uncertainty of emissions from the land use change and forestry sector, in particular land clearing. The first priority of NCAS is to provide the information to refine estimates of Australia's 1990 baseline. The work that is currently being undertaken to support this is focused on:

- area and location of land cover change;
- biomass of the vegetation and carbon content of plant components - such as leaves, roots and stems;
- effects of different land use and agricultural practices;
- the decay rate of wood products - such as furniture, woodframes and paper; and
- refinement of data and models to track these changes. [58]

7.74 Ms Gwen Andrews, Chief Executive of the AGO notified the inquiry that this work should be completed around the middle of 2001.

7.75 CANA put the view that 'further independent (non-government) research is needed to quantify and monitor land use and forestry roles in carbon sequestration and climate change strategies'.[59] The Wilderness Society submission states that 'the controversy surrounding the use of biospheric carbon stores and sinks would be substantially mitigated by the establishment of an independent (from government and industry), resourced, scientific body whose tasks would be to refine the science and develop the reporting, monitoring and compliance rules to allow any role of land use change and forestry to be creditable'.[60]

7.76 This in part stems from a view that:

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57 *Greenhouse notes: Information from the Australian Greenhouse Office*, No 16: National Carbon Accounting System, December 1999.

58 *Greenhouse notes: Information from the Australian Greenhouse Office*, No 16: National Carbon Accounting System, December 1999.

59 Climate Action Network Australia, Submission 193, p 2036.

60 The Wilderness Society, Submission 178, pp 1844-45.

> Current government policy is to allow substantial increases in domestic industrial emissions and meet the Kyoto target 'on paper' with off-setting mechanisms. This will require creative accounting that gives the impression of reductions while in reality the planet's atmosphere is left with more greenhouse gases not less. The main tools to achieve this at a domestic level will be land use change, emissions trading, and sinks (tree planting) schemes.[61]

7.77 Given the work of the NCAS and the CRC for Greenhouse Accounting, Australia is well placed to meet the reporting requirements of the Kyoto Protocol and provide greater certainty on the emissions from land use, land use change and forestry. In the interest of transparency, greater steps could be taken by the Government to remove the 'black box' of accounting by involving a broader range of non-government stakeholders in discussions on the work taking place and ensuring the results of peer review are publicly reported.

Recommendation 67

The Committee recommends that regular briefings for all stakeholders are held on the progress of the National Carbon Accounting System and the outcomes of work as it is finalised.

The Role of Native Forests and Plantations

7.78 An issue that was frequently raised in submissions and presentations to the inquiry was the question of whether Australia was doing enough to protect and enhance existing carbon sinks. The Wilderness Society submission states:

> The most effective form of carbon storage is, without doubt, to leave fossil fuel deposits in the ground. However, a significant form of carbon sequestration is the maintenance of, and increase in, the mature forest estate, that is, to:
>
> 1. preserve existing carbon stores (undisturbed, mature and old growth forests); and
>
> 2. foster an increase in biomass, and hence carbon storage, in previously disturbed native forests. That is, to cease logging, firewood collection or other forms of forest degradation, and allow the forest to naturally increase in age and continue to sequester carbon to biomass and soil stores in perpetuity.[62]

7.79 The Wilderness Society further explained that:

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61 Climate Action Network Australia, Submission 193, p 2037-38.

62 The Wilderness Society, Submission 178, pp 1844-45.

> The Land Use Change and Forestry sector in Australia is a net source of carbon emissions. Unlike other Annex B countries, much benefit can be gained by protecting Australia's existing stores of biospheric carbon. It is widely acknowledged that protecting carbon in already existing stores such as old growth forest is more secure than creating potential carbon sinks such as plantation forests. Ending both deforestation and the conversion of old growth forests to regrowth forests also have many other environmental benefits which do not accrue to many sink activities such as establishing industrial wood plantations. Any discussion of terrestrial carbon emission trading should highlight this distinction.[63]

7.80 In exploring this issue further, the Committee has sought to clarify the role of native forests and plantations in meeting Australia's Kyoto target and the contribution of native forests and plantations to the national Inventory. Key areas of focus were:

- the extent of existing native forest and associated carbon sink and potential threats to this sink;
- the extent and type of plantations and associated carbon sink;
- the potential for new carbon sinks, including environmental plantings and revegetation activities, and potential impact of the establishment of such sinks;
- sustainable forest management and carbon sequestration (public and private land); and
- the sourcing of forestry waste as biomass fuel.

Native forests

7.81 Approximately 156 million hectares of Australia is native forest[64], of which approximately 116 million hectares is woodland and mallee.[65] The native forest estate includes nature conservation reserves (national parks, nature reserves), state forests or multiple use forests, vacant crown land, private land and private leasehold land. Natural, undisturbed forests (such as those contained in conservation reserves) are considered to exist in balance and are therefore considered to be neither a source nor a sink. These forests are excluded from Inventory calculations. However, a considerable proportion of Australia's native forests do not fall into this category and are subject to anthropogenic change (human-induced) through activities such as

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63 The Wilderness Society, Submission 178, pp 1844-45.

64 *Native Forest* - Any local indigenous community the dominant species of which are trees, and containing throughout its growth the complement of native species and habitats normally associated with that forest type or having the potential to develop those characteristics. It includes forests with these characteristics that have been regenerated with human assistance following disturbance. It excludes plantations of native species and previously logged native forest that has been regenerated with non-endemic native species (Commonwealth of Australia, *National Forest Policy Statement*, 1992, p 48).

65 Department of Primary Industries and Energy and Environment Australia, *Australia's Forests - The path to Sustainability*, 1998.

commercial timber production, grazing, and clearing for agriculture, which alters the natural CO_2 flux.[66]

7.82 These forests include a broad variety of forest types and can be mature, old growth[67] or regrowth forest. When calculating the emissions or removal of carbon by these forests the calculations are made on the basis of:

- forest type eg rainforests, tall dense eucalypt, medium dense eucalypt, and medium sparse eucalypt etc; and
- the annual growth rate of that forest type rather than the age class (mature, old growth, and regrowth).

7.83 The reason for this is that density of a forest, whether it is closed forest, open forest, or woodland, and the growth rate, has a greater bearing on the level of associated biomass than the age of that particular forest. The AGO has advised that 'the amount of carbon stored in old growth forests is highly variable, being closely related to forest type. Current estimates are in the range of 39-490t of biomass per hectare'.[68]

7.84 However, it is generally acknowledged that mature and old growth closed or dense forest contain more stored carbon than forest undergoing a cycle of harvest and replant. Drawing on research undertaken by the Resource Assessment Council in 1992 the AGO's *Greenhouse Sinks and the Kyoto Protocol: An Issues Paper* notes that:

> The amount of carbon stored in regrowth forests combined with that stored in forest products has the capacity to exceed storage in mature forest. However, it takes 500 years before this effect is fully offset by stored products and there is a period of several decades immediately post harvest during which carbon storage is less than that in a mature forest. Increased storage will not occur where there are long periods between harvest of regrowth forests; where a large proportion of harvested material is used as pulp; or where sawn timber products are not kept for a long time.[69]

7.85 The Wilderness Society and the Native Forest Network Southern Hemisphere submissions to the inquiry argue for the cessation of old growth logging and for the protection and restoration of native forest as part of the strategy to achieve

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66 *Land Use Change and Forestry*, Workbook for Carbon Dioxide from the Biosphere, National Greenhouse Gas Inventory Committee, Workbook 4.2 with supplements, NGGI, 1998, p 32.

67 *Old Growth Forest* - Forest that is ecologically mature and has been subject to negligible unnatural disturbance such as logging, roading and clearing (Commonwealth of Australia, *National Forest Policy Statement*, 1992, p 49).

68 Australian Greenhouse Office, response to questions on notice from the Committee hearing of 22 June 2000.

69 Australian Greenhouse Office, *Greenhouse Sinks and the Kyoto Protocol: An Issues Paper*, 2000, p 61.

stabilisation of the global carbon cycle. This view was supported by the World Wildlife Fund in the presentation of their evidence before the Committee:

> I think one of the more compelling arguments in terms of the study of land use change in forestry is to look at what is the ballooning, if you like, of carbon that will come as a result of the initial cuts of old-growth. These issues are not looked at all that closely in my view for looking at the totality of the carbon budget. I think if you are looking for a clear incentive for the protection of old-growth forest, it would clearly be to avoid that balloon of greenhouse gases that results from the initial cutting of those areas.[70]

7.86 This view in part is supported in the AGO Issues paper which notes that 'the main benefit of increasing conservation reserves from a greenhouse perspective is the decrease in emissions associated with timber harvesting'. Preliminary analysis by the AGO of the recent transfer of production forests to conservation reserves under the Regional Forest Agreement (RFA) process, indicates that 'the potential rate of carbon sequestration in above ground biomass in these areas is 4.5 million tonnes of CO_2 per year'. However, the Paper also notes that 'ceasing harvesting may decrease growth in the long term harvested wood product pool' and that 'increasing forest conservation areas provides no guarantees that harvesting regimes in other areas will not be intensified, effectively cancelling out any gains'. [71]

7.87 It has also been argued that the incentives (particularly the allocation of tradeable carbon credits) for sink establishment through plantations could lead to native forest being cleared for the purpose of establishing plantations. This was a particular concern of the WWF, Wilderness Society, and Native Forests Network Southern Hemisphere. The Committee shares this concern but notes that, theoretically, this should not occur under the Kyoto Protocol as such an activity would count as deforestation under Article 3.3 and a debit, rather than a credit would be accrued. The AGO has advised that under the National Forest Policy Statement of 1992, all states except Tasmania agreed that no further native forest would be cleared for plantation establishment. In Tasmania, clearing of native vegetation is subject to commitments under the RFA.

7.88 There is also considerable concern about the sourcing of forestry waste as biomass fuel. This issue in part relates to ecologically sustainable forest management. Under the RFAs between the Commonwealth and some state governments, agreement has been reached on ecologically sustainable forest management principles. As a result, the Commonwealth and some states have endorsed the use of biomass fuel sourced from native forests as a renewable fuel source that can be counted under the 2 per cent renewables legislation. Many groups are opposed to this use of native forests:

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70 Mr Michael Rae, *Official Committee Hansard*, Sydney, 23 March 2000, p 442.

71 Australian Greenhouse Office, *Greenhouse Sinks and the Kyoto Protocol: An Issues Paper*, 2000, pp 63-65.

> Biomass burning for energy is an unacceptable use of native forests and their products. No credence should be given to such project proposals as being renewable, or carbon neutral energy sources. Biomass from a special purpose plantation that was planted for the biomass is carbon neutral but when it comes from native forests it is not carbon neutral. It is certainly not renewable.[72]

7.89 The WWF has noted that:

> The use of biomass energy with biofuels sourced from native forest should not be eligible for inclusion in the 2 per cent renewables target. There is a loophole resulting from the interaction of the IPCC Inventory guidelines and the Kyoto Protocol's Article 3.3. Under the IPCC guidelines emissions from biomass burning are not included as energy emissions but changes in forest biomass are accounted for. However, the Protocol excludes biomass changes in most forests. Thus it is possible for biomass energy to reduce standing biomass but for this not to be counted as an emission under the Protocol. In addition it would be impossible to show that using 'forest residue' for biomass energy does not result in increased forestry activity and therefore a lower forest biomass as well as adversely affecting other values such as biodiversity.[73]

7.90 In its inquiry into the Renewable Energy (Electricity) Bill 2000, the Committee rejected the RFA list as a valid criterion for judging whether biodiversity values would be infringed by the use of native forest biomass for renewable electricity. The Committee recommended that non-plantation native forest wood products and wood wastes be specifically excluded from the list of eligible renewable energy sources.[74]

7.91 There are also concerns that the provisions for additional sink activities in Article 3.4 activities, such as 'intensification of native forest management practices including fertilisation and intensive silviculture, will have significant deleterious consequences for biodiversity and for other environmental values and must not be countenanced'.[75]

7.92 The Committee is concerned about the additional pressure that may be placed on native forests as a result of the above and is supportive of the view that greater efforts be taken to protect existing sinks such as undisturbed mature and old growth native forest. It is the Committee's view that no carbon sinks should be established and exchanged for credits at the expense of existing native forest and vegetation.

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72 Mr Noel Ryan, *Official Committee Hansard*, Canberra, 10 March 2000, p 82

73 World Wildlife Fund, Submission 156, p 1585.

74 Renewable Energy (Electricity) Bill 2000, Renewable Energy (Electricity) (Charge) Bill 2000: Report of the Senate Environment, Communications, Information Technology and the Arts References Committee, August 2000, p 15.

75 Mr Noel Ryan, *Official Committee Hansard*, Canberra, 10 March 2000, p 82.

Recommendation 68

The Committee recommends that steps be taken to ensure that no native forest/vegetation is cleared for the purpose of establishing carbon sinks, that no tradeable carbon credits be allocated under a domestic emissions trading scheme where this has occurred, and that an emissions debit be recorded.

Plantations

7.93 Approximately 0.7 per cent of Australia's forest estate is plantation[76] forest, predominantly softwood. The primary purpose of existing plantation is to supply timber for domestic needs - plantations currently meet about 40 per cent of domestic requirements. [77] The advent of the Kyoto Protocol has brought with it a renewed focus and interest in plantation establishment and development as a means of effectively offsetting greenhouse gas emissions from other sources; and a source of carbon credits that can be traded in an international emissions trading scheme and potentially a domestic emissions trading scheme.

7.94 The AGO has advised the Committee that a typical estimate for the level of biomass contained in plantations is 244 tonnes per hectare.[78] The AGO also noted that 'in many instances a plantation forest because of improved site condition due to soil aeration and fertiliser application will be more productive (carrying more biomass at maturity) than a native forest in mature condition'.[79]

7.95 Module 6 of the NGS sets out a number of measures by which governments intend to enhance greenhouse sinks through plantations. Much of the nationally focused effort to date has been through expanding existing programs such as the Farm Forestry Program; and Plantations for Australia: The 2020 Vision. The Farm Forestry Program aims to foster the development of farm forestry[80] and complementary environmental outcomes through incorporating commercial tree growing and management into farming systems for the purpose of wood and non-wood production,

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76 *Plantations* - Intensively managed stands of trees of either native or exotic species, created by the regular placement of seedlings or seed. Generally a long rotation agricultural crop that can be managed to produce large volumes of wood per unit area. (Commonwealth of Australia, *National Forest Policy Statement*, 1992 pp 49 and Department of Primary Industries and Energy and Environment Australia, *Australia's Forests - The path to Sustainability*, 1998.)

77 Department of Primary Industries and Energy and Environment Australia, *Australia's Forests - The Path to Sustainability*, 1998, Canberra.

78 Australian Greenhouse Office, response to questions on notice from Committee hearing, Canberra, 22 June 2000.

79 Australian Greenhouse Office, response to questions on notice from Committee hearing, 9 March 2000.

80 *Farm Forestry (Agroforestry)* - The incorporation of commercial tree growing into farming systems. Can take many forms including timber belts, alleys, and wide spread tree plantings (Department of Primary Industries and Energy and Environment Australia, *Australia's Forests - The path to Sustainability*, 1998).

increasing agricultural productivity and sustainable natural resource management. The 2020 Vision seeks to treble the plantation estate by 2020, building an internationally competitive, market focused, and sustainable plantation growing and processing industry with significant private sector investment.[81] The AGO submission to the inquiry notes that 'a significant increase in the area of plantations being established has already been achieved, with current establishment rates of approximately 65,000 hectares per year'.[82]

7.96 A number of state governments have been actively pursuing plantation establishment as a greenhouse response measure. In presenting evidence to the inquiry, Mr Nigel Routh of State Forests NSW, stated:

> State forests, about two years ago, at the time of the imminent signing of the Kyoto Protocol, saw this as a positive opportunity for the plantation sector in particular; we see that plantations now, and increasingly in the future, will be valued for components above and beyond their timber facets. For instance, in this case they have a very significant role to play in carbon sequestration, and there are also synergies in terms of things like the role that can be played vis-à-vis dryland salinity, land repair - for instance, on mine sites - and in terms of having planted forest for biomass energy plants. So it is a significant shift, I think, for an industry that is now faced with what we see very much as an opportunity to contribute towards the solution in addressing greenhouse emissions.[83]

7.97 Mr Routh also told the Committee that a contract had recently been signed with the Tokyo Electric Power Company. Under the contract, Tokyo Electric Power will offset a portion of their greenhouse emissions by establishing from 10,000 to 40,000 hectares of plantation in New South Wales:

> The arrangement with the Tokyo Electric Power Company is that the expectation is that it will be a long-term sawlog rotation of the order of 30 years. But the contract is flexible in the sense that we are the service providers and it is principally going to be established on private land with annuity arrangements or lease or rent arrangements with private landowners. But the Tokyo Electric Power Company will have the discretion really as the carbon market develops to decide when thinnings occur, when the final harvest occurs and I guess hypothetically depending on a carbon value of the future even if a timber harvest occurs. [84]

7.98 Mr Routh advised that State Forests NSW was also talking with other companies interested in taking a hedging approach towards potential future emissions

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81 Australian Greenhouse Office, *The National Greenhouse Strategy: Strategic Framework for Advancing Australia's Greenhouse Response*, 1998, p 72.

82 Australian Greenhouse Office, Submission 169, p 1698.

83 Mr Nigel Routh, *Official Committee Hansard*, Sydney, 22 March 2000, p 9.

84 *Official Committee Hansard*, Sydney 22 March 2000, pp 14-15.

liabilities. Mr Routh asserted that plantations held great potential and represented a significant opportunity for the forestry industry and greenhouse:

> In New South Wales we may be looking at one million hectares of current essentially cleared land on which you could establish plantations. You are probably familiar with the 2020 vision and the goals in that. There are opportunities which will, as I mentioned earlier, lead to those multifaceted benefits. Certainly the estate in New South Wales at the moment is, especially on the hardwood side, relatively small but it has virtually doubled in the last five years and there is major opportunity for the future.[85]

7.99 Similarly, the Western Australian Government has been pursuing investment in plantations as a means of addressing salinity and greenhouse and advised the Committee that:

> … large areas of our agricultural land are affected by salinity. The areas that are likely to be affected are increasing quite rapidly. What I propose to do today is to outline to you a partial solution to two problems: a solution to the salinity problem and a partial solution to greenhouse gas abatement. The issue is very much one of using trees or vegetation to revegetate areas that have previously been cleared. So we are not now talking about our native forests; this is about clearing land that has previously been cleared and using it for revegetation purposes.
>
> …
>
> We have some 90,000 hectares of blue gums, which have been planted since 1988. We indicate that the potential there is some 250,000 hectares. That would in fact lead to a carbon accretion of 2.3 million tonnes of CO_2 equivalent. The cost of producing that, as opposed to the cost of other abatement measures or trading, is between zero and $20 per tonne. The ranger is dictated entirely by the commerciality of the timber of the blue gums. In other words, if you have a commercially viable blue gum plantation the carbon credits are a strict bonus - that is, there is a zero cost associated with accumulating that carbon. On the other hand, if one goes to a submarginal blue gum plantation on the fringes of the wetter areas there is actually a cost associated with accumulating that carbon, and that is estimated at about $20 per tonne CO_2 equivalent.
>
> Blue gums are confined to the high rainfall areas. The one we are currently promoting is on the drier margins of the wheat belt, at the transition between the wheat belt and the higher rainfall areas, and is maritime pine, also known as *Pinus pinasta*. We have an initial aim to plant 150,000 hectares of those pine trees. The potential area is in the order of 0.6 million hectares, which would give us about 7.5 million tonnes of CO_2 equivalent, locked up at a cost of between $2 and $6 per tonne. [86]

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85 *Official Committee Hansard*, Sydney 22 March 2000, pp 14-15.

86 Dr Wally Cox, *Proof Committee Hansard*, Perth, 17 April 2000, p 457.

7.100 The Tasmanian Government submission notes that:

> In many regions of Australia, including Tasmania, there are extensive areas of cleared land that are not used by owners because of low productivity. Land owners are likely to be happy to lease this land for low rates (eg $50 per hectare per annum) to enable the establishment of plantations. Although such low productivity land is not commercial for tree farms due to the low returns from the timber grown on it, the trees will sequester carbon while they growing and return a yield to an investor from the sale of the timber. Further research into the possibility of joint-venture agreements, allowing the land owner to attract external investor funding to establish plantations on cleared land, should be encouraged.[87]

7.101 The range of economic benefits that may accrue to the investor are the greatest incentives for establishing plantations as carbon sinks. Investment in plantations as a carbon sink is seen to be largely a 'no regrets' low cost action - as demonstrated by the Western Australian Government. A company looking to minimise its emissions may choose to invest in a plantation as an offset to those emissions rather than take a potentially more expensive path of reducing emissions at source. In return for the investment in establishing the plantation, the company would own the rights to the carbon sequestered, which could potentially be traded at a later date under an emissions trading scheme, as well as the profits arising from the sale of the timber at harvest.

7.102 A key issue raised in hearings and submissions was the question of suitable land for the establishment of plantations. There was some concern that the rapid growth and encouragement of plantation establishment would compete with valuable agricultural land.[88] As noted earlier in this chapter, this is particularly the case in some developing countries where the prime sites for plantation establishment may also be those used to source food and fuel.

7.103 A recent ABARE study which examined the potential to expand plantations identified a number of regions in Western Australia, Tasmania and the Green Triangle region of South Australia and Victoria, as economically suitable for plantation development and the development of further wood processing capacity.[89] Whilst the study was primarily looking at plantations for wood production potential, the study also took into account an assumed price of $20 a tonne for carbon sequestered in plantations. The report notes that:

> … the additional returns available from the sale of carbon credits enabled plantation investments to become more competitive against existing land

87 Tasmanian Government, Submission 185, p 1986.

88 National Farmers Federation, Submission 145; and Native Forest Network Southern Hemisphere, Submission 18a.

89 Burns K, Walker D and Hansard A 1999, *Forest plantations on cleared agricultural land in Australia : A regional economic analysis*, ABARE Research Report 99.11, p 8.

> uses. However, in most cases these returns from carbon credits only supplemented the returns from the sale of harvested timber. In the carbon scenarios, the assumed maximum processing capacity remained a significant constraint to plantation establishment.[90]

7.104 The issue of the primary purpose of plantations for commercial wood production does raise the question of the level of carbon sequestered as a result. The carbon is not sequestered in perpetuity but would be released at the point of harvest. It was unclear to the Committee whether investment in plantations is occurring solely for the purpose of carbon sequestration, or whether the prospect of carbon credits for carbon sequestered will make otherwise uneconomic plantations commercially viable. The examples cited by the NSW and Western Australian Governments suggest it is the latter.

7.105 However, the submission to the inquiry from Southern Pacific Petroleum and Central Pacific Minerals (SPP/CPM) notes that they are looking to carbon offsets as a key component of their climate change action plan and are currently investing approximately $3.5 million in intensive long term research and development studies in Queensland, into native species reforestation with the primary purpose of carbon sequestration. The aims of the studies are to:

- investigate the sustainability (economic, environmental and social) of carbon intensive native species plantations for carbon sequestration;
- develop an understanding of the carbon dynamics to support the establishment of carbon accounting procedures and predictive models for above ground and below ground biomass (roots and soil carbon) for the above scenarios;
- develop new silvicultural and reforestation practices for carbon sequestration (that are not applicable in purely commercial forestry) which enhance the competitiveness of land restoration and plantations versus conventional commercial forestry;
- investigate a range of approaches to natural revegetation along with its carbon storage and other environmental benefits; and
- determine the best means to integrate widespread reforestation with the current dominant industry of grazing.[91]

7.106 The approach SPP/CPM is taking to reforestation is welcome; however the principal activity it seeks to offset with sequestration is shale oil mining which is itself an energy-intensive activity. The Committee notes that the sequestration activity will not offset all the greenhouse emissions of the project. As discussed in chapter 5, the

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90 Burns K, Walker D and Hansard A 1999, *Forest plantations on cleared agricultural land in Australia : A regional economic analysis*, ABARE Research Report 99.11, p 8.

91 Southern Pacific Petroleum and Central Pacific Minerals, Submission 172, p 1745.

Committee supports the evaluation of greenhouse gas impacts as part of an environmental impact assessment process.

7.107 The Native Forest Network Southern Hemisphere (NFNSH) submission to the inquiry presented a disturbing picture of the impact that plantation establishment is having on rural communities in Tasmania, noting that:

> Opposition to plantations has moved beyond the environmental sector and now includes a significant range of the rural community, particularly dairy farmers and local councils. Meander Valley Council has successfully challenged the development of private Timber Reserves twice, forcing the Government to change the legislation for the establishment of PTRs. Burnie City Council is having to deal with the loss of the rate payer base. North Ltd for example owns 40 per cent of Burnie Municipality and pays approx. $150,000 vs the other ratepayers (about $12 million). A recent news story on 'Stateline'… details the opposition of dairy farmers to plantations because of the devaluation of properties adjoining tree farms and the social isolation caused by wall to wall plantations located in the middle of once-thriving rural communities.
>
> A group 'Communities Over Plantations' has now been formed in the north of the State, and does not constitute an environmental pressure group, rather a traditional rural community group.[92]

7.108 The NFNSH also provided the following anecdotal evidence, alleging that:

1. corporations are targeting prime agricultural land for establishment, not degraded farmland;

2. property prices in rural areas are falling due to the conversion of farmland to non-agricultural uses;

3. other industries are being negatively impacted by this proliferation of chemical tree farms, e.g. Tasmania's burgeoning organic sector;

4. some landowners are being intimidated by forestry employees and politicians into selling their land at reduced rates;

5. some rural townships are simply closing down as residents leave, thus exacerbating the existing crisis facing rural Australia;

6. plantation prospectuses are grossly exaggerating the benefits of carbon sequestration as an additional economic benefit to pulp production whilst completely ignoring the fact that the principle of carbon sequestration is not even currently recognised by international scientists and policymakers. The Federal Government is complicit in this cover up, and is currently seeking to preempt international processes by playing a numbers game with countries supportive to its position; and

92 Native Forests Network Southern Hemisphere, Submission 18a, pp 2268-70.

7. due to the Federal Government's new capital gains tax provisions companies can write off 150 per cent of the costs associated with the destruction of agricultural infrastructure on the farms they have purchased (i.e. dairies are being bulldozed, farmhouses buried in huge pits, dams being filled). This is depreciating rural Australia's agricultural assets.[93]

7.109 The Committee has not been able to establish the veracity of the above claims. The Tasmanian Government declined to appear before the Committee and was not previously asked to provide a response. The Committee has since made a written request to the Tasmanian Government to do so. These allegations that prospectuses are exaggerating the potential economic value of carbon sequestered, and that regional Tasmanian communities are suffering significant impacts as a result of plantation development, are of serious concern to the Committee. The Committee has referred the allegations of misleading prospectuses to the Australian Securities and Investments Commission for their investigation.

Recommendation 69

The Committee recommends that the Tasmanian Government, in cooperation with local councils, farmers organisations and the forestry industry investigate the concerns about plantation developments raised by the Native Forest Network Southern Hemisphere.

7.110 As noted earlier, the IPCC Special Report on Land Use, Land Use Change, and Forestry has explored the potential socioeconomic impact of plantation projects internationally, particularly in developing countries. The IPCC Special Report states that:

> Agroforestry activities can sequester carbon and produce a range of environmental and socioeconomic benefits. For example, trees in agroforestry farms improve soil fertility through control of soil erosion, maintenance of soil organic matter and physical properties, increased nutrient inputs through nitrogen fixation and uptake from deep soil horizons, and promotion of more closed nutrient cycling (Young, 1997). Thus, agroforestry systems that incorporate trees on farms can improve and conserve soil properties (Nair, 1989; MacDicken and Vergara, 1990), as is the case in the AES Thames Guatemala project (Dixon et al., 1993). Agroforestry projects also may provide local economic benefits, with farmers gaining higher income from timber, fruits, medicinals, and extractives than they would from alternative agricultural practices (Cooper et al., 1996).

93 Native Forests Network Southern Hemisphere, Submission 18a, pp 2268-70.

> Poorly planned and implemented agroforestry projects, however can fail to benefit or have negative impacts on local farmers. For example, the introduction of labor-intensive agroforestry technologies can lead to labor competition between agroforestry practices and traditional farming (Laquihon, 1989; Repollo and Castillo, 1989). Poorly planned projects can also lead to excessive light and water competition between crops and trees, as well as reducing the area available for food crops.[94]

7.111 The Committee has sought to establish what is happening or may happen in the Australian context. For example, the Western Australian evidence put to the Committee identifies over 1 million hectares of cleared agricultural land with plantation potential, land which may be currently used for wheat or pastoral purposes, therefore the investment in plantations would mean displacing existing crops entirely or shifting them to new locations - potentially more marginal agricultural land. In response, Dr Wally Cox noted that:

> People are making judgements about what they invest in. If you plant a tree, then the current utilisation of that land would be foregone. In most cases, though, the current utilisation is pasture for the production of sheep and wool. Given the current price of wool, you can see why people are switching over to other options.[95]

7.112 The CRC for Greenhouse Accounting provided a similar response:

> … if the price of carbon were high, could it mean that poor land-holders were forced to do things which were not sensible from other perspectives? Within Australia, I am sure it is something that all land-holders will take into account, but I would have to say that projected value of carbon is much less than the projected value of food… . What I am saying is that food is much more valuable in that context, and I cannot see that a farmer would stop producing food if he or she had an economically viable outfit. I cannot see that they would stop producing food - certainly crops, that is - and grow trees. I do take your point though, in terms of marginal agricultural. It is the case that there are a lot of areas of Australia that are marginal in terms of agriculture, and land users are going to have to make sensible decisions about these things. If carbon is traded, they are going to have to make projections about the cost of carbon and weigh that out against other activities on the land.[96]

7.113 The submission to the inquiry from the National Farmers Federation (NFF) notes that:

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94 Watson et al, *Land Use, Land-Use Change and Forestry: A Special Report of the IPCC*, Cambridge University Press, 2000, p 328.

95 *Proof Committee Hansard*, Perth Monday 17 April 2000, p 467.

96 Prof Graham Farquhar, *Proof Committee Hansard*, Canberra, 6 September 2000, p 924.

> Australia's commitment to meet greenhouse abatement targets is expected to enhance investment in forestry and farm forestry activities in rural Australia. Further, some producers of agricultural commodities which have suffered on-going poor returns may be looking to diversify their options through investment in forestry activities.
>
> NFF believes there are pros and cons for rural communities in extensive investment in forestry and revegetation. The shift from agricultural production to forestry could make a significant impact on the social structure of many rural communities.[97]

7.114 However, overall the NFF supports promoting the uptake of commercial farm forestry due to the multiple benefits offered and takes the view that carbon sink enhancement 'may help to increase the returns from farm forestry, making it a more attractive investment option in regions where previously the economic returns did not offset the initial costs of investment'.[98]

7.115 The Committee is concerned that too little focus has been given to the socioeconomic impact of encouraging substantial uptake of plantations as a greenhouse abatement measure. It is the Committee's view that the potential longer term cost of displacing productive, as opposed to degraded, or marginal agricultural land, and the impact of that on rural communities needs to be treated with equal weight as the economic benefit to be derived from plantations.

7.116 The management of plantations also raises a number of issues of concern. Plantations are not subject to the same codes of practice as native forests. Plantations are usually monocultures - single native or in some instances introduced species - and depending on the species may be subject to a more intensive management cycle, and fertilisation to encourage rapid growth. For plantations to be both commercially viable and sequester carbon they need to established with sequestration in mind - that is, in order to maintain a constant pool of carbon, planting and harvesting would need to be rotated. This would require plantations with mixed age trees, potentially over a more extensive area, to provide for a commercially viable crop and carbon sequestration. How this would operate in practice was demonstrated by Mr Nigel Routh, as follows:

> … what happens if there is a harvest? If there is a harvest that is 100 per cent emission of the amount of trees harvested at that time. The way we approach it is that, particularly because of the scale of what they are proposing, we would establish a carbon pool so that you build gradually to that 10,000 or 40,000 hectare level by establishing in the initial year 1,000 hectares, building, we hope, to a steady state of 5,000 hectares per annum planting in the fifth year and that will be maintained through the duration of the contract so that you have a mixture of ages in your plantation pool.

97 National Farmers Federation, Submission 145, p 1506.

98 National Farmers Federation, Submission 145, p 1508.

> Therefore, when you do come to harvest, if that is the outcome, depending on the future markets, you are not incurring 100 per cent emission of that entire pool because the ages are such that you take out, for instance, 1,000 hectares in year 30 and 1,000 hectares in year 31. So, with the incremental growth in the remaining majority of the plantation, you are actually keeping pretty much a steady state in your carbon pool. [99]

7.117 The Australia Institute notes that in practical terms this may mean that 'only large, professionally managed plantations are likely to qualify and be commercially worthwhile'.[100]

7.118 It has also been suggested that the establishment of plantations in themselves can cause significant emissions associated with some of the techniques used in planting. CANA cites new research by Turner and Lambert examining changes in organic carbon in forest plantation soils in eastern Australia, that suggest significant loss of soil carbon as a result of the technique of deep ripping of the soil. The associated carbon loss is estimated to take 10 to 20 years to reach a balance.[101]

7.119 Recent data collected by State Forests NSW suggests that the soil carbon loss may not be as extreme as portrayed by Turner and Lambert :

> It is likely that soil carbon declines initially after plantation establishment, due to mineralisation of soil organic matter and a decrease in litter addition to the soil. However, the substantial losses reported by Turner and Lambert do not correspond with the data collected by State Forests. Our data suggest a decline only in the zone of soil disturbance, amounting to 12 per cent of initial soil carbon on average across the site.
>
> As the plantation grows, soil carbon is replenished from litter fall and root matter. Due to the proliferation of fine root growth within the mounded soil, soil carbon accumulates particularly in the mound. State Forests' evidence from the NSW North Coast suggests that within five years the addition to soil organic matter from the plantation will balance, or even exceed, the soil carbon losses that occur in early establishment. Therefore, the net effect of soil carbon decline and recovery, and accumulation of tree biomass, will produce a net positive carbon balance within five years in this environment.
>
> The decline in soil carbon will be greatest in high fertility agricultural soils in warm, wet environments, and least on low fertility, sandy soils, and in dry environments such as the low rainfall areas of the Murray Darling Basin. As tree growth rates are slower in dry areas, the replenishment of lost soil

99 Mr Nigel Routh, *Official Committee Hansard*, Sydney, 22 March 2000, pp 14-15.

100 The Australia Institute, Submission 79a, p 9.

101 Climate Action Network Australia, Additional Submission, August 2000, p 3.

carbon may take a similar time period to that estimated for more productive environments.[102]

7.120 A five year delay does, however, impact on the timing of establishment of plantations, if credits for carbon sequestered are to be allocated during the first commitment period. The known Kyoto rules are that the plantation must be established after 1990 and the only carbon sequestration that will be eligible (at present) is that achieved during the first commitment period of 2008 to 2012. For new plantations investment and establishment would need to occur in the next few years to make the most of that period.

7.121 It is the Committee's view that a balanced approach needs to be to be taken on the question of the contribution of plantations as potential carbon sinks. The Committee agrees that plantations can bring needed regional development opportunities, improvements to agricultural production, and a reduction in the reliance on native forests for timber products. However, the Committee is also concerned about the longevity of plantations as a carbon store and the potential negative impacts on rural communities of large scale monoculture plantation establishment. The Committee cautions against hurried investment in plantations until such time as the rules and costs of accounting for the carbon, and property rights over the carbon sequestered have been clearly established.

Recommendation 70

The Committee recommends that the Government, in consultation with all stakeholders and the forestry industry, undertake a public inquiry into the potential for plantations as a carbon store, including an assessment of the broader regional environmental, social and economic implications.

Environmental plantings and revegetation activities

7.122 An alternative to the establishment of plantations as carbon sinks is to focus on environmental plantings and revegetation[103] activities with the aim of creating a sink in perpetuity. While these are subject to the same risks of fire, pests and disease as native forests and plantations, there are also clear benefits to be gained in terms of reducing salinity, restoring biodiversity and erosion control, and thereby increasing the productivity of agricultural land. The AGO Program Bush for Greenhouse aims to channel investment in carbon offsets through revegetation projects for environmental

102 State Forests NSW, Additional Submission, September 2000, p 3.

103 *Revegetation* - An activity undertaken to restore and rehabilitate degraded and/or cleared land to improve its environmental values and/or productivity. Revegetation projects range from encouraging natural regeneration of remnant vegetation to establishing grasses, shrubs and trees on previously cleared areas. In general such projects are not of commercial forestry nature but may have other commercial non-timber value such as oil production or food products. Projects also focus primarily on the use of locally sourced native species.

purposes. The resulting offsets would be recognised under the Greenhouse Challenge Program and potentially eligible for carbon credits under future emissions trading schemes. 'Revegetation is expected to be maintained over the long term, cover a wide geographic diversity and use locally native mixed species'.[104]

7.123 Dryland salinity has emerged as a significant environmental issue in the last decade. The South Australian submission to the inquiry states that the cost to the South Australian economy of dryland salinity is approximately $50 million annually in lost agricultural production.[105] In Western Australia 1.8 million hectares in the south-west agricultural region are affected by salinity.[106] The incentive of the possibility of carbon credits for revegetation provides a new opportunity to assist in addressing dryland salinity.

7.124 A recent CSIRO research report into emerging land use systems for managing dryland salinity calls for 'a revolution in land use' to address the issue and identifies the planting of low rainfall native trees that can be used as a food source, pharmaceutical source, and a source of industrial products such as bio-fuels as one option for changing land use.

7.125 The report notes that:

> While this is potentially the most effective land use option for managing salinity by reducing leakage, it is not commercially viable due to a lack of markets to drive reforestation and/or revegetation at the necessary scale.

7.126 The provision of carbon credits for carbon sequestration as a result would make such an option more commercially viable.

7.127 Others such as Mr Robert Vincin of Emission Traders International are advocating the planting of native saltbush (Atriplex) as a response to greenhouse and salinity with the added benefit of providing reliable fodder for sheep and cattle. Mr Vincin informed the Committee of his work in this regard, noting that:

> What is missing in the entire equation of tree plantations is the function of fauna - animals. By grazing the sheep, cattle, goats or camels in other countries, their droppings create carbon. Each time you graze the Atriplex back, it creates a complete new root system underneath, like roses, so what was there before is stored carbon. Seventy per cent of carbon is in the soils and subsoils. Only 30 cent is in the trees above; the rest is in the soils and subsoils. We graze it twice a year through an electric fencing process and we rotate them through. Year 3 it is cash positive; year 8 it is fully paid for. In our contracts with these major corporations - whom I will not name - they invest in the Atriplex plantation. They can either buy the property or

104 http://www.greenhouse.gov.au/pubs/factsheets/fs_bush.html.

105 South Australian Government, Submission 199.

106 Western Australia Ministry of Premier and Cabinet, response to questions on notice, 23 May 2000.

> contract lease it. We then sell the meat, wool or leather, and improve the land. We buy the land at $40 and improve it to $200, because we have new organic matter in the soil again. We can stop erosion. We lift the salt out of the ground into the biomass and that is taken in through the animals and regenerated back out into the topsoil.[107]

7.128 The Western Australian Government, as part of its action to combat salinity, is also encouraging investment in revegetation activities with economic benefits through the production of oil mallees as a source for biofuel. Dr Cox informed the Committee:

> Finally, a really innovative approach is to re-establish native vegetation in the drier margins of the wheat belt. It is something that is being pursued by some 800 farmers at present with the production of oil mallees, a naturally occurring species in that part of the landscape. Again, the estimate is that some half million hectares of that would also accumulate significant amounts of carbon, at a cost of about $12 per tonne. As you can see from the totals at the bottom, some 1.35 million hectares of revegetation - and I emphasise that: it is revegetation; it is land that has been cleared historically and is currently farming land - would accumulate some 10.9 million tonnes of CO_2 equivalent, which is almost half of that figure of 24 that we talked about previously, and the cost ranges between zero and $20 per tonne.[108]

7.129 The Western Australian Greenhouse Council report by the Sustainable Land Management Technical Panel, notes that:

> Mallee coppices prolifically and can be harvested on a two year rotation from age four onwards, when it yields an average harvest of three tonnes of above ground carbon per year (i.e. six tonnes/harvest) and a harvested stand maintains an average above ground carbon sink of three tonnes/ha. After oil extraction the biomass residue can be used as fuel, thereby avoiding emissions from fossil fuels. Root carbon increases at a steady one tonne/year for many decades as the plant builds up its root stock from which the coppicing stems rise.[109]

7.130 Accounting for the carbon contained in revegetation projects suffers from the same degrees of uncertainty as other aspects of the land use change and forestry sector. A secondary objective of the Bush for Greenhouse Program is to put in place carbon measuring and accounting systems suitable to Australian revegetation projects. Under the Program, a carbon accounting tool will be developed and applied to Bush for Greenhouse revegetation projects to work out the potential carbon sequestration.

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107 *Official Committee Hansard*, Sydney, 22 March 2000, p 6.

108 *Proof Committee Hansard*, Perth, 17 April 2000, p 457.

109 Western Australian Greenhouse Council, 1999, *Report to Council Sustainable Land Management Technical Panel*, p 34.

The Program will also support the development and refinement of best practice tools and methods for measuring carbon sequestration in vegetation systems.[110]

What Should the Legitimate Role of Sinks Be?

7.131 In taking evidence on the role of sinks in greenhouse policy, the Committee was presented with a diverse range of views. These focused largely on the issues of permanence and security of the carbon store; marketing carbon stores as a tradeable commodity via carbon credits; the ancillary benefits that can be achieved through investment in sinks; and the broader impact that sinks as a greenhouse response measure may have on emissions reduction in other sectors. For example, the CANA submission states that:

> Australia is currently channelling an excessive amount of financial and policy resources into establishing sink schemes as a mechanism to meet the Kyoto Protocol. While carbon sequestration by trees has been classified as a valid mechanism to meet Kyoto targets, sequestration science is still uncertain.
>
> Planting trees has undeniable environmental benefits, but trees only lock carbon away in temporary storage. They will never be a substitute to leaving fossilised carbon in geological deposits locked away for thousands of years. For this reason tree planting schemes are no solution to the main cause of global warming – burning fossil fuels. Yet Australia is giving money to farmers to plant trees through landcare and agro forestry – and calling it climate change. The longer this continues, without genuine emission reduction at source, the further Australia will sink into a quagmire of inaction.[111]

7.132 The above statement appears somewhat inconsistent with other environment group views that maintenance of and increase in, the mature forest estate is an effective and significant form of carbon sequestration (see the discussion earlier in this chapter). An opposing view to that of CANA has been put by the CRC for Greenhouse Accounting which argues:

> If they [sinks] are well managed… there are potentials for improving biodiversity, improving water quality and river flows, increasing quality and quantity of forests, soils and grazing lands and fisheries, increasing sustainable access to fibre, fuel and shelter, and improving health and social equity and reducing poverty. The main message I would like to leave you with is as follows: as far as the atmosphere is concerned, reduction in the level of greenhouse gases by enhancing sinks or reducing emissions from the land sector has equal validity with reduction of fossil fuel emissions. We have the opportunity for better management of Australia's land surface, in partnership with land users, to reduce greenhouse gases and reverse land

110 Australian Greenhouse Office, *Greenhouse Notes, Bush for Greenhouse – linking industry and landholders*, April 2000.

111 Climate Action Network Australia, Submission 193, p 2038.

> degradation. Future decisions made by policy makers and land managers must be informed by the best science.[112]

7.133 As noted earlier, scientists and community groups have called into question the permanence or security of the establishment of greenhouse sinks, through plantation or revegetation activity, as a greenhouse response measure. The IPCC Special Report has provided a greater degree of certainty in this regard with the IPCC Chair, Robert Watson, stating in his presentation of the IPCC Special Report:

> A basic conclusion of the report is that LULUCF [Land Use, Land Use Change and Forestry] activities provide an opportunity to reduce greenhouse gas emissions into the atmosphere by avoiding deforestation, and to increase the uptake of carbon from the atmosphere into the terrestrial biosphere through afforestation, reforestation and improved forest, cropland and range-land management activities.[113]

7.134 The IPCC Special Report notes that 'newly planted or regenerating forests, in the absence of major disturbances, will continue to uptake carbon for 20 to 50 years or more after establishment, depending on species and site conditions, though quantitative projections beyond a few decades are uncertain'.[114]

7.135 Overall the views that have been forthcoming in submissions regarding the role of sinks as a greenhouse response measure can be summarised in the following manner. The positive benefits of carbon sequestration through forestry and revegetation activities include:

- providing the opportunity to meet a number of environmental objectives including:
    - a reduction in and reparation of dryland salinity;
    - increasing biodiversity through native vegetation initiatives; and
    - a sustainable source of biofuels;
- facilitating an increase in forested areas and providing for a reinvigorated forestry industry with a focus on plantations rather than harvesting of native forests, and creating a new market value for plantation forests; and
- buys time to identify more cost-effective, longer term solutions for reducing emissions at source.

7.136 However, there are also potential negative outcomes, including:

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112 Professor Graham Farquhar, *Proof Committee Hansard*, Canberra, 6 September 2000, pp 924-25.

113 Robert T. Watson, Chair of the IPCC, *A Report on the Key Findings from the IPCC Special Report on Land Use, Land-Use Change and Forestry*, 12th session of SBSTA, Bonn, Germany, 13 June 2000, p 1.

114 *Summary for policymakers: Land Use, Land-Use Change, and Forestry: A Special Report of the Intergovernmental Panel on Climate Change*, Canada, IPCC, 2000, p 4.

- loss of biodiversity if the focus is solely on investing in those species which sequester the most carbon without taking into account broader environment considerations;
- the risk of loss as a result of fire, pests or disease resulting in removal of the offset and therefore further greenhouse emissions;
- the administrative costs of monitoring, auditing and accounting for the carbon stored and ensuring a credible and verifiable accounting takes place;
- undermining the transition to more sustainable forms of energy use, if no limit is placed on the extent to which sinks can be used as an offset to emissions; and
- the long term reductions in atmospheric CO_2 levels as a result are still uncertain.

7.137 It is the Committee's view that overall, sinks do a have a legitimate role to play in Australia's greenhouse response, as many of the negatives can be managed, avoided or addressed through the development of appropriate policies and measures. However, the extent to which sinks play a role, the scope of sink activities, recognition of those activities and the overarching policy framework is not so straightforward.

Trading in Carbon Credits

7.138 A number of submissions and evidence put to the inquiry suggests that investment in sinks will only occur if there are provisions in place for the allocation of tradeable carbon credits for the carbon sequestered and a clear national policy framework recognising the role of sinks.

7.139 The issue of sequestered carbon as a tradeable commodity arises from the potential inclusion of carbon credits in an international emissions trading scheme and/or domestic emissions trading. This issue is canvassed in the AGO's third emissions trading discussion paper, *Crediting the Carbon*. The paper discusses the design of a national emissions trading system that allows for carbon credits, including carbon sinks. Arguments put forward in favour of the inclusion of forest related sinks in such a system are that their incorporation would:

- provide additional stimulus to the creation of forest (and other) sinks allowable under the Kyoto Protocol;
- give financial benefits to the forestry and rural sectors by revitalising the forestry industry, and have wider community and environmental benefits; and
- provide a low cost option to offset greenhouse gas emissions.[115]

7.140 The system would work by issuing a 'carbon credit' for each tonne of CO_2-e sequestered in a Kyoto sink. There would be no regulatory limit to the number of

115 Australian Greenhouse Office, *National Emissions Trading: Crediting the carbon*, Discussion paper No. 3, 1999, p 4.

credits issued provided the sink is eligible under the Kyoto Protocol. Emissions permits and carbon credits would be interchangeable as both would have the same unit of measurement. Accounting for the sequestered carbon would need to occur at site level using accepted measurement standards, rules and guidelines at reasonable cost. The cost and ease of monitoring and reporting would be a key factor in decisions to invest, however, ultimately it will be the price of carbon established in an emissions trading system that will determine whether carbon credits are a viable option.

7.141 To ensure the transparency and credibility of the system, and enable the carbon sequestered to be counted towards Australia's target, independent verification may be required. A consistent legal framework would also need to be put in place across the states for the registration of ownership of carbon rights.

7.142 Governments and industry have expressed general support for the incorporation of Kyoto sinks in a domestic emissions trading scheme, noting however, that there are a number of design, legislative and methodological issues that would need to be resolved in the first instance. A number of states have already taken steps to stimulate a market. Dr Bryan Jenkins of the Western Australia Environment Protection Agency informed the Committee that:

> Some contracts have already been written between government and particular industries on setting up afforestation projects, with one of the major components being carbon sequestration measurement. We are looking at trying to broaden that. As Dr Cox mentioned, there is an interest in establishing carbon rights, and a lot of work has also been undertaken in developing the methodologies for carbon sequestration and its measurement. But clearly, there you need not only the baseline measurement of the amount of carbon that is in a particular forest but also predictive models. Quite a bit of work has been done in relation to Western Australian species by the CALM specialist in forecasting what the future amount of carbon sequestration would be and also in developing assurance regimes so that when it comes to a commitment period and you need to count, the trees are still there and have not been harvested.
>
> We are looking at whether we can actually establish carbon rights through Western Australian legislation but, as you will be will aware, at the end of the day the only value they will have is through a Commonwealth regime as part of a Kyoto or an international protocol. At the end of the day, we can establish all the carbon rights mechanisms and the estimations of carbon that has been sequestered, but until it actually becomes an international and a Commonwealth policy - because you can only have trading between countries under the Kyoto Protocol, not between states or between companies - they will not have any recognised value. But we are certainly moving down that path with particular emphasis in relation to forestry.[116]

116 *Proof Committee Hansard*, Perth, 17 April 2000, p 461.

7.143 The NSW Government has also taken steps in this direction with the establishment of a number of contracts with private entities and the establishment of the *Carbon Rights Amendment Act* which separately identifies carbon as a tradeable commodity. The Sydney Futures Exchange also signalled an intent to develop the world's first exchange-traded market for carbon sequestration credits consistent with Article 3.3 of the Kyoto Protocol.[117] Trading was due to commence in the middle of 2000, however, the Committee understands that this has been put on hold until further interest develops in the market and uncertainties relating the Protocol are clarified.

7.144 The Executive Director of the Australian Petroleum Production and Exploration Association, Mr Barry Jones, has cautioned against moving ahead too quickly with the incorporation of carbon credits in the design of an emissions trading system:

> I do not see how you can design an emissions trading system if the concept of carbon credits is going to largely rest on forestry of various kinds, you do not know the rules for sinks and sinks enhancements, you do not have property rights in that area and you do not have legislative arrangements which separate the carbon from the trees from the land ownership. There is a whole suite of uncertainties there that make it very difficult to make definitive policy statements that might run for the 12-year time frame that we are now looking at.[118]

7.145 CANA discussed this issue in an additional submission to the inquiry on the role of sinks in a national emissions trading system. While not ruling out the incorporation of carbon sinks, they note that the same uncertainties apparent at the international level are inherent in a domestic system, and caution against assigning carbon credits beyond activities outlined in Article 3.3 of the Kyoto Protocol. CANA has proposed that the following rules be included the framework for a domestic emissions trading:

- a permanence requirement. Every carbon credit obtained and used in the national emissions trading system has a permanence requirement that if, for **any** reason, the sequestered carbon is released to the atmosphere, the holder of this unit has to make good the emitted carbon;
- allowed credits be restricted only to Article 3.3 activities and are valid if and only if the carbon stock of the land on which the credit is generated equals or exceeds the carbon stock of that land in 1990;
- credits generated are only issued ex poste, based on third party assessment and only issued to the extent of the mean estimate of the stock change less 2 standard deviations of the estimate (this gives actors an incentive to

117 Sydney Futures Exchange, Submission 161, p 1620.

118 Mr Barry Jones, *Proof Committee Hansard*, Canberra 23 June 2000, p 805.

reduce the uncertainty through better measurement or to choose other mitigation options eg at source);

- a fixed and small cap is established for the total amount of credits that can be issued as a proportion of the total assigned amount for the first commitment period and further, in relation to actors having emissions quotas, there be strict cap on the proportion of sinks-related carbon credits that permit holders can claim for the purpose of achieving their emissions quotas;
- the explicit identification of forestry, land use change and other sinks-related activities that are **not** eligible for receiving carbon credits, including 'managed' native forests, woodlands and rangelands and any activities that are inconsistent with state, national and international commitments on biodiversity protection; and
- a strong monitoring and third party verification framework for carbon crediting.[119]

7.146 The Committee is broadly supportive of the incorporation of sinks into a domestic emissions trading system, and agrees that the design of the sink components of the system must reflect the final decisions on sinks taken internationally, and not go beyond the scope of activities accepted under the Kyoto Protocol. The Committee is of the view that caution be exercised in the allocation of carbon credits due to the uncertainties surrounding the international debate on carbon sinks. The Committee is supportive of the CANA suggestion of a built-in permanence requirement and is of the opinion that investors in carbon sinks should be prepared to bear fully the risk of making good any emitted carbon.

Recommendation 71

The Committee recommends that any approach taken to credit carbon sinks should take into account uncertainties surrounding the international debate and should be consistent with any international framework.

Recommendation 72

The Committee recommends that the incorporation of carbon credits in a domestic emissions trading system be limited to Kyoto eligible sinks and:

- **subject to monitoring and reporting requirements consistent with the Kyoto Protocol;**
- **subject to an independent verification process to ensure transparency and credibility of reports;**
- **subject to permanence and biodiversity requirements; and**

119 Climate Action Network Australia, Submission 193a, p 2.

- **complemented by activity aimed at reduction of emissions at source.**

Australian Democrats Recommendation 8

The Australian Democrats recommend that a cap be set on the number of sinks credits that any one company or country can use to offset emissions.

Australian Democrats Recommendation 9

The Australian Democrats recommend that credits are issued based on a 'tonne year accounting approach' after third party assessment of the sequestration and under clear monitoring provisions.

Recommendation 73

The Committee recommends that sink rules comply with the Convention on Biological Diversity and that activity in native forests, woodlands and rangelands that threatens biodiversity protection, be explicitly excluded from eligibility for carbon credits under a domestic emissions trading system.

Australian Democrats Recommendation 10

The Australian Democrats recommend that reforestation and afforestation credits are only made available for plantings that enhance local biodiversity and are not detrimental to water sources.

A National Policy Framework for Sinks?

7.147 Considerable concern has been expressed throughout the inquiry that sinks are viewed by governments and industry as a long term solution rather than a transitional strategy, and a strong perception exists that it is the Government's intent that a large proportion of Australia's Kyoto target be met through sink activity.

7.148 Sinks can be viewed in a number of ways:

- as a long term measure/response;
- as an interim or transitional measure (short term/buying time); or
- as an entirely additional activity with greenhouse benefits but no tradeable credit for action as not reducing emissions at source.

7.149 Most witnesses to the inquiry accept that sinks are not a long term solution. The CANA submission notes that:

> The notion that carbon sequestration represents a solution is based on a dangerous delusion - the delusion that forests, plantations and other sinks represent intrinsically permanent stocks of carbon and that there is almost infinite scope to increase these stocks. In reality, carbon sequestration

> offers, at best, the potential for taking a small proportion of the current anthropogenic CO_2 emissions from the atmosphere and providing a short term store for that carbon. Under the Kyoto Protocol, however, even this small benefit is ambiguous, since for every emission unit claimed as sequestered unit of carbon, a corresponding additional unit of gross industrial emissions is permitted. In other words, the use of sequestration activities, within the Kyoto Protocol framework, results in more greenhouse gases being added to the atmosphere than would otherwise have been the case.[120]

7.150 The Committee does not favour consideration of sinks as a long term measure. It is the Committee's view that the science on the longer term future of sinks remains uncertain. Contributing to this uncertainty is the scope of the sink activities contained in the Kyoto Protocol, the potential lack of permanence, and the risk of sink removal post the first commitment period if there is not contiguous reporting into a second commitment period. As noted by the WWF in evidence to the Committee:

> The focus should be reducing greenhouse emissions at source. Land use change and forestry is a peripheral activity which cannot address some of the issues that the previous speakers today have mentioned, that is, what is the long term goal for greenhouse gas reductions far and beyond Kyoto?[121]

7.151 The Committee takes the view, that as a transitional measure, sinks can make a valuable contribution to both meeting the Kyoto target and putting in place longer term strategies for reducing greenhouse gas emissions at source. This was a view put forward by CSIRO and many others to the Committee:

> The other response is sequestration - that is, if you do not want carbon dioxide in the atmosphere. It is important for committee members to realise that you have a choice of only three places to put that carbon. It does not disappear from the system. It does not leak out into space. It is a mass and that mass remains constant. If we do not want carbon dioxide in the atmosphere, we could leave it where it is, which implies not burning fossil fuels, not wreaking massive land use changes. If we are going to continue to burn fossil fuels and we do not want the carbon in the atmosphere, then it needs to be either put back into the lithosphere via geological sequestration, or it gets put into the marine environment or the terrestrial environment via tree planting programs, vegetation, et cetera. Sequestration may be a transitional strategy until we go to more sustainable forms of energy usage.[122]

7.152 The Committee emphasises that sinks should only be viewed as one part of the solution, and that the primary focus of greenhouse response measures should be on

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120 Climate Action Network Australia, Submission 193a, p 4.

121 Mr Michael Rae, *Official Committee Hansard*, Sydney, 23 March 2000, p 441.

122 Dr Chris Mitchell, *Official Committee Hansard*, Melbourne, 20 March 2000, p 114.

reducing emissions at source and encouraging fundamental changes in the energy and transport sectors.

7.153 It is the Committee's view, that without the benefits of tradeable carbon credits, much of the valuable ancillary benefits to be gained from carbon sequestration may not arise, because the financial incentive for investment would no longer exist. The Committee agrees that carbon credits should not be the driver for necessary revegetation activities to reduce and repair salinity, but acknowledges the potential for carbon credits to stimulate action in this regard.

7.154 The Western Australian Government has argued that for sinks to make an effective contribution to Australia's Kyoto target, significant changes in policy are required. Dr Cox informed the Committee that:

> … governments by themselves cannot possibly achieve that outcome. It has to be achieved through private sector participation. The three elements we think are important to achieve those outcomes are, firstly, the recognition of the Commonwealth Parliament that revegetation will provide cost-effective greenhouse gas abatement and will also deliver regional development, ecologically sustainable development and environmental management on a large scale; secondly, understanding that commercial action is necessary to achieve the required scale of revegetation and that government action in the early stages is required to demonstrate the potential and to develop markets for commercial products and biomass energy; and, finally, early resolutions of uncertainties about accounting rules and the adoption of national regulations for controlling greenhouse gas emissions.

7.155 Dr Cox suggested that a national policy framework for sinks is required to facilitate and encourage action and adds that the key policy elements required are:

- … [r]ecognition of property rights. In other words, if people grow vegetation for the purposes of carbon accretion, that property right must be recognised and we have suggested the framework that should be established for that.

- … [a] framework needs to be put in place for a trading environment so that people can trade carbon credits between farmers and industry and so that the money generated from that can be utilised by farmers for revegetation purposes.

- … [t]o enable trading to take place, there must be an accounting framework and a measurement system in place. It is currently being worked on but, again, we would encourage a policy framework at the Federal level, supported by the states, to ensure we have the ability to account for what is being accredited. [123]

123 *Proof Committee Hansard*, Perth, 17 April 2000, p 458.

7.156 The NGS sets out a number of measures by which greenhouse sinks may be expanded, enhanced and managed, but does not address the issues outlined by the Western Australian Government, link activities and measures, or establish a goal for the contribution of sinks to meeting Australia's target. A number of the principles developed and agreed by governments to guide the further development and implementation of the NGS do go some way towards providing the basis of a national policy framework and should be considered in the development of a national policy framework for sinks.

7.157 The Committee supports the development of a national policy framework for sinks that:

- integrates with natural resource management and ecologically sustainable development;
- provides the basis for broadscale activity to address significant environmental issues such as dryland salinity; and
- facilitates opportunities for new industries under a greenhouse banner.

Recommendation 74

The Committee recommends that the Australian Greenhouse Office coordinate the development of a National Policy Framework for Greenhouse Sinks, which:

- **is developed in partnership with state and territory governments and relevant stakeholders; and**
- **is informed by the outcomes of the international negotiations on the scope of sink activities to be included in the Kyoto Protocol.**

The policy framework should identify principles to guide the establishment of sink activities and consider, but not be limited to:

- **the protection and enhancement of the native forest estate and native vegetation;**
- **the impact on the environment of plantations versus environmental plantings or revegetation;**
- **socioeconomic impacts on regional and rural communities;**
- **opportunities for the facilitation and development of new industries particularly in regional communities;**
- **the opportunities for broadscale activity to address significant environmental issues such as dryland salinity, land clearing and sustainable land management;**
- **how sink activities may best be integrated with existing land uses such as grazing;**

- **legislative mechanisms for the recognition of carbon rights;**
- **cost effectiveness of the range of sink activities; and**
- **the role of partnerships in achieving outcomes.**

Recommendation 75

The Committee recommends that a National Policy Framework for Greenhouse Sinks do the following:

- **give priority to actions that will protect and enhance the native forest estate and native vegetation;**
- **provide for research and development into native species reforestation and revegetation activities which enhance carbon sequestration;**
- **provide funds for rural strategies that will facilitate greenhouse abatement and broader environmental outcomes such as the establishment of fuel plantations in salinity affected areas, and biomass based cogeneration plants for agro-industrial plants in rural regions;**
- **set out the accounting framework to be used and establish an independent verification process; and**
- **establish the framework for the trading of carbon credits domestically and define the range and scope of sink activities that will be recognised in a national emissions trading system.**

Alternative Methods of Carbon Sequestration

7.158 The inquiry also heard of various projects currently underway to test the long term viability of sequestering carbon in underground cavities and in the ocean. CSIRO told the Committee that research into such methods was the focus of considerable international activity.[124]

7.159 Geological sequestration appears to have enormous potential, with estimates in Australia of up to 60 gigatonnes of CO_2. However, no detailed analysis has yet been conducted to determine the capacity of Australian sedimentary basins to sequester CO_2 and it appears to be a very high cost method of greenhouse gas abatement. Technologies to perform this currently exist in oil extraction industries, although challenges exist in concentrating CO_2 and separating it from other industrial pollutants.

7.160 Research efforts are also being directed into the marine sequestration of carbon dioxide, either through direct injection of CO_2 into the ocean depths, or the

124 CSIRO, Submission 206, pp 2481-83.

stimulation of phytoplankton growth in surface ocean layers through the addition of nutrients such as nitrogen and iron. There are currently significant technical difficulties with such methods and uncertainty about their broader ecological impacts.

7.161 Dr Thomas Trull, from the Antarctic Cooperative Research Centre at the University of Tasmania, told the Committee about experiments they had conducted with ocean fertilisation. In February 1999 they fertilised an area of the Southern Ocean 'about the size of the entire Derwent estuary and the greater Hobart region', using iron in the form of ferrous sulphate heptahydrate, a salt:

> That bloom did not exceed what you can see there in November when natural processes produce activity anyway when there is iron available. By adding iron we are able to essentially extend the phytoplankton production season… . This algal bloom transferred approximately 2,000 tonnes of carbon from the atmosphere to the ocean. That is roughly one part per million of the present natural global uptake by the ocean. It was a very small experiment and a very small increase in the uptake, but it demonstrated the feasibility and how that can occur. Even if we were to carry this activity out over the entire Southern Ocean we could achieve levels of enhanced uptake very similar to the terrestrial reforestation process, but both of those are small compared to the emissions from fossil fuels.[125]

7.162 The Antarctic CRC felt that this method was promising but cautioned that further research was needed:

> There are still possibilities for deleterious effects. We do not know exactly which algae will respond when and where. We could get nuisance algae. We could get changes in food and the ecosystem structure which would not be desirable. We could produce toxic algal blooms. But probably all those things can be avoided.[126]

7.163 The CRC argued that the possibilities for oceanic sequestration were similar to those for sequestration on land and, while worth pursuing, would not substitute for the reduction of fossil fuel use in the global greenhouse abatement task:

> Both these enhancements of the terrestrial and oceanic sink produce only relatively small decreases in the atmospheric carbon dioxide level. They both produce decreases of about 50 parts per million. That is to be compared with our present levels of about 360 and our expectation that that will double. Ocean enhancement should be given the same attention that terrestrial enhancements are given. Both should be viewed as small in their impact compared to the necessary reduction of emissions if we want to

125 *Proof Committee Hansard*, Hobart, 5 May 2000, pp E490-1.

126 *Proof Committee Hansard*, Hobart, 5 May 2000, pp E490-1.

> maintain atmospheric CO_2 levels close to present levels or even keep them below doubling.[127]

Recommendation 76

The Committee recommends that Australian government, industry and scientific community should continue to monitor research into alternative methods of carbon sequestration, and to support it where such methods seem promising and prudent.

Agricultural Production: Reducing Greenhouse Gas Emissions

7.164 The agricultural sector is responsible for 20 per cent of Australia's greenhouse gas emissions (excluding land use change). The agricultural industry has been receiving a great deal of focus in terms of the potential for carbon sequestration through the creation of carbon sinks on cleared agricultural land, but little attention appears to have been focused on ways to reduce emissions at source. While the Committee notes that emissions from this sector have been relatively stable for some time, the Committee takes a longer term view of the need to address greenhouse gas emissions and believes that all sectors must play their part in achieving emissions reductions.

7.165 Module 6 of the NGS seeks to ensure incorporation of greenhouse issues into agricultural management practices through the promotion of sustainable agricultural practices and development of packages of information for each key industry type. Much of the emphasis of the measures is on capacity building, provision of extension services to the agricultural community and communication and education programs.

7.166 The NFF submission to the inquiry states:

> NFF believes there is a need for greater identification, dissemination and extension of on-ground changes to land management practices which enhance sustainability but also reduce emissions from the agricultural sector.
>
> Land managers need access to such tools, if they are to play a role in emissions reduction. Greenhouse alone as an issue will not in the present situation be sufficiently compelling to the individual farmer to make changes to their land management. However, production orientated solutions, which enhance sustainability but also reduce emissions are more likely to be embraced.
>
> There is also a clear need for provision of information to land managers about greenhouse issues, how they relate to natural resource management

127 *Proof Committee Hansard*, Hobart, 5 May 2000, pp E490-1.

and how they may impact on their management decisions and costs of production.[128]

7.167 Primary responsibility for the delivery of these programs lies with the state and territory governments and intergovernmental mechanisms such as the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). The submission from the NFF suggests that not much progress has been made on this front to date.

7.168 As part of the Commonwealth submission to the inquiry a work program for the ARMCANZ Standing Committee on Agriculture and Resource Management (SCARM) was provided. This program outlines the work the Council is intending to undertake to assist in implementation of the NGS. The activities outlined in the work program are intended to address the policy and institutional issues to enable agriculture and natural resource management to contribute to reducing greenhouse gas emissions and establishing carbon sinks.

7.169 The work program has three broad themes as follows:

- Sustainable agricultural management practices:
    - identify activities with the greatest greenhouse benefit;
    - identify incentives to encourage uptake of sustainable agricultural practices; and
    - use this information to inform policy development.
- Sinks:
    - review the potential contribution of different primary industries to sink establishment and maintenance;
    - investigate potential incentives to encourage uptake of carbon offset activities;
    - review current regulations and institutional frameworks impeding the establishment of carbon sinks; and
    - consider auditing processes and procedures for assessing carbon sequestration in vegetation.
- Emissions Projections:
    - development of scenarios of future emissions levels; and
    - opportunities emanating from the establishment of an emissions trading regime.

128 National Farmers Federation, Submission 145, p 1507.

- Emissions Trading:
    - analysis of the issues for the agricultural sector and provision of advice on how a framework may best be devised for the sector.
- Industry Awareness:
    - ensuring industry and government stakeholders are aware of the role of agriculture and natural resource management will need to play in meeting greenhouse commitments.
- Adaptation strategies for climate change.

7.170 SCARM has sought $2 million from the Commonwealth and state agencies to support implementation of the work program over the next two years. The Committee is concerned that the broad scope of the SCARM work program will result in limited on ground abatement activity. The work program distributes minimal resources across a very broad range of activities that will result primarily in research reports and may risk duplicating work that is being undertaken by Commonwealth agencies such as the AGO, for example, emissions projections, emissions trading and sinks. It is the Committee's view that a number of the issues that the program is seeking to address, such as emissions trading and sinks, are beyond the scope of the Council and need to be considered as part of a higher level policy framework specifically addressing these issues.

7.171 The work program appears to offer little practical application of measures to reduce emissions, and the focus is on further research and policy development, rather than communication and education about action that can be taken now. In the view of the Committee, a more strategic approach to action than presented in the SCARM work program is required. This is discussed further in the section on sustainable land management below.

7.172 The Committee is also concerned at the overall scarce level of funding being provided to support measures in the agricultural sector. The Committee is not aware if the SCARM work program is fully funded and notes that in the Prime Minister's 1997 Statement only $1 million out of $180 million was specifically allocated to a measure in the agricultural sector.

7.173 The Committee was presented with very little evidence in both hearings and submissions on the agricultural sector and the progress of measures to reduce emissions in the sector. With the potential for the agricultural sector to be incorporated into a future national emissions trading system, the Committee is highly concerned at the paucity of measures, beyond sink creation, receiving attention by governments. The Committee is aware that a significant level of attention is currently being given by the Federal Government to the development of a natural resource management strategy. The Committee believes that a central focus of this strategy should be the reduction of greenhouse gas emissions from agricultural production.

Recommendation 77

The Committee recommends that the reduction of greenhouse gas emissions from agricultural production be a focus of the Natural Resource Management Strategy currently under development.

Reducing methane emissions from livestock

7.174 Emissions from livestock in 1998 represented 13.8 per cent of total national emissions and 68.2 per cent of emissions from agriculture. These emissions are principally methane produced by sheep and cattle generated through the natural process of enteric fermentation. Methane-producing organisms (methanogens) exist in the digestive tract of cattle, sheep and goats as a normal product of fermentation of the fodder that livestock consume. The level of methane produced varies depending on feed quality and intensity of management. For example, sheep fed on low quality pasture produce less emissions per head but more over a lifetime due to the time taken to reach target live weights, while sheep fed on grain produce more emissions per head but less over a lifetime as they reach target live weight gain more quickly.[129]

7.175 Research to control methane production in livestock is not new and has been a focus for nutritionists for some time as its production represents a loss of energy resulting in lower productivity (growth, and production of milk and wool) of the animal concerned. CSIRO advises that 'methane has no nutritional value for livestock and it is breathed out by them. The methane produced by methanogens accounts for between 2 per cent and 12 per cent of the energy in the fodder that livestock consume'.[130]

7.176 Manure management in the intensive livestock industries also produces methane and nitrous oxide emissions.

7.177 Options for reducing greenhouse gas emissions from livestock appear to be limited and focus on either inhibiting or suppressing the production of methane in the enteric fermentation process; and/or reducing stocking rates, adopting grazing management strategies that result in less methane being produced and less carbon being lost from pastures; and modification or improvement in effluent disposal techniques.

7.178 Options for inhibiting or suppressing methane and reducing greenhouse gas emissions through changing the composition of feed or introduction of additives

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129 R S Hegarty, 'Practical methods for reducing methane emissions from Australian livestock' in Reyenga P J, and Howden S M, (Eds), *Meeting the Kyoto Target: Implications for the Australian Livestock Industries*, Workshop Proceedings, Canberra, 4-5 November 1998, Bureau of Rural Sciences, Canberra, 1999, pp 97-98.

130 G McAlpine and C Mitchell, *CSIRO – Solutions for Greenhouse*, an overview prepared for the Australian Greenhouse Office (AGO), June 1999, p 25.

which inhibit the production of methane have limited application in Australia. The method of delivery is only suitable to intensively managed stock, such as dairy or feedlot cattle, as daily or frequent doses are required and would also require reduction in actual stocking rates to reduce overall greenhouse gas emissions.[131]

7.179 The most promising option appears to be a vaccine currently under development by CSIRO. Under the Prime Minister's 1997 Statement, *Safeguarding the Future*, $1 million was allocated to promote the vaccine which inhibits the production of methane in the rumen of livestock. The vaccine under development uses the immune system of the animal to inhibit the methanogens, poses no risk to the animal, improves productivity, would be easily administered to all livestock and have long term effects. Expected emissions reductions are yet to be fully quantified but could be in the order of 18 per cent.[132]

7.180 CSIRO has advised the Committee that work is still in the research and development phase and commercial viability is yet to be established. The current focus is to establish whether a vaccine for sheep is commercially viable by early 2001 and develop an estimate of the likely level of reduction in emissions. Registration of the vaccine could then take up to 3 years. Prototype vaccines for cattle and goats are yet to be developed and are dependant on further funding.[133]

7.181 The cost-effectiveness of the vaccine as a greenhouse gas abatement measure would depend on the benefits to the purchasers in terms of productivity gains and reduction in emissions. The Western Australian Government estimates 'suggest annual reduced emissions of 0.8 to 1.0 Mt CO_2-e possible from sheep at approximately $100 per tonne and from dairy and beef cattle, at approximately $35 per tonne'.[134] The basis for the above estimates has not been provided.

7.182 There is the potential that the livestock sector will be faced with costs under an emissions trading scheme, if action is not taken. This issue is addressed later in this chapter. However, opportunities for action in the livestock industries have been identified. The outcomes of the Bureau of Rural Sciences (BRS) 1998 Workshop into the Kyoto Protocol and Implications for the Australian Livestock Industries note that:

> Significant emission reductions could be achieved through the development of new technologies. There are currently a number of research avenues that

131 R S Hegarty, '*Practical methods for reducing methane emissions from Australian livestock*' in Reyenga, P J, and Howden S M, (Eds), *Meeting the Kyoto Target, Implications for the Australian Livestock Industries*, Workshop Proceedings, Canberra, 4-5 November 1998, Bureau of Rural Sciences, Canberra, 1999, pp 100-01.

132 Western Australia Greenhouse Council, *Report to Council Sustainable Land Management*, Technical Panel June 1999, p 26.

133 Advice provided to the Committee by the CSIRO Animal Production Unit, 23 March 2000.

134 Western Australia Greenhouse Council, *Report to Council Sustainable Land Management*, Technical Panel June 1999, p 27.

show potential to reduce emissions substantially while increasing animal productivity. At present most receive little research funding in Australia.

Australia should invest in the development and commercialisation of these technologies rather than wait to buy them from other countries. There are opportunities for greenhouse 'credits' if Australia uses these technologies in Joint Implementation (JI) and Clean Development Mechanism (CDM) activities. There are also opportunities to enhance the image of Australian industries.

Funding for research and development should come from both industry and government as reducing emissions relates to both business advantage and the 'national good'. The existing commitment is small.[135]

Recommendation 78

The Committee recommends that a greater level of support be sought from governments and industry for research and development in emissions reduction opportunities in the livestock industries. This could be facilitated by provision of seed funding by the Commonwealth or matching funding from the Commonwealth to industry funds.

Sustainable Agricultural Management Practices

7.183 The concept of ecologically sustainable management is generally accepted. The benefits that can be gained in terms of improvements in productivity, the environment, and the longer term future of agricultural production in Australia are widely recognised. However, the potential role of sustainable agricultural management practices in reducing greenhouse gas emissions, particularly nitrous oxide from agricultural soils, is still under investigation.

7.184 Efforts to improve the general management practices of the livestock industry through improved animal husbandry and improved effluent management should not be discounted as an option. These can improve productivity and enhance the long term viability of the industry. Management practices that will reduce greenhouse gas emissions that could be promoted include:

- improving feed conversion efficiency through breeding and culling;
- supplementary feeding, herd health, improved pastures, optimal stocking rates and feedlotting (depending upon net feed conversion efficiency);

135 P J Reyenga and S M Howden, (Eds), *Meeting the Kyoto Target: Implications for the Australian Livestock Industries,* Workshop proceedings, Canberra, 4-5 November 1998, Bureau of Rural Sciences, Canberra, 1999, p 126.

- encouragement of farm management practices which promote stocking rates that minimise the risk of degrading pasture cover, root material and soil carbon; and
- consideration of alternative and new animal species for production.[136]

7.185 More efficient management of farm effluent could result in reduced methane emissions and other greenhouse gas emissions through greater energy efficiency. The Western Australian Greenhouse Council report from the Sustainable Land Management technical panel notes that:

> At present up to half the dairy farms in Western Australia do nothing to manage dairy shed effluent effectively and many management systems do not prevent off site drainage of nutrients (in total about 75 per cent of farms do not manage dairy shed effluent acceptably).[137]

7.186 Other key agricultural management practices that are to be promoted under the NGS include conservation cropping, reducing energy use in agricultural production, and reduction of biomass burning. The Western Australian Greenhouse Council assessments of the potential of measures such as these indicates that:

> Adoption of grazing management strategies in northern Australia to increase the perennial grass component could sequester approximately 300 million tonnes of organic carbon into the top 10 cm of soil. Rehabilitating degraded land could possibly store a further 140 million tonnes of organic carbon. However, it is expected that there would be extra carbon sequestered in extra biomass from improved pasture management.[138]

7.187 The Council also notes that:

> The use of alternative tillage systems may reduce overall rates of emissions of soil carbon by about 2.5 million tonnes per annum (Lloyd, 1994). Howden & O'Leary (1995) suggested that wheat cropping systems in Victoria emitted between 1.35 and 2.15 tonnes of carbon dioxide per hectare per year. Stubble retention wheat cropping systems could reduce the average net emissions per hectare by up to 37 per cent.[139]

7.188 In presenting evidence to the Committee, Dr Brian Jenkins of the Western Australian Environment Protection Authority, noted that:

> If you look at the main measures in the sustainable land management, and here you will see some of the areas we cannot actually cost because they

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136 National Greenhouse Strategy, p 79.

137 Western Australia Greenhouse Council, *Report to Council Sustainable Land Management Technical Panel*, June 1999, p 27.

138 Western Australia Greenhouse Council, *Report to Council Sustainable Land Management Technical Panel*, June 1999, p 27.

139 Western Australia Greenhouse Council, *Report to Council Sustainable Land Management Technical Panel*, June 1999, pp 29-30.

> really depend upon individual circumstances - and that is where the asterisks are - in terms of emission reduction with animal husbandry we can get in the order of about one megatonne at an estimated cost of about $35 per tonne.
>
> The major improvements would come from the CSIRO injections or feed changes that you would need to introduce… to reduce the amount of belching by the cows and the sheep. If you look at fertiliser management, we believe that you can get up to about two megatonnes. The cost there is uncertain but that could be a no regrets measure. With conservation tillage which you may wish to undertake for land management reasons, you are getting about 1.8 [Mt saved] and also for the stopping of land clearing, about 3.9 [Mt saved]. So you are starting to get some sizeable figures there in land management. These issues come under article 3.4 of the Kyoto Protocol, for which there is not international agreement yet on their inclusion, but clearly the contribution they can make is quite substantial in the West Australian context and agriculture is quite a major component of the West Australian emissions.[140]

7.189 The BRS workshop summary notes that:

> There are a number of things farmers can do now to reduce their greenhouse gas emissions as well as improve their sustainability. However, industry currently has little exposure to these options. To address this we need to assess the economic and greenhouse benefits and costs of different management practices and develop greenhouse 'best practice' guidelines. This was seen as a priority as potential new mitigation technologies are still a number of years away.[141]

7.190 The Committee accepts that further investigation to quantify the greenhouse benefits of sustainable agricultural management practices and the cost-effectiveness of such actions may be required before widespread action and uptake is achieved. The Committee does not, however, see these as reasons to not pursue action in this sector and urges governments to encourage and facilitate uptake of such practices. It is the Committee's view that Measure 6.9 of the NGS - Incorporating consideration of greenhouse issues into agricultural management practices, has the potential to meet the needs identified by the BRS workshop and the Western Australian Government. Action under this measure should be facilitated and accelerated as a priority.

Recommendation 79

The Committee recommends that the Standing Committee on Agriculture and Resource Management (SCARM) work program be enhanced with the aim of:

- **improving understanding of agricultural producers about greenhouse;**

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140 Dr Bryan Jenkins, *Proof Committee Hansard*, Perth, 17 April 2000, p 557.

141 P J Reyenga and S M Howden, (Eds), *Meeting the Kyoto Target: Implications for the Australian Livestock Industries*, Workshop proceedings, Canberra, 4-5 November 1998, Bureau of Rural Sciences, Canberra, 1999, p 123.

- **involving agricultural producers in identifying options and solutions; and**
- **identification of options where sustainable land management leads to reductions in emissions and greater productivity.**

Recommendation 80

The Committee recommends that greater attention and priority be given by all governments to meet the objectives of National Greenhouse Strategy relating to agricultural management practices.

Emissions trading and the agricultural sector

7.191 The Committee has indicated support for an emissions trading system that incorporates as wide a base as possible. The Committee is aware of concerns that the design of such a system may impose undue hardships on some sectors such as agriculture. However, there is also broad support for the inclusion of all sectors in such a system.

7.192 The NFF submission to the inquiry notes that:

> Should an ET regime be established in Australia that it must be capable of accommodating the needs of participants with many smaller emission sources. The farm sector which falls into this category, could be at a relative disadvantage with regard to transaction/compliance costs unless well accepted default measures were devised to easily estimate and aggregate such emissions.[142]

7.193 However, the NFF also notes that:

> The establishment of ET could potentially offer a dynamic, market-based system which drives greater investment in revegetation and retention of vegetation in rural Australia. This opportunity could however be lost if the transaction, compliance and permit costs are beyond the viable means of small players.[143]

7.194 The summary of the BRS workshop discussion notes the following with regard to emissions trading and the agricultural sector:

> If a free-market approach to emissions trading is adopted and the livestock industry are unable to make cost effective reductions in emissions they are at risk of having their permits purchased by other industries which have lower emissions per unit economic return.

142 National Farmers Federation, Submission 145, p 2.

143 National Farmers Federation, Submission 145, p 2.

> If the livestock sector can make significant reduction in methane emissions, farmers will have emission permits to sell. If emissions trading eventuates there may also be potential for claiming carbon credits from forage shrub establishment and on-farm forestry plantations.[144]

7.195 Possible coverage in an emissions trading system is discussed in chapter 9. The Committee supports mechanisms to stimulate more sustainable agricultural practices and emission abatement. It further recognises that there are a number of abatement opportunities that could be judiciously pursued in advance of a national emissions trading system without posing undue hardship in the agricultural sector.

The Scourge of Land Clearing

7.196 The Committee has very serious concerns about currrent rates of land clearing in Australia and its destructive environmental impacts. While the actual contribution of land clearing to Australia's greenhouse gas emissions remains uncertain, the effects of land clearing on greenhouse emissions, biodiversity, soil conservation and water management are well documented. The ACF has stated that:

> Land clearing is an environmental problem for three reasons:
>
> It destroys and fragments the habitat of native plants and animals, killing between five and ten million birds a year.
>
> It contributes to greenhouse gas emissions through the burning and rotting of vegetation.
>
> It often leads to land degradation and salination, with serious economic and social repercussions.
>
> *The State of the Environment Report: Australia 1996* says that land clearance is the single greatest threat to biodiversity, and may be Australia's most serious environmental problem.[145]

7.197 Greenhouse emissions from land clearing are the result of the loss of carbon stored in vegetation and more importantly the soils. The 1998 NGGI report on the land use change and forestry sector states that:

> Present emissions are in part a result of past actions - for example, emissions from soil disturbance reflect previous clearing. The soil is a large carbon reservoir and clearing of vegetation results in disturbance of the soil and death and decay of tree roots with consequent release of carbon from belowground. This release is neither instantaneous nor uniform.

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144 P J Reyenga and S M Howden, (Eds), *Meeting the Kyoto Target: Implications for the Australian Livestock Industries*, Workshop proceedings, Canberra, 4-5 November 1998, Bureau of Rural Sciences, Canberra, 1999, pp 120-21.

145 http://www.acfonline.org.au/campaigns/landclearing/briefings/background.htm (25/10/00).

> The pattern and rate of release of soil carbon over time are not known for the variety of Australian soil and vegetation types. Nor is it known whether, under different management conditions, there is net uptake or emission. Release or uptake will be affected by the nature of land use change and by climatic conditions. [146]

7.198 The uncertainties of measurement of greenhouse gas emissions from land clearing are being dealt with through the NCAS. In response to questions from the Committee regarding rates of land clearing in Queensland, and providing more certainty on the contribution of land clearing to Australia's national emissions, Mr Ian Carruthers of the AGO, stated:

> In terms of the available data for land clearing rates for Queensland, they have been published up to 1997. At that point they were running at about 340,000 hectares a year for the period 1995-97. We understand that the Queensland Government will be publishing more recent information in the near future. [This study, referenced below, showed the rate for 1997-99 was 425,000 hectares per year.]
>
> What we are embarking upon is by far the largest and most intensive program of remote sensing of Australia's vegetation cover that has ever been undertaken in this nation. It will give us high quality information about changes in vegetation cover, both during the 1990s and stretching back to 1970, which will obviously have important value for other natural resource and sustainability purposes.[147]

7.199 To estimate the emissions from land clearing, sound estimates of the rates of land clearing are required. As land management is primarily the responsibility of the state governments, estimates are reliant on the provision of data from the states and territories, the availability and quality of which varies.

7.200 The most recently published NGGI data indicates that overall, the rate of land clearing has decreased significantly with the exception of Queensland. The Queensland estimates for the 1991 to 1995 period were approximately 289,000 hectares per year and for 1996 to 1998 340,000 hectares.[148] This represents an increase of over 50,000 hectares per year, more than the total of land clearing per annum for all other states in the same period. The subsequently released Queensland Statewide Landcover and Trees Study shows that the average annual rate of land clearing in Queensland for the period 1997-99 was 425,000 hectares per year. [149] This

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146 Australian Greenhouse Office, *National Greenhouse Gas Inventory Land Use Change and Forestry Sector 1990-1998*, 2000, p A-7.

147 Mr Ian Carruthers, *Proof Committee Hansard*, Canberra, 22 June 2000, p 684.

148 Australian Greenhouse Office, *National Greenhouse Gas Inventory Land Use Change and Forestry Sector 1990 to 1998*, 2000, p A11-A12.

149 *Statewide Landcover and Trees Study (SLATS 1997-1999), Vegetation Change Report*, produced by the Department of Natural Resources, Queensland. SLATS is a vegetation monitoring program of the Department of Natural Resources, Queensland, which gathers accurate vegetation cover and cover

rate is 25 per cent higher than the 1995-97 rate and 47 per cent higher than the 1991-95 rate.

7.201 The Federal Environment Minister, Senator Robert Hill, stated on 5 September 2000:

> We believe land clearing, for example, in Queensland is now up to something like half a million hectares a year - 500,000 hectares - or somewhere between 80 and 90 per cent of all land clearing taking place in Australia.[150]

7.202 The Australian Conservation Foundation (ACF) has been undertaking independent tracking of land clearing rates and has published the following information on land clearing rates for 1999 in a briefing note on their website.

Table 7.1

ACF's estimates of Australia's clearing rates for 1999 (hectares per year) [151]

State	**Hectares**
Qld	400,000
NSW	60,000
NT	20,000
Tas	10,000
WA	6,000
Vic	2,000
SA	1,200
ACT	0
TOTAL	**499,200**

7.203 The above estimates reflect only the amount of land cleared and not necessarily the number of permits or approvals for land clearing given. Permits and approvals for land clearing have increased in both NSW and Queensland in recent years. In 1999, permits for the clearing of 644,515 hectares were granted in Queensland, and 86,000 hectares approved for clearing in 1998 in NSW.[152]

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change information for vegetation management planning and for greenhouse gas inventory purposes, http://www.dnr.qld.gov.au/resourcenet/veg/slats/report/index.html#9799veg.

150 *Senate Official Hansard*, 5 September 2000, p 15850.

151 http://www.acfonline.org.au/campaigns/landclearing/briefings/background.htm.

152 http://www.acfonline.org.au/campaigns/landclearing/briefings/background.htm.

Land clearing and Queensland - A case study

7.204 As noted above, Queensland is not the only the only state in which land clearing occurs, however, it is the most prominent in the current debate about native vegetation management. Until recently (September 2000) there were minimal controls in place for clearing on leasehold land and no controls on freehold land.

7.205 On 8 September 2000, the Queensland Government passed new legislation to regulate clearing on leasehold and freehold land. The legislation does not proscribe a blanket ban on clearing. However, in most instances landholders will need to seek approval to clear native vegetation. On leasehold land the clearing of 'endangered'[153] and 'of concern'[154] regional ecosystems is regulated while on freehold land protection is only given to 'endangered' regional ecosystems.[155] This is the result of a compromise between the Queensland Government and land holders, discussed further below, and has been the subject of much criticism from the Commonwealth Government and conservation groups.

7.206 Attempts to control land clearing in Queensland have been described as a 'major challenge'.[156] A 1999 stocktake of Commonwealth, state and territory native vegetation management, notes that Queensland is:

> A State which is still extending its agricultural base and where there has been a long tradition of no control over operations on freehold land and limited controls on leasehold. It is made even more challenging by its juxtaposition with a range of other issues that are perceived to impact adversely on rural voters, particularly in forest management and water

153 'Endangered' regional ecosystems are defined as a regional ecosystem that has either:

(a) less than 10 per cent of its pre-clearing extent remaining;

(b) 10 per cent to 30 per cent of its pre-clearing extent remaining and the remaining vegetation covers less than 10,000 hectares; and

(c) composed of species characteristic of the vegetation's undisturbed predominant canopy.

Queensland Department of Natural Resources, *A Guide to Vegetation Management Policy in Queensland*, 2000, p 11.

154 An 'of concern' regional ecosystem is defined as - A regional ecosystem that has either:

(a) 10 per cent to 30 per cent of its pre-clearing extent remaining; or

(b) more than 30 per cent of its pre-clearing extent remaining and the remaining vegetation covers less than 10,000 hectares; and

(c) composed of species characteristic of the vegetation's undisturbed predominant canopy.

Queensland Department of Natural Resources, *A Guide to Vegetation Management Policy in Queensland*, 2000, p 11.

155 Queensland Department of Natural Resources, *A Guide to Vegetation Management Policy in Queensland*, 2000.

156 Griffin nrm 1999, *Native Vegetation National Overview: States/Territories/Commonwealth Stocktake of Native Vegetation Management*, prepared for ANZECC-Environment and Conservation Ministerial Council and Native vegetation managers in all Australian jurisdictions, p xiii.

> reform. The pressures on vegetation in the past have been primarily those associated with land clearing and there are no signs that this pressure is abating.[157]

7.207 The most recent state assessment of land cover change in Queensland has been conducted for the period 1997 to 1999. The Statewide Landcover and Trees Study (SLATS) has identified that the average clearing rate for this period was 425,000 hectares per year.[158] This is 47 per cent higher than the 1991 to 1995 rate. The majority of this clearing occurred on freehold land (59 per cent).[159]

7.208 The SLATS report also estimates that 34 per cent of clearing, on areas where regional ecosystem mapping has been undertaken (92 per cent of the state), included ecosystems considered endangered or of concern. [160]

7.209 The recent increase in land clearing appears to have been largely driven by landholder fears that land clearing will be subject to strict controls and a view that such controls impinge on landholder rights to develop their land. The 1999 stocktake report noted that:

> Concern over native vegetation is occurring at a time when there are a number of other major initiatives or changes which are impacting on land managers. In particular, these include the development of water allocation management plans, uncertainties over the ramifications of the Wik decision on land title, issues associated with Australia's international greenhouse commitments, and reforms associated with RFAs. The spectre of vegetation management controls which impinge on perceived 'rights' or impact negatively on asset values is understandably yet another controversial issue. Consequently, the constituency is unsettled and the government under pressure from all sides.[161]

7.210 A 1995 Scientific Forum, established to examine the impact that tree clearing on leasehold land has had or is likely to have on production, economics and the environment, concluded that in some areas tree clearing increase the productivity of land 2 to 4 fold, and that controls on land clearing can reduce property values for

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157 Griffin nrm 1999, *Native Vegetation National Overview: States/Territories/Commonwealth Stocktake of Native Vegetation Management*, prepared for ANZECC-Environment and Conservation Ministerial Council and Native vegetation managers in all Australian jurisdictions, p xiii.

158 Queensland Department of Natural Resources, *Land Cover Change in Queensland 1997-1999*, 2000, p 1.

159 Queensland Department of Natural Resources, *Land Cover Change in Queensland 1997-1999*, 2000, p 1.

160 Queensland Department of Natural Resources, *Land Cover Change in Queensland 1997-1999*, 2000, p 8.

161 Griffin nrm 1999, *Native Vegetation National Overview: States/Territories/Commonwealth Stocktake of Native Vegetation Management*, prepared for ANZECC-Environment and Conservation Ministerial Council and Native vegetation managers in all Australian jurisdictions, p 58.

uncleared properties by 15 to 70 per cent.[162] The 1999 stocktake report notes that the speed with which Queensland acts to reduce land clearing and implement controls:

> Will depend on the extent to which farmers can be convinced that the broader vegetation management approach will provide them with some benefits. Unless a system can be put in place which does provide some benefits, it is likely that there will be little change on the ground.[163]

7.211 The Commonwealth and Queensland have been conducting a vigorous debate on the rates on land clearing in Queensland and need for tighter controls. Senator Hill has stated that:

> Queensland is the only state in Australia which does not have a regulatory bottom line in relation to land clearing. So in that instance of natural resource management there has been a total abdication of responsibility by Mr Beatties' Labor government.[164]

7.212 The Queensland Premier responded to the Commonwealth's calls for action with the introduction of new legislation. However, the strength of that legislation was dependent on $103 million from the Commonwealth requested by Queensland to compensate freehold landowners for clearing restrictions.[165] The Commonwealth has argued that land management is a state issue and that other states have managed to introduce clearance controls without calling on the Commonwealth for compensatory funding. The Queensland Government has stated that it 'has already committed $111 million to fund the on-going management of tree clearing on freehold and leashold land'.[166]

7.213 The Committee understands that a joint taskforce was to be established with Queensland to find a solution to this issue. The Queensland Premier gave the Commonwealth a deadline of 20 August 2000 to reach agreement. That deadline has now passed without an agreement and, as a result, the new legislative controls on clearing have been watered down and no longer provide protection for 'of concern' regional ecosystems on freehold land. The Queensland Minister for Natural

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162 Griffin nrm 1999, *Native Vegetation National Overview: States/Territories/Commonwealth Stocktake of Native Vegetation Management*, prepared for ANZECC-Environment and Conservation Ministerial Council and Native vegetation managers in all Australian jurisdictions, p 55.

163 Griffin nrm 1999, *Native Vegetation National Overview: States/Territories/Commonwealth Stocktake of Native Vegetation Management*, prepared for ANZECC-Environment and Conservation Ministerial Council and Native vegetation managers in all Australian jurisdictions, p 56.

164 *Senate Official Hansard*, 5 September 2000, p 15850.

165 The Hon Peter Beattie MLA, Premier, *Queensland Acts on Tree Clearing*: Beattie, Ministerial media statement, 20 August 2000.

166 The Hon Peter Beattie MLA, Premier, *Queensland Acts on Tree Clearing:* Beattie, Ministerial media statement, 20 August 2000.

Resources, the Hon Rodney Welford MLA, has stated that 'we can't go further with regulation on freehold land without funding support from the Commonwealth'.[167]

Land clearing - A Commonwealth responsibility?

7.214 The above case study highlights the need for greater cooperation between the Commonwealth and state and territory governments if environmental objectives are to be achieved. The ACF is very critical of the Commonwealth Government for avoiding responsibility on land clearing, arguing that:

> The Federal Government has expressed deep concern about land clearing, yet seems unwilling to take real action to regulate or control clearing. Land clearing is not included in the new *Environment Protection and Biodiversity Conservation Act* as a matter of national environmental significance, and its nomination as a key threatening process under the old *Endangered Species Protection Act* was twice rejected by the Environment Minister, Senator Robert Hill.[168]

7.215 The ACF also pressed states and territories to act more decisively:

> There is also an urgent need for strengthening of state clearing control legislation, particularly in Queensland, the Northern Territory and Tasmania. Although Queensland recently devised new clearing control laws, state and Federal politicians have prevented their full proclamation and implementation.[169]

7.216 The Senate Environment, Communications, Information Technology and the Arts Legislation Committee inquiry into the Environment Protection and Biodiversity Conservation (EPBC) Bill 1998, addressed the issue of inclusion of land clearing as a matter of national environmental significance under the Act and noted that:

> With regard to the inclusion of 'broad scale' matters as triggers, the Committee notes that legislation is not always the most appropriate way of dealing with these matters and that policies and programs are the most effective responses.[170]

7.217 The EPBC Bill inquiry noted that the Government has in place a number of initiatives to control land clearing through the Natural Heritage Trust and that governments were working together, through the Australian and New Zealand

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167 The Hon Rodney Welford MLA, Minister for Natural Resources, *Commonwealth Fails Queenslanders on Tree Clearing*, Ministerial media statement, 24 August 2000.

168 http://www.acfonline.org.au/campaigns/landclearing/briefings/background.htm.

169 http://www.acfonline.org.au/campaigns/landclearing/briefings/background.htm.

170 Environment Protection and Biodiversity Conservation Bill 1998 and Environmental Reform (Consequential Provisions) Bill 1998, Report of the Senate Environment, Communications, Information Technology and the Arts Legislation Committee, April 1999, p 50.

Environment and Conservation Council (ANZECC), to develop a national framework for the management and monitoring of Australia's native vegetation.[171]

7.218 The EPBC Bill inquiry also concluded that:

> There are significant practical difficulties in applying an environmental impact assessment approach to climate change, vegetation clearance, and land and water degradation in a way that clearly establishes the Commonwealth's responsibility vis-à-vis the states and territories. These processes typically result from the cumulative effect of diffuse, small-scale, individual activities which are more appropriately regulated at the local and State government levels and for which it is difficult to justify a direct legislative role for the Commonwealth.[172]

7.219 The dissenting report by the Australian Democrats does not concur with this view and notes that the clearing of native vegetation is one of the most serious threats to biodiversity and a significant environmental challenge and should be subject to the Commonwealth's environmental approval process. The report also notes that if appropriate thresholds were applied, the practicality issue of small diffuse actions is avoided. The Committee suggests that it would also be possible to limit Commonwealth involvement in assessment through the use of accredited State environmental impact assessment (EIA) processes. This could streamline the environmental impact statement (EIS) process for proponents but still provide for meaningful Commonwealth oversight.

7.220 The Australia Institute suggests that existing Commonwealth programs are not having the expected leverage or effect on land clearing:

> Current Federal Government policies appear to be working in the opposite direction, especially in pursuit of the Bushcare program objective of no net clearing of land by 2000. Environment Minister Senator Robert Hill was recently reported to have threatened to withhold $34 million in Bushcare grants to Queensland because it appears unlikely to meet the objective. As a result of pressure from Canberra, and the expectation that the Queensland Government will respond by introducing legislative restrictions on land clearing on both freehold and lease-hold land, land holders in Queensland have reportedly increased clearing activity greatly.[173]

7.221 The submission also notes that:

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171 Environment Protection and Biodiversity Conservation Bill 1998 and Environmental Reform (Consequential Provisions) Bill 1998, Report of the Senate Environment, Communications, Information Technology and the Arts Legislation Committee, April 1999, p 51.

172 Environment Protection and Biodiversity Conservation Bill 1998 and Environmental Reform (Consequential Provisions) Bill 1998, Report of the Senate Environment, Communications, Information Technology and the Arts Legislation Committee, April 1999, p 51.

173 The Australia Institute, Submission 79c, p 2294.

> The opportunity to end land clearing provides a means of making a large contribution to meeting Australia's Kyoto target very cheaply. It is moreover, a Federal Government policy objective for reasons unrelated to climate change. Based on ABARE data, Ryan (1997) has estimated that the cost of ending land clearing in terms of forgone agricultural output would be less than $2 per tonne of CO_2 of emissions saved… . This suggests that ending land clearing in Queensland would make a very large contribution to meeting Australia's Kyoto target at around one-tenth the cost of other measures.[174]

7.222 A number of witnesses to the inquiry and submissions highlighted significant concern about land clearing and that measures to halt land clearing were viewed as one of the most cost effective actions that could be taken in reducing greenhouse gas emissions. As noted by Mr Bridson Cribb:

> Then there is the situation where we have land clearing going on in Queensland. My understanding is that, if you stop land clearing in Queensland, you would save 65 million tonnes of CO_2 equivalent per year. The Queensland Government has asked for $100 million in compensation in order to get farmers to stop land clearing. That works out at about $1.50 per tonne of emissions that is saved. Compared with emissions trading costs that you are looking at of around $20, $30 or $40 a tonne, to me $1.50 per tonne of emissions saved - and you are talking about 65 million tonnes, which is a substantial chunk of Australia's emissions - is a very cost-effective, low cost measure that we should be embracing very quickly. [175]

7.223 The Committee is concerned at the ongoing rate of land clearing in Queensland despite the programs currently in place. The Committee understands that the Commonwealth argues that states should fund their own land clearing policies. However the Commonwealth's objective should be to produce clear results now, particularly given the very low cost of the abatement it would encourage. The Commonwealth should make greater efforts to achieve reductions in land clearing in cooperation with the states and territories and ensure that strong controls to contain land clearing are introduced nationally.

7.224 It is the Committee's view that to facilitate the engagement of the rural sector support be given to strategies that boost investment in greenhouse abatement in rural Australia. These strategies should encourage the retention of native vegetation, investment in revegetation activities that will enhance the environment and provide a win-win outcome for landholders, and investment in plant that will support such activities.

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174 The Australia Institute, Submission 79c, p 2294.

175 *Proof Committee Hansard*, Canberra, 23 June 2000, p 783.

Recommendation 81

The Committee recommends that the Commonwealth, states, and territories introduce strong national controls on land clearing as a matter of urgency.

Recommendation 82

The Committee recommends the Commonwealth act with some urgency to provide protection for 'of concern' regional ecosystems, and provide compensation to landholders where warranted.

Recommendation 83

The Committee recommends that the Commonwealth allocate funds for rural strategies that assist in greenhouse responses such as fuel plantations in salinity affected areas and biomass-based cogeneration plants for agro-industrial plants in rural regions.