

26 February 2001

Ms Susan Cardell
Inquiry Secretary
Joint Standing Committee on Treaties
Parliament House
Canberra ACT 2600

Dear Ms Cardell

In response to your request late last year for further information on vegetation thickening and its treatment under the Kyoto Protocol, the Australian Greenhouse Office has prepared a short summary paper (attached).

I apologise for the delay in responding but note that your request came at an extremely busy time with respect to the international climate change negotiations. Please let me know if the Australian Greenhouse Office can be of any further assistance in this matter.

Yours sincerely

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Greenhouse Policy Group

26 February 2001

Vegetation thickening - Dr Burrows' evidence to Joint Standing Committee on Treaties

Background

Vegetation thickening and woody weed invasion - definitions

Vegetation thickening is a broad term referring to an increase in the density of carbon per unit area in shrubs and trees over the landscape and encompasses a diverse range of biological processes and causal factors. Examination of this issue by the IPCC in the Second Assessment Report determined that changes in the balance between herbaceous and woody species, which subsequently affect the productivity and fire frequency of ecosystems, are the result of a complex interaction between human activities and changes in regional climate change and elevated CO₂. For example it is common in grazing areas where cattle have been removed or fire regimes changed but also occurs naturally at all scales of time and space as part of the disturbance-recovery cycle that forest and grassland ecosystems experience.

Vegetation thickening is sometimes also used to describe the invasion of grasslands by woody vegetation. This phenomenon is better described in more specific terms as woody weed invasion. Woody weed invasion occurs as an unintended consequence of grazing native grasslands where stock consume the grass, but leave the young woody vegetation. This removes the competition from the trees and woody shrubs allowing them to displace native grass species and predominate.

The many and varied interpretations of the term vegetation thickening, even among Australian scientists, complicates discussion of this phenomenon in relation to the Kyoto Protocol.

Negotiation of the second sentence of Article 3.7

- Article 3.7 (first sentence) establishing assigned amounts of Annex I Parties, encompasses emissions from all sources and sectors, except from the land use change and forestry sector.
- Likewise Article 3.1, which establishes Kyoto targets, is only expressed in terms of emissions (removals from sinks are excluded).
- This reflected the push in Kyoto by many countries (EU and some G77) to restrict the application of Kyoto targets to greenhouse gas emissions (basically the energy sector) and minimise the possible role that sinks could play.
- This was opposed by Australia and some other countries who were arguing for comprehensive treatment of emissions and removals (sinks).
- The upshot of this debate was the limited inclusion of sinks activities under Article 3.3 (afforestation, reforestation and deforestation since 1990), and the prospect of future agreement on additional scope of sinks activities through Article 3.4.
- To a great extent this outcome met Australia's objectives in encompassing sinks activities in the Kyoto Protocol. However, the contribution of Article 3.7 (first sentence only) together with the construction of Article 3.3 would have been largely injurious to Australia's circumstances (It would have delivered additional abatement costs in the order of \$1 billion per annum over the 2008-12 commitment period).
- This penalty would have arisen because under Article 3.3, emissions associated with land clearing (which are of a significant scale in the case of Australia) would

be excluded from the baseline calculation of the Article 3.7 emissions assigned amount. Yet these emissions would be included as ‘deforestation’ in the commitment period, giving rise to a significant asymmetric debit against Australia’s target.

- Australia’s successful negotiation of the inclusion of the second sentence of Article 3.7 addresses this inequitable treatment of land clearing emissions by allowing, subject to an eligibility test, net emissions from land clearing to be treated in the same fashion as other industrial emissions and included in the 1990 baseline.
- Amongst developed (Annex I) countries, it is likely that this provision will apply only to Australia.
- Figure 1 illustrates the significance of the second sentence of Article 3.7 for Australia in terms of a more realistic abatement task.

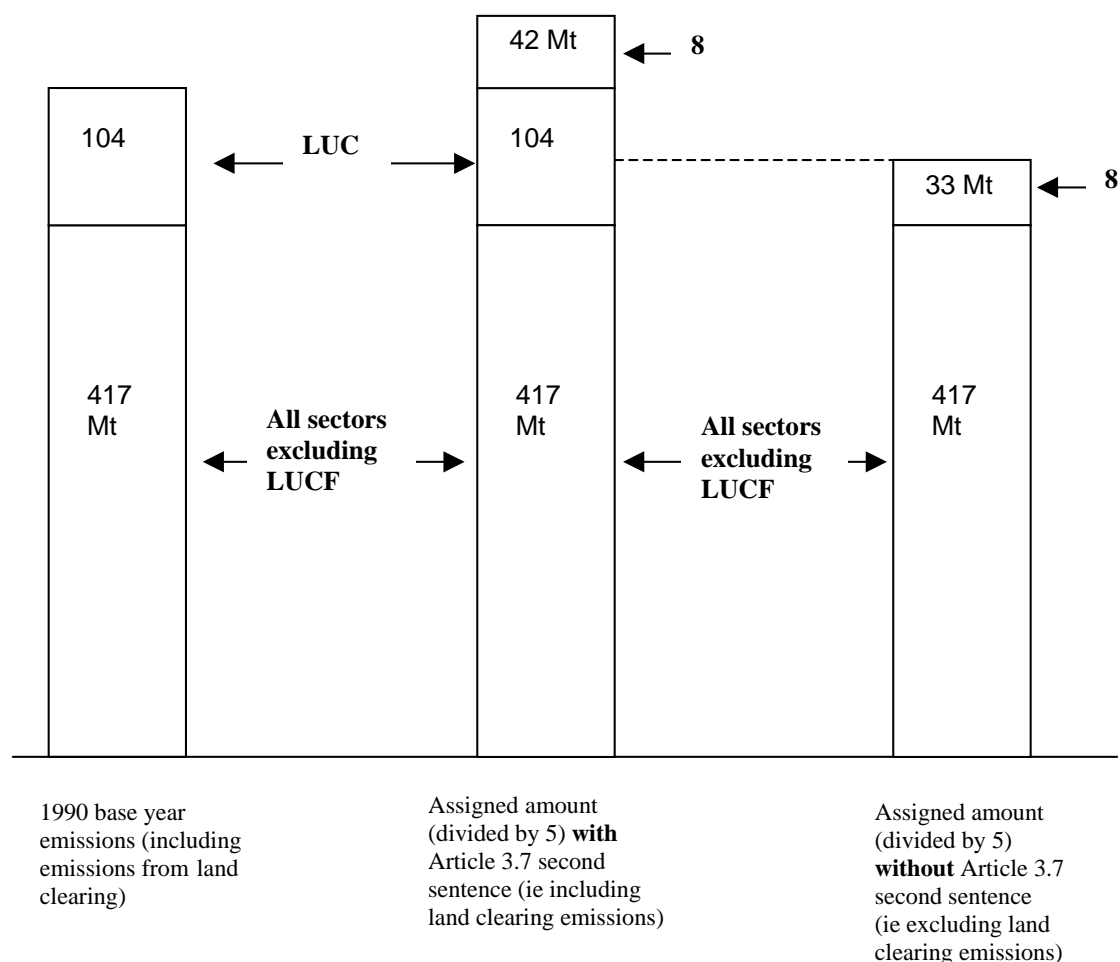


Figure 1: Illustrative effect of Article 3.7 on Australia’s assigned amount. Based on current 1990 National Greenhouse Gas Inventory figures with Australia utilising Article 3.7 second sentence, the assigned amount would be 2813Mt (carbon dioxide equivalents). In the absence of Article 3.7 second sentence, the assigned amount will be 2251Mt of carbon dioxide equivalents. This represents a difference in the assigned amount (or an increase in the abatement task) of 562Mt or 20%.. (The numeric figures quoted show the assigned amount per year rather than across the whole commitment period for simplicity. They should be treated as only illustrative since there are high uncertainties in the current Inventory estimates of land clearing. The National Carbon Accounting System is producing an authoritative and robust land clearing emissions estimate).

Vegetation thickening and Article 3.7

The Framework

- In reaching agreement on the various provisions contained in the Kyoto Protocol, including the second sentence of Article 3.7, it was important that from the outset countries had certainty in relation to the accounting rules needed for monitoring, reporting and compliance purposes.
 - Australia could not risk being held accountable for some future evaluation based on an unknown modification to inventory practice that was in use at the time of Kyoto.
- Article 5.2 of the Protocol and Australia's 1995 National Greenhouse Gas Inventory (NGGI) which was used at the time of Kyoto, provided that certainty.
 - Article 5.2 stipulates that the 1996 IPCC Guidelines (which were developed and adopted for the purposes of the UN Framework Convention on Climate Change) govern monitoring and reporting for the first commitment period of the Kyoto Protocol.
 - The Guidelines require that countries only report emissions and sequestration where robust data is available and where an activity that results in greenhouse gas emissions and sequestration is anthropogenic.
- At the Kyoto conference, the data and information contained in the 1995 Inventory, which was compiled according to the IPCC Guidelines, was used to assess the implications of the second sentence of Article 3.7 - a ratification issue for Australia.
 - The decision on the construct for the eligibility trigger and the negotiations between countries drew upon the UNFCCC synthesis of developed countries 1995 inventories.
- Australia's greenhouse emissions profile is unique among developed (Annex I) countries, particularly with respect to the prominence of land clearing emissions.
 - Consequently, in Kyoto, Australia was essentially a sole advocate for the inclusion of the linked provisions of Article 3.3 and the second sentence of Article 3.7.
 - Australia did point out that there were a number of other Annex I countries who would be adversely affected if they did not also resolve the implications for them arising from the treatment of deforestation under Article 3.3 but they decided not to follow that route (See discussion of consequences below).
 - There was a clear political recognition in Kyoto that Australia had unique circumstances with respect to land clearing emissions and that all sources of greenhouse emissions, including those arising from land clearing, should be treated on an equitable basis. The second sentence of Article 3.7 was specifically tailored to address this.

Australia's National Greenhouse Gas Inventory

- Considerable effort and resources have gone into improving the accuracy of estimates of emissions and sinks in the Land Use Change and Forestry sector of the NGGI, giving Australia a world class system for its time.
 - Unlike most other developed countries, all relevant carbon pools (including soil emissions) from eligible land use change and forestry activities are reported in the Inventory using the extent of data and methods available at the time (and with

explicit recognition of the need for continuous improvement) and according to the common reporting format tables.

- In addition the Australian methodology improves in several areas on the default approaches recommended by the IPCC where this is supported by more detailed data and better understanding of the scientific processes involved.
- Australia's leadership in this area was acknowledged in the Subsidiary Body on Scientific and Technological Advice paper (released in May 2000) which showed that Australia was one of the very few countries to comprehensively report land use change and forestry information using the IPCC formats for all relevant gases and carbon pools.
- An in depth review of Australia's inventory, based on information presented in the second national communication (lodged late 1997) and the inventory workbooks, was completed by a range of international experts in 1999. They reported that Australia's second national communication, together with the workbooks, comprised an extremely well-elaborated set of documentation, including a complete set of inventory data covering a comprehensive list of sources and greenhouse gases.

Importance of including 'land use change' in the 1990 baseline

- The inclusion of 'land use change' in the 1990 baseline ensures that land clearing activities are treated on the same basis as energy and industrial emissions, with any reduction in rates of deforestation contributing to achieving Australia's target (thereby providing an incentive for sustainable management of vegetation cover).
- It is fundamental to Australia's economic interests. It entitles Australia to a fair 1990 baseline estimate and assigned amount figure, and makes realistic the abatement task and cost for Australia in the first commitment period.
- The second sentence of Article 3.7 was developed and drafted to address the specific concerns of Australia.
- The eligibility test or 'trigger mechanism' was based on the information contained in the Inventory of the day – the 1995 NGGI.
- At Kyoto it was accepted that Australia met the eligibility test.
- Some Parties, including the EU, now regret the specificity of the Article 3.7 trigger as more recent analysis of the implications of Article 3.3 suggests that many countries may be facing little net benefit from sinks activities under Article 3.3 or a net debit in the first commitment period as a result of a significant impact from deforestation activities.
- As a consequence the EU are now seeking to address this through a new construct under Article 3.4 which will allow credit from national forest estates to offset debits from deforestation under Article 3.3. (This is a fix for those countries through a new device to deal with the problem of deforestation - which Australia addressed in Kyoto through the Article 3.7 construct).

Including 'land use change' in the 1990 baseline

- Countries whose Land Use Change and Forestry Sector was a net source of emissions in 1990 must include net emissions associated with 'land use change' in their 1990 baseline.
- The meaning of the term 'land use change' in Article 3.7 is derived from the Revised 1996 IPCC Inventory Guidelines and refers to emissions and removals associated with land clearing events.

- In practice this means that countries such as Australia must report all emissions and sequestration arising from land cleared in 1990, as well as any residual emissions associated with biomass and soil decay from land cleared prior to 1990 but emitted to the atmosphere in 1990.
- Woody regrowth following earlier land clearing events where the sequestration occurs in 1990 should also be reported.
- Australia follows this inventory practice in the NGGI and calculates delayed soil carbon emissions as occurring up to 11 years after a clearing event, although these time periods vary according to region. Likewise, there are delayed emissions from residual biomass material.
- Australia also transparently reports carbon sequestration associated with woody regrowth following clearing in the NGGI, including any vegetation thickening that may occur on this land.
- This approach provides for balanced accounting because the 1990 baseline and the treatment of deforestation activity in the commitment period provide a symmetry that is important across emissions sources from all sectors.

The Article 3.7 eligibility test

- A country will be eligible to include emissions from land clearing in the calculation of its baseline if it has a net source of emissions in 1990 from Land Use Change and Forestry. This requires Parties to estimate the net emissions in 1990 for the Land Use Change and Forestry Sector under the Revised IPCC Inventory Guidelines.
- Some commentators have suggested that vegetation thickening in managed forests and rangelands should have been accounted for in the Land Use Change and Forestry Sector of the NGGI.
- In this context, according to IPCC Inventory Guidelines, a Party would need to demonstrate that robust data are available on vegetation thickening and that the resulting greenhouse gas emissions and sequestration is anthropogenic.
- Vegetation thickening has not met this requirement and therefore has not been included in the calculation that determines whether a country is eligible to use Article 3.7.
- There is insufficient and conflicting information and data on vegetation thickening and scientists are currently unable to clearly document and quantify the temporal and areal scale of vegetation thickening in Australia.
- Unfortunately, there is a lack of comprehensive data available to describe the cause of vegetation thickening (in its various forms), the quantum or sustainability of its impact or its spatial extent. While results appear in workshop proceedings and the like, there has not been publication of methods and data in peer reviewed literature that would enable appropriate evaluation.
- Practitioners continue to experience considerable difficulty in identifying areas affected by vegetation thickening and determining whether changes in carbon stock in these areas are the result of anthropogenic influences or natural processes. In at least some Australian savannas, research suggests that tree stocks are inherently unstable, regardless of the influence of fire or grazing, and that thickening events may represent the natural recovery of ecosystems from drought, dieback and El Nino climate cycles (eg Fensham and Holman 1999¹).

¹ Fensham and Holman (1999) Journal of applied ecology, volume 36, p1-17.

- That is not to say that in future Inventories with a proper scientific understanding and data that these vegetation cover changes resulting from various indirect processes should not be included in national Inventories (see discussion below on Articles 3.3 and 3.4).

Vegetation thickening and Article 3.3

- Article 3.3 allows countries to count changes in carbon stock during the commitment period associated with direct human induced afforestation, reforestation and deforestation since 1990.
- Given the ongoing uncertainty with respect to attribution, vegetation thickening would not meet the Article 3.3 threshold test that activities be directly human induced.
- However, there is broad acceptance in the international negotiations that once an eligible Article 3.3 activity has occurred, countries will be required to report changes in greenhouse gas emissions and carbon stocks on that piece of land in perpetuity, irrespective of whether the later changes in carbon stock on that land are the result of human action or natural processes. Under this approach, known as land based accounting, changes to carbon stock from vegetation thickening or thinning on either reforested or deforested land would be accounted for during the commitment period.

Vegetation thickening and Article 3.4

- Parties are continuing negotiations to determine the type and scope of additional sink activities that can be used to meet Kyoto targets in the first commitment period under Article 3.4.
- There are two approaches to additional activities currently before the negotiations. Under the first approach, a "narrow" set of additional activities such as revegetation would be included under Article 3.4, as proposed by Australia. The second option, proposed by the US, Canada and Japan, is the broad approach whereby entire land use systems (managed forests, grazing land and crop land) are included as additional activities.
- Countries choosing to adopt the broad approach to Article 3.4 would be required to account for all changes in carbon stock on these land systems across time, including those arising from indirect processes like climate variability, vegetation thickening, woody weed invasion, soil salinisation and soil acidification. Net credits will accrue to those countries where carbon stocks are increasing on these lands during the commitment period (2008-2012).
- Our understanding of the effect of these phenomena on carbon stocks is very weak and it is not clear whether Australia would gain a net credit from the broad approach if climate variability, vegetation thickening, woody weed invasion, soil salinisation and soil acidification are counted.
- Similarly, countries choosing to adopt the narrow approach to Article 3.4 will also be required to apply land based accounting for those pieces of land on which the specified activity takes place.
- However, at present there is an exceedingly poor understanding of the biological processes taking place in Australia's rangelands, making it difficult to quantify carbon stocks across diverse grazing lands.

- This being the case, Australia supports a flexible approach to implementing additional activities for the first commitment period where countries can choose to implement one or more broad or narrow activities.
- While the Australian Greenhouse Office, through the National Carbon Accounting System have concentrated effort on developing a robust 1990 baseline, the NCAS focus is expected to progress to Australia's broad landscape systems in the immediate years ahead subject to available resources.

Summary

- Australia has a unique profile of greenhouse gas emissions when compared to other Annex I countries.
- It is essential that Kyoto targets treat all emissions, including those arising from land clearing, in a balanced and fair way.
- There was political acceptance at Kyoto of Australia's national circumstances with respect to land clearing emissions and the Article 3.7 second sentence construct was developed to address this issue. (At the time of Kyoto, other developed countries did not see a need to have a provision in the Protocol which would cater for the implications of deforestation activities when formulating their emissions assigned amounts).
- The eligibility criterion in the second sentence of Article 3.7 was formulated utilising the 1995 National Greenhouse Gas Inventories submitted at that time by Parties and the methods and data of the day.
- Vegetation thickening was not included in past National Greenhouse Gas Inventories because there is insufficient and conflicting information on whether the resulting greenhouse gas emissions and sequestration are anthropogenic. Scientists have been and still are unable to clearly document and quantify the temporal and areal scale of vegetation thickening in Australia.
- It would be quite wrong to reconstruct the application of Article 3.7 as it applies to the scope of inclusion of land clearing emissions, based on future inventory methods and data that were unavailable at the time of Kyoto.
- All carbon sequestration and emissions occurring on Article 3.3 lands consequent to reforestation or deforestation activities, including regrowth or vegetation thickening is expected to be accounted for. Similarly, prospective outcomes from future decisions under Article 3.4 on additional sinks activities would seem likely to encompass vegetation thickening and other indirect processes to the extent they are relevant to the defined or chosen additional sinks activities.