

# Inventory

## National Greenhouse Gas Inventory

INFORMATION FROM THE AUSTRALIAN GREENHOUSE OFFICE—JULY 2000

### Forestry and Land Clearing

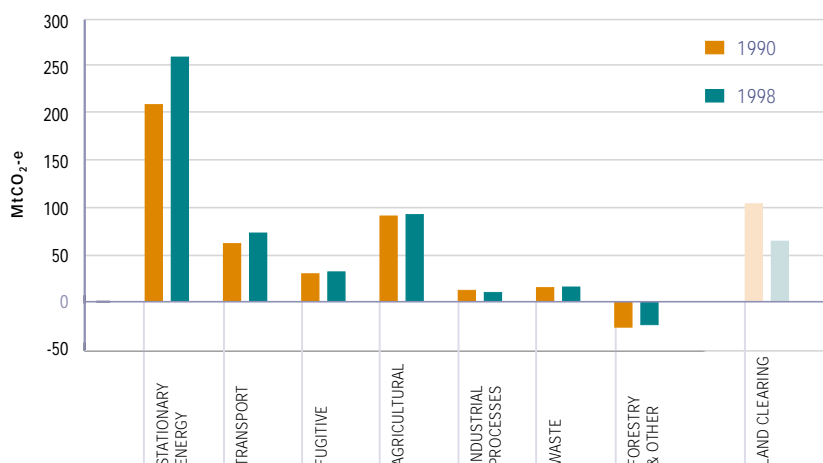
#### 1998 inventory and trends

1998 emissions	Changes in emissions 1990–1998
<b>Australia's estimated greenhouse gas emissions</b> in 1998 totalled 455.9 million tonnes of carbon dioxide equivalent* (Mt CO <sub>2</sub> -e), excluding emissions from land clearing.#	This represents an increase of 5.2% on 1997 national greenhouse gas emissions and a 16.9% increase on 389.8 Mt in 1990. This does not equate to the Kyoto Protocol accounting requirements.
<b>Forestry</b> is estimated to have provided a net sink of 21.6 Mt CO <sub>2</sub> -e or 4.7% of net national emissions.	The 1998 net removals from forestry were similar to those in 1997, but 11.5% lower than in 1990. Emissions from harvesting increased more than sequestration over this period.
The current best estimate of net emissions from <b>land clearing</b> for 1998 is 64.0 Mt CO <sub>2</sub> -e. This estimate is highly uncertain and should be regarded as interim only.	The assessment of trends in land clearing emissions since 1990 is highly uncertain and likely to change significantly in the future.

\* Carbon dioxide equivalents, CO<sub>2</sub>-e, provide the basis for comparing the warming effect of greenhouse gases such as methane, nitrous oxide, the perfluorocarbons, etc

# Including the current best estimate of land clearing emissions, Australia's total emissions would be 519.9 Mt in 1998 and 493.3 Mt in 1990, representing a 5.4% increase. This does not equate to the Kyoto Protocol accounting requirements.

1998 emissions by sector (excluding land clearing)  
Total 455.9 Mt CO<sub>2</sub>-e



FACT SHEET  
1998



AUSTRALIAN  
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## The National Greenhouse Gas Inventory

As part of commitments under the Framework Convention on Climate Change, Australia has produced an annual inventory of national greenhouse gas emissions since 1990. The 1998 Inventory provides the latest report on Australia's greenhouse gas emissions. This Inventory incorporates improvements in data collection methods that have been used to update emission estimates in the 1990-1997 inventories.

The total emissions reported in the national inventory do not represent Australia's performance against the Kyoto Protocol. Guidelines for reporting on the Kyoto Protocol are still being negotiated. For example, some parts of the land based emissions and sinks that are reported in the national inventory will not be included or will be reported differently for the Kyoto Protocol.

Australia's National Greenhouse Gas Inventory is based on international guidelines established by the Inter-governmental Panel on Climate Change and reports on human-induced greenhouse gas emissions in six sectors:

1. Energy
2. Industrial Processes
3. Solvent and Other Product Use
4. Agriculture
5. Land Use Change and Forestry
6. Waste

Emissions from land clearing, a major subsector of Land Use Change and Forestry, are currently reported separately in Australia's Inventory and are not included in the national total. This has been done to maintain transparency while work continues on refining the land clearing methodologies.

## Land Use Change and Forestry

Changes in the amount of carbon in biomass or the soil as a result of human use of the land are accounted for in the Land Use Change and Forestry sector. In Australia, this includes:

**Forestry**- including 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.

**Land clearing**- including burning and decay of aboveground biomass, regrowth on cleared lands, and changes in soil carbon from current and past events.

**Other**- including prescribed burning and wildfires (emissions) and changes in soil carbon from changes in land management practices such as pasture improvement and minimum tillage.

Many of the activities in this sector have not been well documented, although commercial forestry is an exception. In addition, the sector is unusual in that emissions in any year include the results of actions that happened years before. For example, land clearing can cause emissions of carbon dioxide from the disturbed soil for 10 years or more after the event.

Emissions resulting from land clearing are particularly uncertain. Estimates are being revised as improved data becomes available.

There will be major differences between the annual inventory and the Kyoto Protocol accounting rules. The 1990 baseline calculation for the Kyoto Protocol does not generally include this sector. However, if the whole sector is a net source, as in Australia, emissions from land clearing are included in the baseline. Uptake of carbon dioxide in new forests planted after 1990 and emissions from land clearing after 1990 will be included in accounting for the Kyoto Protocol commitment period from 2008 to 2012. Inclusion of other sinks associated with land use, land use change and forestry are still subject to international negotiations.

The numbers presented in the text and figures may not add up to the reported total due to rounding errors. Inclusion of the decimal place does not necessarily indicate a level of precision in the estimates.



## Emissions estimates and trends from 1990 to 1998

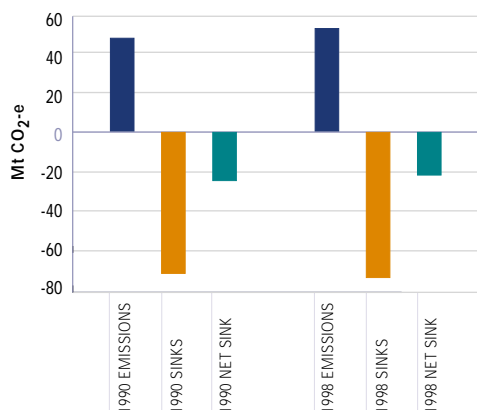
### Forestry

The forestry subsector has been a net sink for greenhouse gases in all years from 1990 to 1998. In 1998, tree growth in managed forests removed 73.4 Mt from the atmosphere. Emissions of CO<sub>2</sub> from commercial harvesting were 38.9 Mt and 12.8 Mt were produced by fuelwood. Methane and nitrous oxide emissions from burning fuel wood are reported under the Energy sector. This resulted in a net removal of 21.6 Mt from forestry activities. The net CO<sub>2</sub> removed by forestry in 1998 was similar to 1997 estimates, but 11.4% lower than in 1990.

The area of plantation forests in Australia increased by 12% from 1990 to 1998, with most of this increase occurring towards the end of this period. The most rapid growth and carbon sequestration (storage) generally does not occur in trees until they are several years old. The recent increase in plantation area does not show any significant contribution to forestry sinks in the 1998 Inventory.

A small amount of emissions results from prescribed burning and wildfires and there is a small sink resulting from minimum tillage and pasture improvement practices. Estimates of these emissions and sinks rely on limited data that are not frequently updated. Their net effect has been a small sink of 2.8 Mt.

Forestry emissions and sinks 1990 and 1998



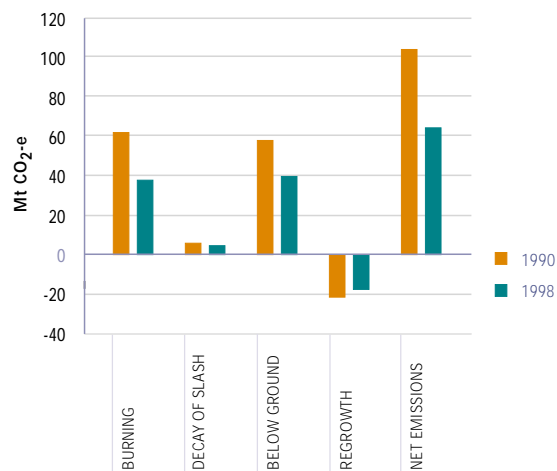
### Land Clearing

Land clearing activities were a net source of greenhouse gas emissions from 1990 to 1998.

Emissions arise from burning cleared vegetation, decay of slash and below ground decay of roots, and loss of soil carbon. Losses from below ground are almost half the total emissions and include contributions from continuing soil carbon losses from past events. Emissions are partly offset by regrowth on previously cleared land.

In 1998, emissions from land clearing are estimated at 81.5 Mt with just under half coming from soil emissions. This was offset by a 17.5 Mt sink from vegetation regrowth. Though the estimates of annual emissions and the extent of reductions over time should be treated with caution, the information does indicate a decline in emissions from land clearing from 1990 to 1998.

Land clearing emissions and sinks 1990 and 1998 \*

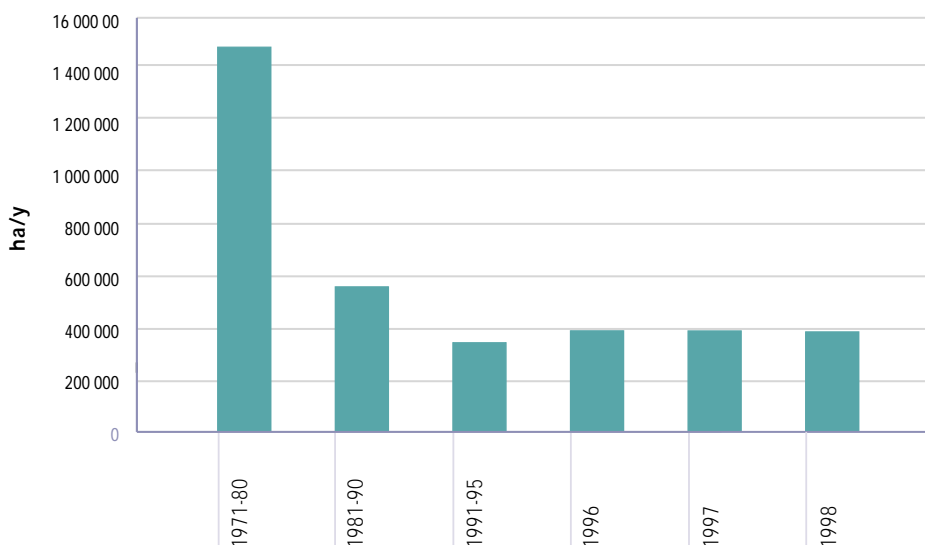


\* Estimates are highly uncertain and should be regarded as interim only.

Presently available data indicates a considerable decline in land clearing from the 1970s to the 1980s and again from the 1980s to the early 1990s. Remote sensing and other analyses are being undertaken to gain a better picture of past land clearing activity.

# Greenhouse

Average national rate of land clearing



## Reliability of emission estimates

The uncertainty associated with data required to develop estimates of emissions and removals in the Land Use Change and Forestry sector is described as medium to high (20-60%).

Land clearing is the most uncertain part of the inventory. Uncertainties in the estimates are due to the lack of accurate statistics on:

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

In recent years, measurement of land use change has moved from relying on surveys and judgements of the actual uptake of clearing permits, to assessing the variations between sets of satellite images recorded at different times.

The methodology is continually evolving. Data on historical and current rates of land clearing are being improved through ongoing research and better data acquisition and analysis. As more images are analysed and the process refined, confidence will increase in estimates of clearing rates.

Work is also continuing on matching the location of clearing activities with vegetation and soil types to improve estimates of the amount of carbon that was stored. These combined efforts will reduce the uncertainties of the emissions estimates.

## The National Carbon Accounting System

The National Carbon Accounting System is a major initiative of the Commonwealth Government. The System aims to provide, by 2002, a solid estimate of the 1990 emissions from land clearing. It also addresses the measurement of forests and other sinks and land clearing emissions since 1990. Improved estimates of areas of clearing, areas of forest plantings, rates of growth in commercial and environmental plantings and emissions from soil will be derived through the System's activities. These estimates will be reported in the National Greenhouse Gas Inventory.

Strategic research on techniques, methods and data generation is being conducted through the recently established Cooperative Research Centre for Greenhouse Accounting.



# Land Use Gas Inventory

## Reducing greenhouse gas emissions in the Land Use Change and Forestry sector

Australia is undertaking a range of activities that are expected to reduce emissions from the Land Use Change and Forestry sector.

The Natural Heritage Trust was established by the Commonwealth in 1996 to stimulate activities to achieve the conservation, sustainable use and repair of Australia's natural environment. The Trust will invest \$1.25 billion over 5 years to achieve this goal. Programs within the Natural Heritage Trust include Bushcare which aims to reverse the long term decline in Australia's native vegetation and the Farm Forestry Program which seeks to incorporate commercial tree growing and management into farming systems.

In December 1999, Australian governments (Commonwealth, States and Territories) agreed to a National Framework for the Management and Monitoring of Australia's Native Vegetation. The Framework provides a vehicle to implement the Commonwealth, State and Territory governments' goal to reverse the long-term decline in the quality and extent of Australia's native vegetation cover.

The Bush for Greenhouse program attracts corporate investment in revegetation projects. Companies investing in the program receive recognition for the carbon sequestered, offsetting emissions from other activities. The program will provide resources and support to landowners for revegetation.

Following the 1992 National Forest Policy Statement, Commonwealth and State governments have developed Regional Forest Agreements (RFAs) for major forestry regions. These Agreements secure a representative reserve system to protect high conservation value native forests, while also ensuring ecologically sustainable forest management and a basis for an internationally competitive forest industry. The RFAs act to conserve and expand the greenhouse sink and storage capacity of Australia's native forests.

A key initiative encouraging establishment of new greenhouse sinks is Plantations for Australia: the 2020 Vision. The aim is to establish an average of 80,000 hectares of plantation forest a year, or a total of 2 million hectares by 2020.

The Greenhouse Gas Abatement Program provides \$400 million to support large scale sustained reductions in greenhouse gas emissions across all relevant sectors. Some activities in the Land Use Change and Forestry sector could be funded through the Regional Partnerships theme within this Program.



# Greenhouse

Information about the National Greenhouse Gas Inventory and initiatives to reduce greenhouse gas emissions from forestry and land clearing activities can be obtained from the Australian Greenhouse Office web site:

<http://www.greenhouse.gov.au>

Copies of the 1998 Inventory and related documents can be obtained by contacting AGO Publications:

**Telephone:** 1300 130 606

**Facsimile:** 02 6299 6040

National Greenhouse Gas Inventory 1998 with Methodology Supplements.

National Greenhouse Gas Inventory Land Use Change and Forestry Sector 1990-1998

National Greenhouse Gas Inventory: Analysis of Trends and Greenhouse Indicators 1990 to 1998

Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks: Workbook for Carbon Dioxide from the Biosphere, Workbook 4.2 reprinted with Supplements 1998

Fact Sheets—1998 National Greenhouse Gas Inventory—Frequently Asked Questions, Overview and other sectors in this series



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