

## CHAPTER 8

# SUMMARY OF INTERNATIONAL LINKAGES AND NATIONAL ACTIVITY

## Introduction

This chapter summarises the international and national coordination responsibilities and related activities associated with Australian involvement in the World Climate Programme (WCP) and other international climate-related programs. Bilateral arrangements relevant to the climate issue are also summarised and Australia's role in helping to foster WCP-related activities in surrounding regions is outlined.

## International Linkages and Activity

### Australian Counterparts to International Sponsoring Agencies

Australian agencies and coordinating bodies counterpart to the international sponsors of the WCP are identified schematically in Figure 8.1. Also identified are the United Nations Development Programme (UNDP) and Committee on Earth Observations Satellites (CEOS) links since, while not formally sponsors of the WCP, both these bodies are substantially involved in its international implementation. Acronyms are elaborated in Appendix 1. Under the umbrella of UNDP, the Australian Agency for

International Development (AusAID) is involved in implementing a number of WCP-related activities in the South-West Pacific and Asian regions. CEOS has a role in ensuring that satellite systems meet the needs of the WCP.

Principal contacts in Australia in respect of the international parent bodies of the WCP and the closely related Global Climate Observing System (GCOS), the International Geosphere-Biosphere Programme (IGBP) and the World Meteorological Organization (WMO)-United Nations Environment Programme (UNEP) Intergovernmental Panel on Climate Change (IPCC) and CEOS are:

- |        |  |
|--------|--|
| ICSU   | Prof. S Serjeantson (Executive Secretary), Australian Academy of Science (AAS)   |
| UNESCO | Prof K Wiltshire (Chairman) Australian National Commission for UNESCO. (Mr J Janssen, Secretary-General, ANC UNESCO, Department of Foreign Affairs and Trade (DFAT))   |
| IOC    | Dr J W Zillman (Chairman) Heads of Commonwealth Marine Agencies (HOMA); Dr A D McEwan, Australian Representative to IOC and member of HOMA. ( Ms A Waterman, HOMA Secretariat, Marine and Water Division, Environment Australia) |
| WMO    | Dr J W Zillman, Director of Meteorology and Permanent  |

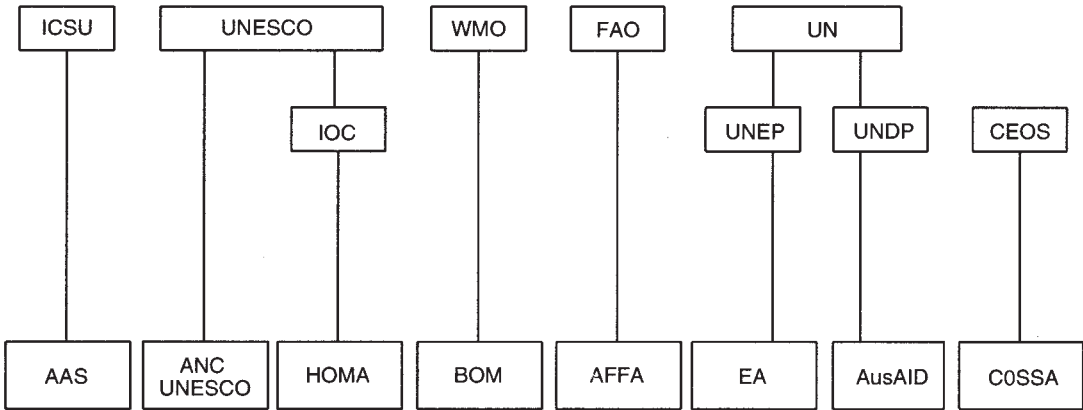


Figure 8.1 Australian counterpart agencies (bottom row) to the international sponsoring agencies of the WCP and related bodies. The full names of the Australian agencies are given in the text and in Appendix 1

	Representative of Australia with WMO, Bureau of Meteorology
FAO	Mr M J Taylor, Secretary, Agriculture, Fisheries and Forestry - Australia (AFFA)
UNEP	Mr H Bamsey, Deputy Secretary, Environment Australia (EA). (Mr M Wilson, UNEP Secretariat, International and Intergovernmental Branch, EA)
UNDP	Mr J Guthrie, Program Manager UN, Multilateral Agencies and Human Rights Section, Australian Agency for International Development (AusAID)
CEOS	Dr D L Jupp, Head, CSIRO Office of Space Science and Applications/Earth Observation Centre (COSSA/EOC)

for the component programs of the WCP, along with GCOS and IGBP and the three Working Groups of the IPCC, are identified schematically in Figure 8.2. The principal contacts for the Australian counterpart bodies are given below.

NCCGC	Dr G I Pearman, Chairman, AAS National Committee for Climate and Global Change (c/- CSIRO Atmospheric Research)
NCC	Superintendent, National Climate Centre, Bureau of Meteorology
AGO	Ms G Andrews, Chief Executive Officer, Australian Greenhouse Office (AGO)
JWG	Dr W K Downey, Chairman, Joint Working Group for GCOS / GOOS / GTOS. (Secretariat, Dr S Barrell, Executive and International Affairs Branch, Bureau of Meteorology)
BOM	Dr J W Zillman, Australian Principal Delegate to the IPCC (c/- Bureau of Meteorology) (Australian IPCC Secretariat Ms B Soderbaum, Climate Change International, AGO)

## National Coordination of the WCP and Related Programs

The Australian agencies and committees with national coordination responsibilities

ACIHDP Dr M Wasson, Co-Chair:  
International Liaison HDP-  
Australia (c/- Australian  
Academy of the Humanities)

Other related National Committees  
and working groups with direct or indirect  
links to the above include:

NCAOS Dr T McDougall, Chairman,  
AAS National Committee for  
Atmospheric and Oceanic  
Sciences (c/- CSIRO Marine  
Research)

ANCAR Prof I Allison, Chairman, AAS  
Australian National Committee  
on Antarctic Research (c/-  
Antarctic Cooperative Research  
Centre)

NCA Dr G Love, Chairman, National  
Committee on Agrometeorology  
(Secretariat Mr R Stringer,  
Services Policy Branch, Bureau  
of Meteorology)

CCST Ms Patricia Scott, Chair,  
Coordination Committee on  
Science and Technology  
(Secretariat, Mr A Gray, Science  
and Technology Advisory  
Section, Department of Industry,  
Science and Resources (DISR))

GSAC Prof D Green, Chairman,  
Greenhouse Science Advisory

Committee (Secretariat, Ms  
Kathy Dunn, Greenhouse Policy  
Group, AGO)

GCOS/ESG Dr M Manton, Chairman, GCOS  
Expert Sub-Group (c/- Bureau of  
Meteorology)

GCOS/ESG Dr N Smith, Chairman, GOOS  
Expert Sub-Group (c/- Bureau of  
Meteorology)

## Participation on International Scientific and Technical Bodies

Australian scientists and institutions are  
represented on a wide cross-section of  
international climate related committees  
and working groups. A current listing is at  
Appendix 3.

## International Agreements and other Climate-related Cooperation

As well as specific cooperative projects  
between Australian scientists and institu-  
tions and their international colleagues, a  
number of bilateral and multilateral agree-  
ments at government or institutional level

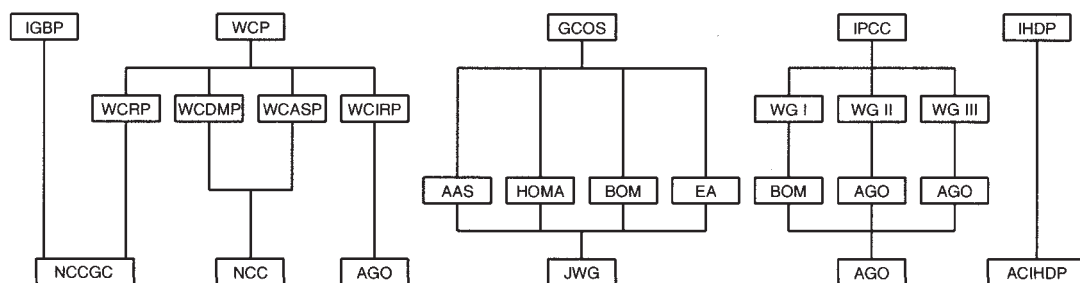


Figure 8.2 Australian agencies and national committees counterpart to the component programs of the WCP and the closely related IGBP and GCOS and the IPCC. The full names of the various committees and agencies along with principal contacts are elaborated in the text and consolidated in Appendix 1.

have been established which either focus on cooperation on climate issues or include climate as a key area of interest:

- The Memorandum of Understanding (MOU) between the Bureau of Meteorology and the China Meteorological Administration (CMA) of the Peoples' Republic of China (PRC) on Cooperation in Meteorological Science and Technology addresses climate issues, including through the operation of the CMA Climate Consultancy and Appraisal Committee.
- The MOU between DoEH and the National Environmental Protection Agency of the PRC on Environmental Cooperation identifies climate change, including the prediction of regional climate change, studies on climate change impact and counter measures, and technology transfer as areas of mutually high priority.
- The MOU between DoEH and the Ministry of Environment of the Republic of Korea, signed on 15 January 1996, identifies activities which mitigate the effects of climate change as an area of cooperation.
- Seasonal and interannual climate forecasting is a key focus of the MOU between the Bureau of Meteorology and the Meteorological and Geophysical Agency of Indonesia.
- The Ministerial Statement of Intent between Australia and Indonesia on Cooperation in the Field of Environmentally Sound and Sustainable Development (1990), highlights climate change impact assessments and response strategies as aspects for regional cooperation.
- The MOU between the Republic of Singapore and Australia relating to Cooperation in the Field of Environmental Management and Protection (1992) includes global warming as a key issue for consultation.
- The MOU between the US National Centre for Atmospheric Research and the BMRC on long-term cooperation (1990) includes climate modelling as one of the features.
- The Agreement between Australia and Russia on Cooperation in the Field of Protection and Enhancement of the Environment (signed with the then USSR in 1990) has the study of global climate change as an important aspect of cooperation.
- Under the tripartite Australia-New Zealand-United Kingdom (ANZUK) Intergovernmental Agreement on climate change research, collaborative work is in progress on historical climate datasets for the southern hemisphere.
- Australia and Japan have established an Exchange of Notes (treaty status) on the Geostationary Meteorological Satellite Program.
- A treaty Agreement on Scientific and Technical Cooperation was signed in February 1994 between Australia (through DISR) and the European Community to stimulate cooperative research and related activities in a range of fields, including climate. Relevant projects include Predicted Impacts of Rising Carbon Dioxide and Temperature on Forests in Europe at Stand Scale (ECOCRAFT) and Land Surface Processes and Climate Response.
- The MOU between the India Meteorological Department and the Bureau of Meteorology includes ongoing cooperation on meteorological satellites and monsoon studies.
- The MOU between the Australian Minister for the Environment and Germany's Federal Minister for the Environment, Nature Conservation and Nuclear Safety (1992) includes cooperation on major global environmental issues such as climate change.
- The Common Subsidiary Arrangement between the Minister for Environment and Nature Conservation of the German

Land of Saxony-Anhalt and the Australian Minister for the Environment was established in 1994.

- Use of climate sensitive urban and building design techniques to improve environmental quality, while maximising efficiency of urban operations and infrastructure, is a key element of the work of the Australian-Indonesian Centre for Sustainable Urban and Regional Development (CSURD).
- The MOU between the Hydrometeorological Service of Vietnam and the Bureau of Meteorology, signed in May 1999, includes climate monitoring and prediction as one of its areas of cooperation.
- A MOU on cooperation in meteorology, including activities involving climate, was signed in Geneva in May 2000 between the Bureau of Meteorology and the Islamic Republic of Iran Meteorological Organization (IRIMO).

Australia is also an active participant in the governing and advisory bodies of several global and regional organisations that address climate issues as part of their overall mandates. These include:

- the UN Commission for Sustainable Development (CSD);
- the International Energy Agency (IEA);
- the Organisation for Economic Cooperation and Development (OECD);
- the Asia-Pacific Economic Cooperation Organisation (APEC); and
- the Australian and New Zealand Environment and Conservation Council (ANZECC).

In the Asia-Pacific region, Australia supports and participates in several key inter-governmental organisations including the South Pacific Regional Environment Programme (SPREP), the South Pacific Forum, IOC WESTPAC and WMO Regional Association V, all of which have a substantial involvement with regional climate issues. As part of its commitment, Australia provides assistance, managed by AusAID, through both government and

private sector channels. Australia also contributes to the Montreal Protocol Multilateral Fund and the Global Environment Facility, both of which have components addressing climate related activities.

Some of the projects that direct AusAID assistance has made viable include:

- the South Pacific Sea Level and Climate Monitoring Project, initiated in response to the concerns of Pacific Island leaders over the potential impact of climate change and sea level rise on Pacific Island Countries. The aim is to monitor sea level at some 13 sites in the Pacific to an accuracy that is capable of detecting variations as small as 1mm per year. The project, which is funded by AusAID and managed by the National Tidal Facility (NTF), contributes to the world wide sea level monitoring effort and also includes capacity building and public awareness components. The project recently entered its third 5-year phase;
- the WMO/ESCAP Project on Smoke Haze for the ASEAN countries, with total funding of \$A0.4 million, which commenced in 1998. This project is related to the impacts of climate variability (especially El Niño) in trans-boundary smoke haze;
- a draft *Strategic Plan for the Development of Meteorology in the Pacific Region (2000–2009)*, which was prepared by SPREP and the WMO Subregional Office for the South-West Pacific in Apia with the assistance of the Bureau of Meteorology, was endorsed by the heads of National Meteorological Services of all 26 SPREP countries in July 1999 and approved by the October 1999 South Pacific Forum;
- as a follow-up to the Strategic Plan for the Development of Meteorology in the Pacific Region, a project entitled: Pacific Meteorological Services: Meeting the Challenges, which identifies the developmental needs of national Meteorological Services of developing

countries and territories in the Pacific, was completed in June 2000. The project identified a number of projects designed to meet these needs. The project was coordinated by SPREP, financed mainly by AusAID, and supported in kind by the National Meteorological Services of the region and WMO;

- on AusAID's initiative and as a follow up to the needs analysis, a project design document for the provision and application of climate prediction to a number of South Pacific Island Countries was prepared in June 2001 by the Bureau. This project focuses on one of the most urgent needs identified in the needs analysis;
- training fellowships for meteorological services personnel from Pacific Island Countries and PNG; and
- assistance to SPREP in general climate matters.

Through WMO funding, the Bureau of Meteorology provides technical and conceptual advice and raises awareness of WMO climate related initiatives, such as CLIPS, to meteorological services of developing South Pacific countries. Bilateral operational and training support, co-sponsored by WMO and AusAID, is provided to meteorological services in the South Pacific, Indian Ocean and Southeast Asia regions and funding has also been provided under the WMO Voluntary Cooperation Programme for the provision of satellite equipment to a number of Pacific countries.

Expertise is also provided by the Bureau to various WMO initiatives aimed at the development of national meteorological services in Africa. As part of the effort towards Urgent Action for Africa under the International Convention to Combat Desertification, Australia, in conjunction with the USA, contributed funding to implement an Internet link to the Drought Monitoring Centre in Nairobi. This followed a joint Australian-WMO study in 1995–96 which examined the feasibility of establishing an electronic communications

network to interlink the Drought Monitoring Centre (DMC) at Harare, the DMC at Nairobi, and the African Centre for Meteorological Applications for Development (ACMAD) in Niamey. The Centre for Resource and Environmental Studies (CRES) at ANU has compiled a topographic and climate data base for the African continent at a spatial resolution of 0.025 degrees of latitude and longitude (approx 5 km). The data are being used to address pressing problems associated with improving food production, managing pests and diseases and preserving biodiversity.

The Asia Pacific Network for Global Change Research (APN) supports capacity building activity in the Asia Pacific region closely linked to the activities of the global research programs of WCRP, IGBP and IHDP. For some time, a priority area for the APN has been on climate variability and change, with a particular focus on the Asian monsoon, the El Niño-Southern Oscillation and greenhouse gases. Australian researchers have worked with the APN in the development of indices of extreme climate events for the whole region.

## National Activity

As improved advances in computing and communications continues to make climate information more accessible, an increasing number of government agencies, research institutes and private concerns are applying this information to improve understanding, sustainable management practices and productivity. As a Party to the UN Framework Convention on Climate Change, Australia is also committed to improving understanding of greenhouse science and its implications for our climate, and to developing suitable long-term climate change response strategies. The contact details of Australian organisations involved in climate activities related to the WCP and other international scientific climate programs are given in Appendix 2.

## Commonwealth Agency Involvement

The principal Commonwealth entities engaged in climate or climate change activities include:

- The Bureau of Meteorology (within the Department of the Environment and Heritage) which operates the national climate observing networks and National Climate Centre, maintains a computer and document archive of Australia's climatological database, provides a range of climate data, information and monitoring services on a national basis and maintains an ongoing climate research program within the Bureau of Meteorology Research Centre.
  - The CSIRO has a substantial research program encompassing atmospheric, oceanographic, hydrological and biospheric aspects of the climate system and a range of climate impact and response areas, such as agriculture, forestry and energy technology. The focus for climate-related activities is provided through the Climate and Atmosphere Sector.
  - The Australian Greenhouse Office, which relates to several government portfolios and reports to a Ministerial Council (Ministers for the Environment and Heritage; Industry, Science and Resources; and Agriculture, Forestry and Fisheries), coordinates Australia's domestic climate change policy and administers key greenhouse response programs including the National Carbon Accounting System, the National Greenhouse Gas Inventory and National Greenhouse Science Program. The latter contributes funding to greenhouse research undertaken by CSIRO, the Bureau of Meteorology, the National Tidal Facility and other organisations (including universities).
  - Agriculture, Fisheries and Forestry – Australia (AFFA) which, through its research Bureaus (BRS, ABARE), the Research and Development Corporations (jointly funded by industry) and its various agriculture and water related programs, conducts or funds substantial climate and climate related research and applications, and the development and implementation of strategies to respond and/or adapt to climate variability and change.
  - Department of Industry, Science and Resources (DISR) which, through AGSO and through its various energy related programs, conducts climate related research and investigations, and develops and implements strategies to respond and/or adapt to climate change.
  - The Australian Antarctic Division (AAD) runs a substantial research program in ice mass balance, sea ice dynamics, and palaeoclimatological reconstruction of ice cores, which contribute directly to the program of the Antarctic CRC. AAD scientists also undertake research on biological and upper atmospheric topics with direct relevance to its goals of understanding the role of Antarctica in the global climate system. The AAD also provides the infrastructure and logistics to facilitate all climate studies in Antarctica, the sub-Antarctic islands and the Southern Ocean.
  - The Australian Nuclear Science and Technology Organisation (ANSTO) contributes to climate research, drawing on its unique expertise in identifying and tracking radionuclides. Jointly with CSIRO, BoM and other organisations, ANSTO's research has enabled measurements of gaseous exchanges and refined dates in palaeoclimatic events.
  - The Australian Institute for Marine Science (AIMS) conducts climate-related research and associated monitoring aimed at describing, understanding and modelling the influence of weather and climate on variability in shallow-water tropical systems.
- Other Commonwealth portfolios are also involved with climate issues in various ways, such as through international

negotiations and funding of projects related to the economics of climate change (Foreign Affairs and Trade) and funding of climate-related research in universities (Employment, Education, Training and Youth Affairs). The Natural Heritage Trust, which is jointly administered by EA and AFFA, has a number of programs, such as Landcare and Bushcare, which have a strong climate underpinning.

It is difficult to provide an annual Commonwealth expenditure on climate activities because much of the work underpins or is aimed indirectly at climate issues, and is spread widely through agencies without always being identified specifically as climate-related. A summary of indicative expenditure in 2000–01 by the major players, based on available documentation and agency estimates, is given in Table 8.1.

Table 8.1 attempts to distinguish between expenditure directly on climate activity (ie. where climate is the primary objective of the expenditure, such as the National Climate Centre and the Bureau of Meteorology and CSIRO climate research programs) and total climate-related expenditure (including indirect costs, such as the entire costs of that part of the Bureau of Meteorology's meteorological observing networks and data processing systems that provide the national climate record even though these also serve other purposes, such as operational weather forecasting).

## Research and Development Corporations

Part of the Commonwealth funding is provided to the Research and Development Corporations, which have been set up by the Commonwealth Government and are funded jointly by industry. These corporations contribute to both climate variability (through the Climate Variability in Agriculture

Program (CVAP) of LWRRDC) and climate change research relevant to primary industries. CVAP has received funding to the total of \$3.5 million from the Commonwealth in the last five years and R&D Corporations also support CVAP through funding for generic projects and for partnership funding of projects of value to their specific industry or charter.

CVAP funding is directed to a range of state agencies, academic institutions, consulting firms, and Commonwealth agencies including CSIRO, BRS, and the Bureau of Meteorology. These agencies also contribute substantial matching funding to CVAP projects they undertake.

## State Agencies

The inherent variability of Australia's climate has a significant impact on state economies, the social well-being of rural communities and the sustainable use of natural resources. Over recent years, State Government agencies have increased their use of climate information in support of agricultural production and other weather sensitive industries, and in developing managing systems for natural resources.

An indication of state agency involvement in applying climate information is shown in Table 8.2. While every attempt has been made to ensure this is representative and current list, there may well be additional climate-related work being undertaken in other agencies or departments. No attempt is made here to estimate funding for these activities.

## Academic Institutions

Many Australian universities undertake climate-related research, as summarised in Table 8.3. While every attempt has been made to ensure the list is representative, the list of departments shown in Table 8.3 and the identified areas of interest are not necessarily exhaustive.

*Table 8.1 Indicative Commonwealth expenditure on climate-related activities, for the 2000-01 financial year. Expenditure that is directly related to climate is identified as well as that for a broad range of activities that underpin, or are indirectly related to, climate activities. The summary includes the main climate-related activities in the Commonwealth departments and agencies listed above, but is not definitive.*

Commonwealth Agency	Department	Climate Expenditure	
		Directly related	Directly+ Indirectly related
		(\$M)	(\$M)
Australian Greenhouse Office (AGO) <sup>1</sup>		10.5	11.0
Bureau of Rural Sciences	AFFA	0.5	0.5
Climate Variability in Agriculture R&D Program (CVAP)		0.5	0.5
Natural Heritage Trust	AFFA/Environment & Heritage	0	150.3 <sup>4</sup>
Australian Antarctic Division <sup>2</sup>	Environment & Heritage	2.5	24.9
Bureau of Meteorology <sup>3</sup>		35.0	84.0
GBRMPA, SOE, ERISS, ERIN		0.1	0.1
AusAID	Foreign Affairs and Trade	2.5	27.5
AGSO-Geoscience Australia	Industry Science & Resources	0	1.2
Australian Institute of Marine Sciences <sup>2</sup>		2.5	3.3
Australian Nuclear Science & Technology Organisation <sup>2</sup>		2.6	8.0
Cooperative Research Centres		0	4.4
CSIRO Climate and Atmosphere Sector <sup>2</sup>		20.2	20.2
TOTAL <sup>1</sup>		77.0	336.0

Notes:

1. Expenditure by AGO and CVAP includes grant funding to various research bodies. While funding to Commonwealth bodies (\$3.7 m) has been included as part of the relevant agency's expenditure, total funding has been adjusted so that funds are not counted twice.
2. A component of this direct expenditure has been committed to in-kind and direct contributions to climate-related Cooperative Research Centres.
3. Includes research, monitoring, services and international activities. To a large extent, the systems that provide climate-related observations also support the Bureau's forecast and warning services. However, some facets of monitoring and prediction, e.g. the network of Reference Climate Stations, have a particular focus on the need for a long term, high quality climate record. Part of the total operating cost of the Bureau's observing systems has therefore been included as a measure of the indicative direct cost of climate monitoring and the remainder is included in the indirect total.
4. This includes the Bushcare, Farm Forestry and National Landcare Programs, all of which include indirect climate-related activities.

Table 8.2 Some of the climate activities undertaken by State Government departments and agencies.

STATE	AGENCY/DEPARTMENT	ACTIVITIES
<b>Australian Capital Capital</b>	Department of Urban Services Environment and Heritage	State of the Environment Reporting, seasonal rainfall monitoring
<b>New South Wales</b>	NSW Agriculture	Promotion of climate/seasonal information through workshops, publications etc. Drought monitor- ing, agroclimatic risk/opportunity management and tactical decision support. Climate variability and drought research
	Environment Protection Authority of NSW	Health impacts of air pollution
	Department of Public Works and Services	Water monitoring and planning; climate impact mitigation
	Pacific Power	Wind studies for potential wind farms
<b>Northern Territory</b>	Department of Planning and Environment	Climate change impact on coastal vulnerability
	Health and Family	Climate impacts on health
	Parks and Wildlife Commission	Sustainable management
	Department of Primary Industry and Fisheries	Climate impacts on grazing land
<b>Queensland</b>	Environmental Protection Agency	Climate change impact on coastal vulnerability; air pollution studies
	Department of Health	Climate impacts on disease vectors
	Department of Primary Industries, Department of Natural Resources and Mines, Queensland Centre for Climate Applications	Promotion of climate/seasonal information. Climate applications research, development and extension work in primary industries. Integrated impact assessment of climate change; greenhouse gas inventory studies. Development of drought and land and pasture degradation alert systems

	Department of Public Works	Climate responsive building design
<b>South Australia</b>	Department of Environment and Heritage	Climate change impact on coastal vulnerability
	Primary Industry and Forestry, South Australian Research and Development Institute (SARDI)	Promotion of climate/seasonal information and its use in decision support tools; development of seasonal response; crop planting strategies; evaluation of seasonal forecasting guidance; land use change
<b>Tasmania</b>	Department of Primary Industries, Water and Environment	Promotion of climate information in property management planning. Air quality and impact on water resources.
<b>Victoria</b>	Department of Natural Resources and Environment	Sustainable farming systems
	Sustainable Energy Authority	Climate efficient design, energy usage patterns
	Department of Human Services	Climate and health
	Environment Protection Authority	Air pollution studies
<b>Western Australia</b>	Agriculture WA	Promotion of seasonal forecast applications. Development of climate risk management and decision support systems for crop farming and crop yield predictions. Assessing and managing vineyard disease risk. Managing water resources in a highly variable climate. Promotion of renewable energy technology.
	Department of Land Administration	Climate change impact on coastal vulnerability
	Ministry for Planning	Climate efficient design and planning
	Waters and Rivers Commission	Water resource management
	Department of Environmental Protection	Air quality studies

---

Table 8.3 *Australian Universities engaged in climate-related activities.*

Institution	Department	Areas of Interest
Australian National University	Centre for Resource and Environmental Studies	Analysis of spatial and temporal variability of climate, bioclimatic modelling, climatic hazards, impacts and adaptation response to climate change impacts on water resources, coasts and flooding.
	Division of Archaeology and Natural History	Sedimentary and Palynological analysis of medium-term climatic change in relation to human settlement.
	Department of Geography	Past global climate change, climate variability and change and global climate modelling
	National Centre for Epidemiology and Population Health	Health impacts.
	Research School of Biological Sciences	Global change, ecosystems, environmental biology, including bioclimatic modelling.
	Research School of Earth Sciences	Climate change on both human and geological timescales, sea level change, biological-climate interactions. Palaeoclimatology, El Niño and drought.
Curtin University of Technology	Remote Sensing and Satellite Research Group, School of Physical Sciences	Satellite monitoring and satellite meteorology

Deakin University	School of Architecture and Building	External and internal climatic influences on built environments.
Flinders University of South Australia	Flinders Institute for Atmospheric and Marine Science	Global warming, natural climate variability, ocean circulation, air-sea interaction
	National Tidal Facility	Sea level/climate monitoring.
Griffith University	Faculty of Environmental Sciences	Climate change impacts on soil erosion. Air pollution monitoring and modelling.
James Cook University of North Queensland	Australian Institute for Tropical Architecture	Climate responsive design of built environments in the tropics.
	Centre for Disaster Studies	Social impacts of extreme tropical weather events.
	School of Engineering	Coastal impacts of tropical extreme weather; building design and assessment of risk in high wind regions.
	Tropical Environment Studies and Geography	Palaeoclimates, palaeoenvironments and palynology.
	CRC for Tropical Rainforest Ecology and Management	Climate change impacts on rare marsupials.
Macquarie University	Climatic Impacts Centre	Climate impacts and response strategies, human and physical aspects of climate, climate variability and change, urban climates, global climate modelling, climate policy.
	Department of Physical Geography, School of Earth Sciences	Global and regional climate modelling, climate impacts on health, building clima-

		tology, applied meteorology, bioclimatology, ocean-atmosphere interaction, climate modelling and climate change, impact of land cover change on global climate.
	Natural Hazards Reduction Centre	Relationship between natural disasters and climate variability/change, impact of global warming on crops.
Monash University	Centre for Dynamical Meteorology and Oceanography	Urban climatology and air pollution studies, arctic climatology, land/atmosphere interaction, climate variability and change, stratospheric dynamics and ozone, clouds and radiation, mesoscale processes, physical oceanography, geophysical fluid dynamics.
	Department of Mechanical Engineering	Wind studies, adaptation in building design
	School of Geography and Environmental Science	Global and regional climate change, palaeoenvironments, arctic climate response to global warming
	CRC for Catchment Hydrology (also Melbourne University)	Hydrological cycle monitoring and modelling, climate variability.
Murdoch University	Australian Centre for Renewable Energy	Applications, response strategies
	School of Environmental Science	Climate and hydrological modelling, land atmosphere interaction, climate impacts and applications
	Institute for Science and Technology Policy	Climate change response strategies for natural ecosystems reserve management, transport systems

Northern Territory University	School of Biological and Environmental Sciences	Climate change impacts on tropical ecosystems, modelling
	School of Mathematical and Physical Sciences	Atmospheric composition in tropical Australia.
Royal Melbourne Institute of Technology	Centre for Remote Sensing and Geographic Information Systems	Meteorological modelling and data analysis.
University of Adelaide	Department of Mechanical Engineering	Thermal comfort, response strategies.
	Department of Physics and Mathematical Physics	Climate dynamics, gravity waves, radar and optical remote sensing and dynamics.
	Department of Geographical and Environmental Studies	Climate change impact on coasts.
University of Melbourne	Centre for Environmental Applied Hydrology	Hydrological monitoring, modelling
	School of Earth Sciences	Global climate modelling, climate monitoring and data analysis, natural climate variability, climate trends, paleo-environmental record
University of New South Wales	Department of Water Engineering	Drought prediction.
	Building Research Centre, and the Solar Architecture Research Unit	Applications, response strategies in building design
	School of Biological Science	Biological-climate interaction, modelling. Quantifying impacts of climate change.
	School of Mathematics	Atmospheric, oceanic and soil- moisture modelling, numerical weather prediction.

	School of Physics	Atmospheric aerosols, climatic impacts, satellite observations, remote sensing, chemical and physical modelling.
University of Newcastle	Department of Geography and Environmental Science	Air pollution, urban climate and meteorology, climate change, applied climatology, quaternary palaeoclimatology.
University of New England	School of Geosciences	Coastal climate change, ocean-atmosphere.
University of Queensland	School of Architecture and Planning	Climate applications.
	Department of Botany	Climate change impacts on forests.
	Department of Geographical Sciences and Planning	ENSO rainfall forecasting, drought, radar storm climatology, biometeorology. Climate and mortality. Climate impacts of land cover change.
University of Sydney	Department of Mathematics	Modelling
	Coral Reef Research Institute	Climate impacts
	Division of Geography	Impact of and response strategies to climate change in coastal environments. Global warming.
University of Tasmania	Ocean Technology Group	Mitigation of carbon dioxide emissions, sinks.
	Cooperative Research Centre for the Antarctic and Southern Ocean Environment (Antarctic CRC)	Climate modelling, radiation, Antarctic and Southern Ocean science, sea-ice monitoring and climatology.

	Institute of Antarctic and Southern Ocean Studies (IASOS)	Antarctic and Southern Ocean science, ultraviolet radiation in high southern latitudes, climatology.
	Department of Geography and Environmental Studies	Radiation climatology studies: mapping of surface radiation from satellite data, estimation of ultraviolet radiation in the Southern Hemisphere. Air quality levels.
University of Technology, Sydney	Institute for Sustainable Futures	Development of greenhouse response strategies.
University of Western Australia	Department of Microbiology	Climate impacts on vector-borne disease.
University of Western Sydney	School of Agriculture and Rural Development	Climate risk management and decision support systems for cropping
	School of Science, Food and Horticulture	Climate change impacts.
University of Wollongong	Quaternary Environments Change Research Centre	Quaternary environmental change
	Department of Chemistry	Surface-atmosphere trace gas exchange, solar radiation, isotopic measurement of greenhouse gases
	School of Geosciences	Climate data applications to bushfire management

---