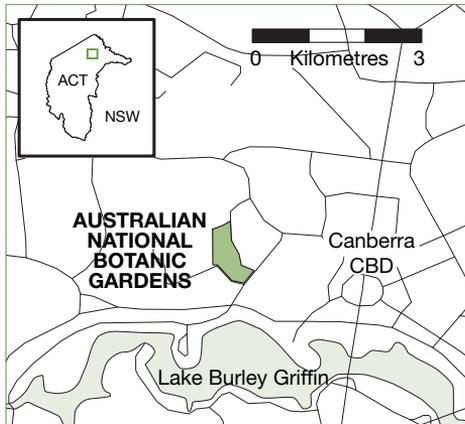


## Australian National Botanic Gardens

[www.anbg.gov.au](http://www.anbg.gov.au)



### Special features

The Australian National Botanic Gardens (ANBG) is a major scientific, educational and recreational resource. It was one of the first botanic gardens in the world to adopt the study and display of a nation's native species as a principal goal. Approximately one-third of the known flowering plant species that occur in Australia and about half the known eucalypt species are represented in its living collection. The ANBG is a national showcase for the horticultural use of Australia's native plants.

The ANBG contributes to meeting Australia's obligations under international environment conventions to which Australia is a signatory. In particular, the *Convention on Biological Diversity* recognises the importance of botanic gardens in *ex situ* and *in situ* conservation, research, training, plant identification and monitoring, raising public awareness, providing access to genetic resources, and global cooperation in the sustainable use of plant biodiversity.

Location	Latitude 35°16' South, Longitude 149°06' East
Area	85 hectares
Proclamation date	17 September 1991
IUCN category	Category IV
Biogeographic context	Displays plants from a diverse range of climatic and biogeographic regions—alpine to tropical, coastal to central desert
Management plan	Second plan of management expires 9 January 2009
Other significant management documents	Management Plan Implementation Schedule; Risk Assessment and Management Schedule; ANBG Masterplan (National Capital Authority); Emergency Response Procedures Manual June 2005; ANBG Fire Procedures 2006; kangaroo and wallaby management plans; ANBG Education Service Policy; ANBG Photograph Collection Policy; Agreement for the Establishment and Operation of the Centre for Plant Biodiversity Research (CPBR) between the Director of National Parks and the CSIRO; CPBR Strategic Plan

Financial	Operating	\$9.422 million
	Capital	\$0.473 million
	Revenue	\$0.670 million
Visitors	501,400 to site 96,000 to visitor centre	
Living plants	Planted in 2007–08: 4,535 Total number of taxa in the living collection: 6,339 Total number of registered plants in the living collection: 78,146	
Herbarium specimens	Specimens added to database in 2007–08: 38,518 Total number of specimens in collection: approximately 1.2 million	
Australian Plant Image Index	Added in 2007–08: 4,027 Total number of photographs in collection: 40,000	
Permits	4 commercial activity permits; 45 wedding or wedding photography licences; 100 licences to publish 509 photographs from the collection.	

**International conventions and agreements**

World Heritage Convention	Supports Australia's World Heritage sites through botanical research, scientific plant collections, plant identification, botanical information management, and horticultural and educational programs
Wetlands (Ramsar) Convention	Supports Australia's obligations under the Ramsar Convention through access to plant identification services and data on aquatic plants in the Australian National Herbarium, and by delivering information on Australia's aquatic plants through its website
Other agreements	Collaborates with international organisations including: <ul style="list-style-type: none"> <li>• International Association of Botanic Gardens</li> <li>• International Association of Plant Taxonomists</li> <li>• International Plant Propagators Society</li> <li>• International Union of Biological Sciences Taxonomic Databases Working Group</li> <li>• International Plant Name Index (Royal Botanic Gardens, Kew, and Harvard University)</li> <li>• Global Biodiversity Information Facility</li> <li>• International Organisation for Plant Information World Vascular Plant Checklist Project</li> <li>• Species 2000</li> </ul>

**Environment Protection and Biodiversity Conservation Act 1999**

Heritage	On Commonwealth Heritage List
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## Centre for Plant Biodiversity Research

The Centre for Plant Biodiversity Research is a joint venture between the ANBG and CSIRO Plant Industry. It was formed in 1993 and cooperative arrangements were renewed for a further 10 years in 2000.

The Australian National Herbarium is the core of this facility, housing voucher specimens for research, environmental studies and for the ANBG living collection. Databases support the living, herbarium, and photograph collections. The herbarium is a major contributor to the network of Australasian herbaria, to *Australia's Virtual Herbarium*—a national project involving all states and territories—and to the *Australian Plant Census* project that is developing a national endorsed list of scientific names for Australian plants. It is a key contributor to the *Taxonomy Research and Information Network* and the *Atlas of Living Australia*.

## Monitoring

The ANBG's horticultural planting is scientifically documented through voucher specimens in the Australian National Herbarium. A team of botanists, including national and international collaborators, ensure that the correct botanical names are always applied to the living specimens and used in public interpretation. New collection accessions help document the occurrence and distribution of plants in Australia.

A specialised database system (the *Integrated Botanical Information System*) helps to maintain essential links between specimens in the herbarium, contemporary scientific literature, the living plants in the gardens and the photographs in *Australian Plant Image Index*.

A team of ANBG staff regularly stocktake its living plant specimens, recording plantings, locations and deaths, plus the overall health of the collection.

## Future challenges

Major challenges are:

- ANBG sustainability—defining the operational and business model that will secure sufficient resources to achieve government and national priorities
- developing a new strategic plan for the ANBG, with a long term (50 year) vision, and completing a new management plan in accordance with the EPBC Act
- water management because of the continuing drought and sharp increases in unit water costs in Canberra. Funding of \$1.5 million has been allocated to upgrade water infrastructure. Access to a sustainable supply of non-potable water is fundamental to this upgrade

- integrating climate change considerations into ANBG operational management. This includes the management of water, horticultural practices, Australian plant climate change impacts and adaptation, the education role and the scope of the living collections held in Canberra
- calculating a financial, social and environmental value for the living, herbarium and photograph collections. Valuation will help to ensure the collections are adequately resourced
- maintaining the ANBG's role as a tourist attraction in the face of water restrictions. Lawn-dependent visitor attractions, such as the Friends of the ANBG's summer concerts, will require careful management
- the Centre for Plant Biodiversity Research, which will conclude its current operational and funding agreement on 31 December 2009. The role and effectiveness of the Centre will be reviewed before a new agreement is negotiated between the Director of National Parks and CSIRO
- accommodation space for the collections of the Australian National Herbarium has become critical. The current arrangements with their lack of workable space are becoming dysfunctional. A major capital funding proposal for building extension must be negotiated with both CSIRO and the Department of the Environment, Water, Heritage and the Arts (DEWHA)
- completion of the *Australian Plant Census* project to produce a list of flowering plant names for the whole of Australia that is endorsed by the Australian Government and the state and territory herbaria. The project coordinator is located at the Australian National Herbarium. Although the project will be ongoing, the first phase is due for completion in 2010, when all families will have been reviewed. So far 244 families representing about 58 per cent of the flowering plants have been treated
- implementing the next phase of *Australia's Virtual Herbarium*. Funding for the first phase has ended and the ANBG is working with state and territory herbaria and museums to build on the project through new national infrastructure proposals
- biodiversity information management as part of the *Atlas of Living Australia* and the *Taxonomic Research and Information Network*. Modern information technology is being engaged to improve the efficiency and productivity of taxonomy and systematics research on the Australian flora.



## Report on performance by key result areas

### KRA1: Natural heritage management

#### Major issues

- Water management and associated infrastructure
- *Ex situ* conservation
- Plant records and census of living plant collection
- Introduction of GIS to living collection management

#### Actions

- Increase water use efficiency
- Commence review of the scope and operations of the living collections
- Position the ANBG as a leader in *ex situ* conservation including seed banking
- Accelerate census of the living collection
- Use GIS to accurately map the living collection

#### Performance results 2007–08

- The ANBG put considerable effort into securing a more sustainable water supply. The Government has committed \$1.5 million to address the ANBG's water infrastructure needs as part of the National Water Security for Towns and Cities program
- Project planning and tender processes for major water infrastructure improvements have been completed and will be implemented next year
- The efficient application of water to garden beds was refined. This included the use of ornamental pools as reservoirs for recycling run-off water from the site, increased use of water-sensors to determine and refine watering regimes and increased use of mulch to reduce evaporation
- An external consultant was engaged to develop a draft framework for a comprehensive review of the ANBG living collection and its interaction with other associated ANBG collections
- Initiated a program for *ex situ* conservation of alpine plants with an emphasis on germplasm storage under controlled and cryogenic conditions. During the year 10 field trips to the Kosciuszko area were undertaken, resulting in 287 seed samples being stored
- The ANBG contributed to a review of seed banking in Australia in cooperation with State and Territory botanic gardens and the Kew Gardens *Millennium Seed Bank* project, with the aim of developing a long term national germplasm strategy

- An accelerated stocktake was undertaken to complete a living plant census within the year as input to a comprehensive collection review. Staffing constraints have extended the likely completion date to October 2008
- The intended first phase of the ANBG's GIS implementation has been placed on hold due to funding constraints

#### **KRA2: Cultural heritage management**

##### *Major issues*

- Displaying the flora of Australia
- Education related to the flora of Australia

##### *Actions*

- Display the flora of Australia in a horticultural setting
- Provide cultural interpretation and education programs about the Australian flora

##### *Performance results 2007–08*

- The ANBG displays about one-third of the plant species occurring naturally in Australia in a managed horticultural setting. Water restrictions imposed during the recent drought placed much of the collection under stress and, coupled with staff losses, resulted in some loss of plant specimens, contraction of planted areas and decline in some horticultural displays
- A project was initiated to develop and document techniques to grow attractive native annuals and Sturt's desert pea (*Clianthus formosus*) as high-impact display plants. The public will be able to view them in spring and summer. Interpretation and horticultural extension will be a major part of this project
- The cultural values of Australian native plants were promoted with exhibitions in the visitor centre and elsewhere in the ANBG: 'Caring for Land', 'Friends School Photographic Exhibition', 'Local Colour', 'Botanical Art Group Exhibition', 'Growing Home, the Street Trees of Canberra', 'A Tree in the Palm of your Hand Bonsai Exhibition' and 'Snakes Alive!'
- 13,208 students attended the ANBG Education Programs, 4,074 families and individuals attended the Snakes Alive Exhibition, totalling 17,282 participants
- Commenced development of an Australian bush food plants trail and redevelopment of the Aboriginal Plant Use Walk
- Distributed approximately 300 copies of the education unit's poster on the floral emblems of Australia to schools and educators on demand



#### **KRA4: Visitor management and reserve use**

##### *Major issues*

- Visitor management
- Visitor safety

##### *Actions*

- Conduct visitor surveys
- Initiate a marketing plan
- Conduct an eastern brown snake survey

##### *Performance results 2007–08*

- Results from two major visitor surveys, conducted in conjunction with the Botanic Gardens of Australia and New Zealand and the National Capital Attractions Association, are being analysed for incorporation into the ANBG strategic planning process
- Implementation of a marketing strategy developed last year has been constrained by available resources
- Development commenced of a new policy on snake management within the public areas of the ANBG in response to the eastern brown snake survey

#### **KRA5: Stakeholders and partnerships**

##### *Major issues*

- Ongoing support for the Centre for Plant Biodiversity Research (CPBR)
- Servicing DEWHA's need for technical advice on native plants
- Supporting and participating in botanical forums: the Council of Heads of Australasian Herbaria, Council of Heads of Australian Botanic Gardens, Global Biodiversity Information Facility, Taxonomy Research and Information Network, Atlas of Living Australia and Taxonomic Databases Working Group
- The need to develop memoranda of understanding with non-government organisations associated with the ANBG
- Working with, and supporting, the Friends of the ANBG
- Supporting the Australian Cultivar Registration Authority (ACRA), the Australian Network for Plant Conservation (ANPC) and Greening Australia

##### *Actions*

- Continue to participate in the joint ANBG–CSIRO Centre for Plant Biodiversity Research
- Undertake and promote services that ANBG and CPBR can provide to DEWHA in the form of technical and expert advice

- Continue the Australian National Herbarium's leadership role in the Council of Heads of Australasian Herbaria
- Continue the ANBG's participation and strategic leadership in the Council of Heads of Australian Botanic Gardens
- Continue strategic partnerships and cooperative data management with the Taxonomic Databases Working Group and the managers of the *Global Biodiversity Information Facility, Taxonomy Research and Information Network, and Atlas of Living Australia*
- Formalise the strong relationship with non-government organisations located on site via memoranda of understandings
- Continue the partnership between the ANBG and the Friends of the ANBG
- Continue hosting on the ANBG website the Greening Australia Community Seedbank, the Australian Cultivar Registration Authority and the Australian Network for Plant Conservation

#### *Performance results 2007–08*

- The ANBG maintained its strong ties with CSIRO Plant Industry in jointly managing the Centre for Plant Biodiversity Research and the Australian National Herbarium
- The incorporation of the Atherton Annexe of the Australian National Herbarium into the new Australian Tropical Herbarium in Cairns resulted in new partnerships in its joint management with James Cook University and the Queensland Government Environmental Protection Agency. The Herbarium was opened on 4 March 2008
- The Australian National Herbarium continued to play a coordinating role on behalf of DEWHA for projects undertaken by the Council of Heads of Australasian Herbaria. These included developing weed profiles, endangered species profiles and the Australian Plant Census. The staff also updated profiles for threatened vegetation systems
- Took a leadership role within the Council of Heads of Australian Botanic Gardens by coordinating a climate change workshop. This resulted in a draft national climate change adaptation strategy and action plan for botanic gardens
- Ran a workshop on the role of botanic gardens in climate change education
- Continued membership of technical working groups under the Global Biodiversity Information Facility and Taxonomic Databases Working Group
- The CPBR continued its close association with the new *Taxonomy Research and Information Network*, housing its core staff and also participating in projects such as systematic and diversity studies of the weed Lantana and biodiversity information management



- The CPBR and *National Plant Image Index* assisted the new *Atlas of Living Australia* project through providing information technology advice, harvesting data, contributing images and initiating a demonstration on-line species information project featuring mangrove communities
- The ANBG participated in a national workshop on information standards for species profiles for on-line floras, faunas and species fact sheets. This will allow integration and sharing of information across institutions and collaboration in projects such as the *Atlas of Living Australia*
- At year's end, of the four non-government organisations on site only Greening Australia had a formal memorandum of understanding with ANBG
- The Friends of the ANBG ran the annual students' photographic competition and the autumn and spring plant sales; published quarterly newsletters; provided volunteer guided walks each day; and supported the ANBG's annual summer concerts in January 2008
- A new initiative between the Friends and the ANBG saw the establishment of the Botanical Resource Centre, a facility for the general public to identify plants using computer tools, microscopes and specimens. The Centre was opened by Her Excellency Mrs Marlena Jeffery on 15 May 2008
- The Australian Cultivar Registration Authority (ACRA), based at the ANBG, documents the nomenclature of cultivated plants. In October 2007, the International Society for Horticultural Science Commission approved the reappointment of ACRA as the official International Registration Authority for Australian plant genera for a further four years. ANBG initiated a strategic planning workshop for ACRA
- The Australian Network for Plant Conservation, based at the ANBG, continued to serve its network of members and provide workshops in plant conservation techniques throughout the country. During the year it produced four editions of its newsletter and ran three workshops
- Continued the close collaboration between the ANBG seedstore and Greening Australia, including joint field collecting, seed storage and management. The ANBG also provides Greening Australia with ground space and irrigation for seedling production

#### **KRA6: Business management**

##### *Major issues*

- Long term sustainability for the operation of the ANBG
- Budget management
- Staff management
- Risk management

*Actions*

- Major review of the functions and priorities
- Ensure business continuity and service delivery
- Manage staff resources efficiently
- Continue ongoing risk assessment

*Performance results 2007–08*

- An internal review commenced early in the year was discontinued. There was a need for a more comprehensive strategic analysis of the ANBG's role and directions in changing circumstances
- Increases in the costs of water, electricity and maintenance placed considerable strain on the ANBG as savings in other areas are required to cover basic maintenance and running costs
- Increasing costs are affecting the standard of delivery of existing services and the ability to ensure business continuity
- Maintained and improved staff consultation, involvement and capacity building formally (through training, the occupational health and safety committee, staff planning days) and informally (through opportunities for higher duties, informal consultation)
- Damage to buildings and nursery polyhouses from the February 2007 hail-storm continued to affect the Gardens—as insurance claims were not settled within the current year.

**KRA7: Biodiversity knowledge management***Major issues*

- Curation of the Australian National Herbarium
- Nationally consistent Australian plant names
- Taxonomic botanical research
- Improving access to botanical databases and information management
- Improving access to plant photographs and other images
- Dissemination of botanical information via the web
- Development of species profiles
- Responding to Climate change
- Developing national collaborative projects



### Actions

- Maintain and curate the Australian National Herbarium collections. Make botanical data, information and expertise available to the national and international botanical communities
- Develop and maintain the *Australian Plant Name Index* and the *Australian Plant Census* to define and list all the flowering plants in Australia
- Integrate departmental plant and animal name databases to allow a more consistent management and delivery of biological data
- Undertake taxonomic and systematic research, and publish and disseminate research findings
- Develop and maintain scientific databases of Australian plant information
- Enhance the extensive collection of photos and illustrations of plants and further develop access to the collection using innovative technology
- Promote and provide information about Australian native plants via the internet
- Develop innovative ways to collate data from a range of sources to be presented as 'species profiles'
- Position the ANBG as a leader in the dissemination of information on climate change issues in botanic gardens
- Drive national collaborative biodiversity information management projects

### Performance results 2007–08

- Databased 38,518 herbarium specimens and curated approximately 6,000 herbarium specimens, for accession to the *Australia's Virtual Herbarium* project
- Produced and maintained an agreed list of scientific names for Australia's flowering plants through management of the *Australian Plant Name Index* and the national collaborative *Australian Plant Census* project. The project was partially funded through the Natural Heritage Trust and endorsed by Australian Government, State and Territory herbaria
- Consultants and contractors were engaged to redevelop the *Australian Faunal Directory*—managed by the Australian Biological Resources Study for compatibility with the *Australian Plant Name Index*
- Researchers completed scientific papers or publications resulting from research undertaken at the Australian National Herbarium. Areas of study include Australian Orchidaceae, Rutaceae, Myrtaceae, Malvaceae, Santalaceae and the bryophytes
- Research was undertaken to understand ecological function, structure and the small-scale dynamics of grassland communities in south-eastern Australia, using grasslands in the West Wyalong district as model systems. The research particularly focused on understanding the importance of plant community diversity in reducing vulnerability to invasive plant species

- After an extended vacancy, the appointment of a senior systematist to lead the Systematics and Evolution program of the CPBR has injected new vigour into the systematics and taxonomy research programs
- 'Born-digital' images now contribute significantly to the *Australian Plant Image Index* which was previously based on 35 millimetre slides; 4,615 additional images were made available via the web
- Continued to develop the ANBG/CPBR website as the premier online resource for information about Australian plants. The website of about 43,000 pages, provides access to extensive botanical databases. It recorded an average of 41,000 hits each day
- A new configuration of the photographic data allows web search engines to directly deliver images from the database. As a result, about 5,300 named plant photos are accessed each day
- The ANBG and CPBR were involved with developing species profiles for both weeds and threatened species to be delivered via the web. A further initiative to collate such profiles by harvesting a range of data sources is being developed through involvement with the *Atlas of Living Australia* and the *Taxonomy Research and Information Network*
- The ANBG coordinated a national education forum on climate change for botanic gardens throughout the country
- The ANBG and CPBR participated in national and international biodiversity information management and technical infrastructure projects including the *Atlas of Living Australia*, the *Taxonomy Research and Information Network*, the *Australian Plant Census*, the *Australia's Virtual Herbarium* and the *Global Biodiversity Information Facility*

## Pacific Highway Bulahdelah Bypass orchid recovery project



*Corybas dowlingii*, one of the three orchids that are the subject of the Bulahdelah Orchid Recovery Project

In partnership with the NSW Roads and Traffic Authority, the Centre for Plant Biodiversity Research is investigating the biology of three threatened species of orchid, which are affected by the proposed Pacific Highway Upgrade at Bulahdelah in NSW.

Two of the species, *Cryptostylis hunteriana* (leafless tongue orchid) and *Rhizanthella slateri* (eastern Australian underground orchid), are listed under the Commonwealth

*Environment Protection and Biodiversity Conservation Act 1999* and *Corybas dowlingii* (red lanterns) is listed under the *NSW Threatened Species Conservation Act 1995*. All occur within, and adjacent to, the proposed highway upgrade site on the lower slopes of Alum Mountain.

The project involves both field and laboratory research on the species to:

- improve our understanding of the requirements for the long-term survival and population sustainability of each species
- provide a basis for and recommendations on the translocation of each species in compliance with the EPBC Act
- support future scientific research on the conservation of these and related species.

All orchids depend on mycorrhizal (symbiotic root-dwelling) fungi for seed germination and maintenance of plants in the wild. The two nationally threatened species being investigated also rely on a range of host plants for their survival. Such complex relationships mean the project is focusing on more than just the orchids themselves.

The field research component of the project involves the location, hand pollination and collection of seeds of the three threatened orchid species at the Bulahdelah site; the isolation, identification and establishment of the nature of the mycorrhizal fungal relationships with each orchid species, and the identity of potential higher plant host species. This information will help identify possible alternative sites on Alum Mountain suitable for translocation of those plants directly affected by the road construction.



*Rhizanthella slateri* – eastern Australian underground orchid

Already 15 visits have been made to the site to gather data on the life cycle and ecology of each species and to collect samples for research. Further fieldwork will involve translocating some individuals identified within the road footprint, and the identification and assessment of other sites suitable for translocation or re-introduction of laboratory propagated orchids.

Research in the laboratory will involve the isolation, culture and identification

(through DNA sequencing and analysis) of the mycorrhizal fungi associated with the orchids; artificial propagation of the orchids from seed in association with the appropriate mycorrhizal fungus; and, where appropriate, propagation of seedlings of potential host tree and shrub species. As they develop, orchid seedlings will be matched with their associated mycorrhizal fungus and host plant species as units, for re-introduction into appropriate off-road sites at Bulahdelah. Translocated and re-introduced orchids will be monitored by our partners for a period of ten years to assess the results.

The nature of the species and the time constraints involved make this a challenging and ground-breaking project. Its results will be highly significant in understanding the interactions and complexities of these and similar species and in providing answers to crucial questions to support future conservation management.



## Taking a lead in responding to climate change



*Soil sensors have been installed at the Australian National Botanic Gardens to accurately determine the water needs of the living collection*

The Australian National Botanic Gardens (ANBG) is taking action nationally, regionally and locally in response to the challenges of climate change. This includes:

- leading national coordination of education and of *ex situ* plant conservation to support conservation in the wild
- developing an alpine seed collection and research program
- redesigning on-site water management to reduce consumption.

As climate change places greater pressures on the natural ranges and survival of wild populations of plants, Australia's botanic gardens are among the first in the world to take a national approach to supporting plant conservation. The ANBG has facilitated the development of a national climate change adaptation strategy that capitalises on three key strengths of botanic gardens.

The first of these is education. Receiving about 13 million visitors annually, Australia's botanic gardens are places where people, plants and biodiversity come together. As a first step to putting together a national approach to raising community awareness, the ANBG facilitated development of shared key messages around climate change and biodiversity, to be delivered in botanic gardens across the country.

Second, botanic gardens provide a safety net for plant conservation. Seed banks and other living collections offer a living store of genetic diversity. These collections are valuable to a range of taxonomic, species and ecological research and as an insurance policy supporting plant conservation in reserves.

Third, botanic gardens are places of immense knowledge about how to grow and propagate plants. This knowledge underpins efforts to reintroduce species and restore ecosystems. It supports climate change research and provides botanic information towards the management of our reserves.

One of the areas where the ANBG is applying its expertise is in research and conservation of alpine plants. Recognised as one of the 11 Australian centres of plant diversity, the alpine region has been identified among the most vulnerable to climate change. The ANBG has completed its third year of seed collection from critically vulnerable alpine areas, and is laying the groundwork for a collecting and germination research program.

The work will support broader alpine vegetation research, conservation of alpine species and species recovery, where little is currently known. Understanding the effects of a changing climate through germination studies will help develop management strategies to ensure survival and adaptation in the wild.

A changing local climate is also inspiring best-practice water management strategies in the ANBG. To make the most of every drop, the ANBG introduced new soil moisture sensors to be used in conjunction with the computer controlled irrigation system that was commissioned in 2006. The sensors help staff understand how quickly the soil is getting wet and how deep the water goes. Staff members are monitoring water use more effectively and ensuring each area is watered at just the right level and the right time to meet plant needs.

Other water-saving initiatives already in place in the gardens include recycling water in the pond systems and nursery, minimising watering on lawns, and collecting water from buildings for the Growing Friends nursery.

The ANBG's achievements this year form a strong foundation for future work that will make a difference in response to climate change.

