

Australian National Botanic Gardens: Research areas

(for Honours, Masters or PhD projects)

Please contact the ANBG at ANBGadmin@dcceew.gov.au or the contacts below to discuss potential Honours, Masters, or PhD projects. Projects may involve more than one of the research areas/contacts listed below. The ANBG is uniquely positioned to contribute to plant conservation through its collection of 'living laboratories' including the National Seed Bank (NSB), plant production nursery, and cross-sector conservation partnerships. The ANBG holds the largest collection of Australian flora in the world.

National Seed Bank (NSB)

The NSB holds significant collections of native seeds for long-term conservation and undertakes seed biology research to enable optimal storage of seed, understand seed dormancy and ecology, and maximise germination to improve seed use efficiency. Research also extends to advanced ex situ conservation techniques such as cryo-storage and tissue culture to secure rare and threatened species with seeds that cannot be banked or that are difficult to propagate in horticulture.

- Seed biology; seed ecology; seed storage and germination physiology; plant conservation; functional seed traits – Lydia Guja, lydia.guja@environment.gov.au
- Plant conservation; seed biology; seed ecology; climate change impacts on plant regeneration from seed – Gemma Hoyle, Gemma.Hoyle@environment.gov.au

Horticultural research and ex situ plant conservation

The ANBG Nursery team applies specialised horticultural expertise to investigate the propagation and growing requirements of native plants, and to establish translocation-ready plant collections. This is largely undertaken in collaboration with state government and other partners. The nursery holds several plants species for which effective conservation will require investigations of species biology, population genetic structure, breeding systems, selection through cultivation, and community ecology.

Management of living plant collections presents some unique challenges and opportunities for site-based research. For example, living collections provide an opportunity to investigate physiological tolerances and resilience of plant species in different microclimates and potential future climate scenarios. Management of pests and diseases would benefit from more rigorous monitoring and reliable treatments. For example, establishing effective integrated management of common nursery pests, biological control of common pathogens such as soil fungi (e.g. *Armillaria* Root Rot) and *Phytophthora* die-back.

- Plant conservation, cultivation and ecology, translocation, population genetics, plant collection management, use of living collections in horticultural research – Zoe Knapp, zoe.knapp@environment.gov.au

Biodiversity informatics

The Biodiversity Informatics team supports the management of scientific collections by enabling the entry, curation, presentation and analysis of associated data. Nationally this team partners with other botanic gardens and the Atlas of Living Australia to integrate biodiversity datasets, which are delivered internationally to the Global Biodiversity Information Facility and other data exchange partnerships for systematic biological and conservation-based research.

Analysis of our extensive plant collection data could identify factors influencing plant persistence, collection composition (e.g. threatened or at risk taxa), succession planning and other aspects of living plant collection management. There is also scope to explore other areas such as our plant image collections, or to study taxonomy data management.

- Living collections data analysis – Anne Fuchs, Anne.Fuchs@environment.gov.au

Centre for Australian National Biodiversity Research (CANBR)

The CANBR is a successful long-term partnership between the ANBG and CSIRO. In this joint venture the ANBG cooperatively manages the Australian National Herbarium and conducts novel research into the taxonomy, systematics and conservation ecology of Australia's plant diversity.

- Threatened flora conservation; orchids. – Heidi Zimmer, Heidi.Zimmer@csiro.au
- Evolutionary ecology of plant-animal mutualisms; pollinator networks; ecological and evolutionary modelling, invasion ecology, population genetics, environmental DNA and biogeography – Francisco Encinas-Viso, Francisco.encinas-viso@csiro.au
- Molecular systematics and phylogenomics of fungi and lichens; soil crusts – Cécile Gueidan, cecile.gueidan@csiro.au
- Daisy systematics and phylogenomics; computer vision (AI) in identification and collection science – Dr Alexander Schmidt-Lebuhn, alexander.schmidt-lebuhn@csiro.au
- Taxonomy and nomenclature – Brendan Lepschi, Brendan.Lepschi@csiro.au

Other areas of interest to the ANBG include:

- to fill knowledge gaps in taxonomy (e.g. in Asteraceae, Fabaceae, Dilleniaceae), and the revision of contentious or understudied groups such as the eucalypts, Orchidaceae and Brassicaceae.
- Understanding the biology of rare and threatened plant species including seed biology, cultivation and genetic aspects.
- Understanding the ecology of rare and threatened plant species including drivers of species occurrence, regeneration and the role of associated organisms such as pollinators, herbivores, dispersers and symbionts.