



NSW DEPARTMENT OF  
PRIMARY INDUSTRIES

# Resources Research

The Resources Research branch of the Science and Research Division undertakes research into forest resources, salinity, catchment hydrology, soils, recycled organics, remediation technologies, climate science and irrigation to underpin profitable and sustainable primary industries.

## Forest Resources

Forest Resources research is undertaken in four areas.

- The **Forest Health** team undertakes research on the health of the State's 2.9 m ha native and planted forest estate worth an estimated \$1.5 billion. Staff undertake an annual survey of the plantation estate to identify pest, disease and nutrient problems. They prescribe remedial action, collaborate on breeding pest and disease resistant plants, detect and diagnose exotic incursions and potential outbreaks of pathogens and insect pests, and maintain nationally significant insect and fungal collections to aid in diagnosis.
- The **Forest Biodiversity** team delivers research and advice to measure and maximise biodiversity in planted and native forests. Staff quantify effects of forest management practices (logging, fuel-reduction burning, etc.) on fauna and flora, develop management guidelines and models for managing threatened species in forests, identify practical and reliable indicators of biodiversity, develop robust methods for assessing the ecological sustainability of forestry operations, and develop prescriptions for maximising biodiversity outcomes for native vegetation plantings in rural landscapes.
- The **New Forests** team undertakes research into the environmental services provided by planted forests in the areas of carbon sequestration, salinity management and land rehabilitation, in order to underpin the development of markets for environmental services. Staff develop methods to monitor and predict environmental services, identify appropriate species for salinity management and quantify their effect, quantify the carbon sequestration potential of forest plantings, quantify the fate of carbon in wood products based on life cycle assessment, and quantify the benefits of applying recycled organics to assist establishment of planted forest for mine site rehabilitation. They also

undertake research on possible adaptation strategies for Australian forests in response to climate change.

- **Farm Forestry** research identifies opportunities to undertake forestry in traditional agricultural systems in order to generate financial benefits for landholders, environmental benefits for the community and economic development opportunities for regional communities.

## Key research collaborations

CSIRO Forestry and Forest Products; CSIRO Land and Water; Cooperative Research Centre Forestry Limited; CRC Bushfires; various international forest and forest product research institutions; Australian Greenhouse Office; NSW Greenhouse Office; NSW Department of Environment and Conservation; NSW Department of Natural Resources; Catchment Management Authorities; Water and energy authorities; landholders; timber processors; Greening Australia; R&D Corporations, including Forest and Wood Products and the Rural Industries R&D Corporation; NSW Roads and Traffic Authority; the Mining Association; and a range of Australian and international universities.

## Catchment Hydrology

The **Salinity and Catchment Hydrology Unit** is responsible for research to quantify the paddock, farm and catchment scale impact of new and existing land use systems on water balance and productivity. It provides expertise to develop land use systems that are profitable and sustainable and undertakes research to quantify the impact of land use systems on water balance, salinity, agricultural production, natural resources and farm and catchment economics. Hydrology and economic models provide the tools to evaluate options for addressing land and water salinity at a range of scales.

## Key research collaborations

CRC Salinity; CRC Future Farm Industries; ACIAR; Catchment Management Authorities; R&D Corporations; other state agencies; CSIRO; Universities; and grower groups.

## Soils, Recycled Organics and Environmental Health

This program is divided into four research areas.

- The **Soil and Land Use** team undertakes soil survey and site characterisation for both research and commercial uses of agricultural and forest land.
- The **Soil Health** team undertakes research to protect and enhance the chemical, physical and biological fertility of soil resources that underpin agriculture and forestry production systems worth \$10 billion annually to NSW. Focus research areas include nitrogen management and legume use, soil structure and carbon management, management and movement of nutrients in a range of extensive and intensive agricultural systems, soil acidification processes and management, biological constraints to production, and managing erosion in high rainfall horticultural systems.
- The **Recycled Organics** team develops options for the sustainable agricultural and forest reuse of the large volumes of organic and inorganic waste products generated by urban communities which would otherwise be a disposal problem (garden and domestic waste, sewage sludge, food industry wastes, grease trap wastes, etc.). Research identifies technologies to process this material into reusable products, characterise the derived products and evaluates the impact of these products on agricultural and forest land and their potential to rehabilitate degraded or environmentally sensitive land. Research quantifies the presence of heavy metals or other contaminants and tracks the fate of any contaminants in the product chain. The program also helps regulators to develop policies and guidelines for the sustainable management or recycled organic and inorganic products.
- The **Environmental Health** team develops and implements new and recognised technologies to assess and remediate environmental contamination affecting primary industries. Research includes using a licensed technology, CALUX®, for quantifying dioxin contamination and determining the bioavailability of endocrine-disrupting chemicals in soils and sediments; modelling of metals such as cadmium in soils; quantifying the degradation of natural and artificial hormones in sewage and intensive animal wastes; assessing copper contamination in orchards; remediation of cattle tick dip sites; options for removing chemicals in runoff from intensive agriculture and evaluating novel options for sequestering carbon in soils.

## Key research collaborations

CSIRO; Australian Greenhouse Office; NSW Greenhouse Office; Catchment Management Authorities; Grains R&D Corporation; Cotton R&D Corporation; Rural Industries R&D Corporation; Land and Water Australia; Cotton Catchment Communities CRC; other state agencies in NSW, Queensland and South Australia; universities including Sydney, Western Sydney, New England, Southern Cross and Charles Sturt.

## Climate Science and Irrigation Research

The Unit has two key research focuses.

- NSW DPI undertakes research to mitigate against climate change (e.g. through carbon sequestration and reduced emissions) and to develop strategies to adapt to elevated atmospheric CO<sub>2</sub>, climate change and climate variability. The **Climate Science** team coordinates climate-based research across NSW DPI. It quantifies the biophysical and socio-economic impact of climate change and climate variability on NSW regions and primary industries, and coordinates the development of strategies and tools to help primary producers to adapt to those impacts.
- The **Irrigation Research** team is responsible for developing sustainable production systems for irrigated agriculture. Staff undertake research to improve the effectiveness of water used in irrigated agricultural systems through: assessing soil constraints and suitability for irrigation (for example, by using electromagnetic induction technology); measuring the water balance under cropping systems and regional and on-farm irrigation supply and drainage systems; evaluating the impact of using saline and sodic water; and monitoring water tables at a farm and district scale. Integrated hydrological and economic models are also developed to improve on-farm decisions about when and how much to irrigate and to assist with the evaluation of water management policy options.

## Key research collaborations

CRC for Irrigation Futures; CO2CRC; ACIAR; Catchment Management Authorities; R&D Corporations; CSIRO; universities; Bureau of Meteorology; Murray–Darling Basin Commission; State agencies in NSW and Queensland; producer groups; Australian Greenhouse Office; and NSW Greenhouse Office.

## Key contact

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