

Restoring Ecosystems

Sydney Olympic Park's once-degraded wetland and terrestrial ecosystems underwent extensive restoration works during the late 1990s in what was the largest land remediation exercise ever undertaken in Australia.

The high public profile and inflexible timeframe of the Sydney 2000 Olympic Games often referred to as 'Green Games' provided a strong social driver for fast-tracking these works and led to their integration with ecologically sustainable development initiatives occurring as part of the Games development.

The bid for the Games had included a set of environmental guidelines for implementation by host cities (Sydney 2000 Bid Limited 1993) based on sustainability principles adopted at the 1992 United Nations Earth Summit. They included commitments to the preservation and protection of natural ecosystems and endangered species, as well as energy and water conservation, waste minimisation, resource conservation and prevention of pollution.

The Park is located in a unique area in the centre of Sydney, 14 kilometres west of the central business district, and within the Parramatta River catchment of Sydney Harbour. The Park's estuarine habitats are part of a larger network of estuarine habitats along the Parramatta River, but its terrestrial habitats are virtually an island in ecological terms – surrounding urban development has resulted in physical disconnection from most other flora and fauna habitats in the region.

Restoration works were undertaken as part of a wider urban renewal project that created sporting, residential, commercial and recreational precincts across 760 hectares of land. This land was historically subject to extensive land reclamation works and to controlled and uncontrolled landfilling, and was the site of various government-owned intensive industries that closed in the 1980s.

Remediation and restoration works

The ecological component of the restoration works sought to rebuild functional naturalistic ecosystems within an urban parkland environment and involved:

- remediation of 160 hectares of contaminated land and the recovery, consolidation and on-site containment of nine million cubic metres of excavated waste
- restoration works to 100 hectares of remnant estuarine wetlands and 20 hectares of remnant eucalypt forest
- dechannelisation of two kilometres of estuarine creekline, converting it from a concrete stormwater drainage channel into a naturalistic tidal waterway edged by saltmarsh terraces
- restoration of tidal flushing to a 35 hectare land-locked estuarine wetland
- construction of new wetland, grassland, woodland and saltmarsh landscapes on remediated lands, with over eight million seedlings planted on both salvaged and constructed topsoils
- design, construction and establishment of new habitats for target flora and fauna communities, particularly the endangered Green and Golden Bell Frog and the endangered Coastal Saltmarsh community. A network of seventy frog ponds were built

over 90 hectares of land and linked by movement corridors and road underpasses. Saltmarsh terraces were built on the dechannelised banks of Haslams Creek to provide additional saltmarsh habitat.

The majority of these large-scale remediation works were undertaken between 1992 and 2001 at an estimated cost of AUS \$137 million (approximately AUS \$180,000 per hectare). Works were managed by New South Wales state government agencies.

Ecological underpinnings

Prior to remediation, the land now comprising Sydney Olympic Park was anecdotally regarded as having high biodiversity values despite a history of habitat alteration and industrial use, and its ecological isolation in urban surrounds. Site managers sought to integrate biodiversity conservation with site redevelopment. To assist this goal they established an expert review panel of professional ecologists and environmental scientists, and commissioned a suite of ecological studies to provide baseline information on the Park's flora and fauna.

Various ecological research programs, monitoring programs and field trials were established, including funding of a PhD study of Green and Golden Bell Frog ecology, the saltmarsh plant *Wilsonia backhousei*, and prevalence and impact of endocrine disruptors. Many Honours projects have been undertaken at the site.

Park ecosystem management continues to be underpinned by the advice of researchers, consultants, and other scientific experts. This involvement increased in 2009 with commencement of a five-year research program: Building sound restoration strategies for endangered amphibians, to be conducted in partnership with several universities and other government agencies.

Recent projects

Sydney Olympic Park Authority now manages the 640 hectare precinct that is Sydney Olympic Park. Habitat restoration and management works are an ongoing component of Park management. Recent projects include:

- assisted regeneration of an endangered remnant forest community including bush regeneration within the core forest, promotion of passive regeneration at the forest edge, propagation and planting of local provenance seedlings on degraded adjacent lands, and establishment of a 'demonstration garden' to showcase forest species in education and visitation programs
- restoration of remnant stands of endangered Coastal Saltmarsh, including primary weeding of large expanses of the weed *Juncus acutus* and removal of colonising mangrove seedlings from mapped saltmarsh habitats
- rehabilitation of saltmarsh terraces along the reconstructed estuarine Haslams Creek. Following successful field trials, mangrove mulch was mixed into the saltmarsh substrate and the area was rapidly colonised by saltmarsh seedlings
- refurbishment of ponds and plantings for the endangered Green and Golden Bell Frog, in an ongoing periodic disturbance management regime
- restoration of tidal flushing to the 'Waterbird Refuge', an altered estuarine wetland that provides habitat for migratory shorebirds protected under international intergovernmental agreements
- construction of fishways between estuarine and fresh water creek systems to enable fish passage from the Parramatta River estuary to upstream habitats in Lake Belvedere and Boundary Creek that were previously inaccessible due to road culverts

- ecological monitoring, research and adaptive management of remnant and constructed ecological systems
- recognition as one of the top 25 ecological restoration projects in Australia

Environment reports available from Sydney Olympic Park Authority provide further information on many of these projects.

Ecological outcomes

The success of the restoration works is seen in the improved condition of Sydney Olympic Park's habitats and the rich biodiversity that they now support. Over 300 hectares of the Park is managed as habitat for species and communities protected under environmental legislation. The Park's habitats support three endangered ecological communities, protected marine vegetation, over 180 species of birds, seven species of frogs, ten species of bats, 15 species of reptiles, many species of native fish, and thousands of invertebrate species. The original Green and Golden Bell Frog population has been conserved and two new satellite populations have established new habitats on remediated lands. Coastal Saltmarsh has increased in extent from 20 hectares in 2002 to 25 hectares in 2010. Migratory shorebirds have returned to feed and roost at the Waterbird Refuge.

Environmental awards

The restoration works have won several major environmental awards including:

- The United Nations Environment Program's Global 500 Award for Environmental Excellence (2001)
- Gold Banksia Award (2000)
- Banksia Award - Conservation of Flora and Fauna (2000)
- Rivercare 2000 Gold Award (2000)
- Energy Australia-National Trust Heritage Award - landscape conservation commendation - saltmarsh (2005)
- Energy Australia-National Trust Heritage Award – landscape conservation – Brickpit Ringwalk (2006)
- recognised as one of the top 25 ecological restoration projects in Australasia.

Extension and education programs

The parklands at Sydney Olympic Park attracted almost 2.5 million visitors in 2010–11 and more than 20,000 children participated in environmental education programs. Customised Technical Insight Tours and ecological professional development workshops (WET workshops) are also conducted at the Park.

Sydney Olympic Park is a 'best practice demonstration site' for the Green and Golden Bell Frog and for Coastal Saltmarsh. The demonstration sites project was established by the NSW Department of Environment and Heritage and the Sydney Metropolitan Catchment Management Authority to educate land managers and the community about the 'priority' threatened species and communities within the Sydney region and how to best manage them for conservation. Best practice management guidelines aimed at land managers have been produced for these species and communities. Interpretive signage has been installed and a series of technical and community field days are held each year.