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Griffith University Logan Campus – Environmental Arboretum

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Project Overview

In 2013 Logan City Council (LCC) applied for Australian Government funding and was successful with the submission to undertake the 'Slacks Creek Restoration Project' (SCRP). Slacks Creek is an important tidal tributary of the Logan River that has become degraded within a highly urbanized landscape and LCC has a long term commitment to restore the catchment.

LCC developed project partnerships with The Water and Carbon Group (WCG), Griffith University (GU), CSIRO and Logan City Golf Club as part of the submission which have continued throughout the delivery phase in 2014-15. The GU Logan Campus adjoins Slacks Creek as does the Golf Course which are key areas for restoration efforts to reinstate riparian corridor connectivity.

The Water and Carbon Group is the delivery partner, CSIRO provides water quality monitoring expertise while GU assists with fauna monitoring. LCC project manages and reports to the Australian Government.

This riparian restoration project covers 25 hectares of targeted reforestation and a stormwater wetland to increase both terrestrial and hydrological connectivity in Slacks Creek with broader objectives to improve water quality outcomes for the Logan River and Moreton Bay. The project will receive $1,595,897 from the Australian Government over a five year period.

2.6 hectares of GU area was initially nominated to increase the forest cover immediately adjoining Slacks Creek. The project team had the support from GU management to increase the reforestation boundaries to 8.09 hectares. The boundary adjustment now included the ridge that adjoins the campus and therefore greater opportunities to connect the project to the campus developed.

> The concept of an environmental arboretum was developed. The intent of the concept is a regional native tree collection embedded and buffered in biodiverse revegetation that will offer multiple land use benefits.

Concept Design: 'An Environmental Arboretum'

The increase in land availability enabled the project team to explore the opportunities of people using the forest in the future and enhancing access to Slacks Creek. The concept of an environmental arboretum was developed. The intent of the concept is a regional native tree collection embedded and buffered in biodiverse revegetation that will offer multiple land use benefits. Click here to see an overview of the Concept Plan.

The Arboretum focus will be a regional and cultural collection of key tree species that have Indigenous and European significance underpinned by the Queensland Government Regional Ecosystem Framework. For instance tree species that were logged for settlement in Logan including rainforest cabinet timber trees will be included. The Arboretum will also include rare and threatened species endemic to South East Queensland (SEQ) forming valuable ex-situ conservation as part of the living collection.

The project will remediate the currently degraded site which was cleared and has a recent pastoral history. It will activate the open space adjoining the remnant riparian zone while providing an arboreal asset for GU and the community that will have ecological, educational, amenity and passive recreational benefits.

Phase1 plantings after four months. Photo: Anna Markula

Ecological Planning: desk-top searches and field assessment

Once the land provision negotiations were finalized and the arboretum concept agreed on by stakeholders, ecological planning commenced that included both desk top searches and field-based assessments. As part of the desk-top assessment, numerous online searches were undertaken which provided important information for the project. The searches included:

- Aboriginal and European cultural heritage sites and significance
- Contaminated lands (e.g. asbestos materials, unexploded ordnance)
- Existing infrastructure (e.g. internal fences)
- Existing uses (e.g. community leases, agistment contracts)
- Vegetation mapping (remnant reference communities)
- Flood levels, waterway maps, significant wetlands (e.g. RAMSAR sites)

- Topographic contours and specialised soils (e.g. acid sulphate soils)
- Corridor mapping and iconic animal (e.g. koala) management plans
- Registers of threatened native fauna and flora, weeds, pest animals and marine plants
- Biosecurity concerns (e.g. fire ants, myrtle rust)
- Other items such as fire management considerations and location in specialized management districts (e.g. coastal areas).

The field based assessment investigated the historical disturbance regimes and the risks to project success. Risks that were evaluated on site included potential for browsing and vandalism along with seasonal and stochastic events such as drought, flooding and frost. Other key 'ground truthing' activities included:

- Linear infrastructure (e.g. powerlines, fences, access tracks)
- Remnant vegetation communities
- Soil assessment.

Integrated Arboretum and Restoration Design

Arboretum Zones and Pioneer Buffers

The site was mapped into different management zones based on the treatments required and the vegetation community to be reinstated taking into consideration the diversity of trees needed for the Arboretum.

The Arboretum will broadly represent three vegetation communities: open forest, dry rainforest and riparian rainforest in transitional zones that will integrate key tree species of these communities. The three communities will enable diverse tree stands to develop creating an ecotonal forest experience for the user.

The Arboretum zones will be more formally maintained in the future as curated or park-like spaces with interpretation efforts applied in these areas. Formative pruning and thinning of pioneer species will be undertaken as required. There will be an intensive mowing regime to optimize safe access and amenity to enable a diversity of users to experience the site. The Arboretum zones will be separated by pioneer buffer plantings.

The intent of the pioneer buffer plantings is to create a corridor planting adjoining Logan Motorway. Fast growing pioneer tree and shrub species were selected to ensure rapid site capture. This will assist with protection of the site from the prevailing southerly winds, providing a visual barrier to the motorway infrastructure and in future years assisting somewhat as an acoustic barrier. Pioneer plantings will also form internal corridors that will contrast to the curated spaces of the Arboretum zones and potentially increase site resilience to mitigate the incidence of pest and disease.

Remnant Brush Box – Subtropical Rainforest Cabinet Timbers

The southern entrance to the site is dominated by numerous remnant Brush Box *Lophostemon confertus*. The Brush Box community was immediately identified in the site assessment as significant due to age class, now veteran, and as they provide high habitat value due to hollows not only within the trunk and branches but also within the scaffold roots.

Beyond the Brush Box the cleared areas were nominated to be planted with tree species representative of subtropical rainforest cabinet timbers. The aim is to provide a specific collection of timber trees as many of these species are now restricted to fragmented patches of lowland rainforest. The Logan River and tributaries had a significant logging history throughout settlement.

Remnant Brush Box *Lophostemon confertus*. Photo: Dan Cole

Threatened Species: Angle-stemmed Myrtle & Richmond Birdwing Butterfly

Part of the restoration design in the riparian zone includes actions to assist in the conservation of rare and threatened native species Angle-stemmed Myrtle *Gossia gonoclada* and the Richmond Birdwing Butterfly *Ornithoptera richmondia*.

A few individuals of *Gossia gonoclada* occur along the creek bordering the project area appearing as a sub-canopy tree. It is currently listed as Endangered in Queensland (*Nature Conservation Act, 1992*) and nationally (*EPBC Act, 1999*). If possible seed will be collected and stock grown and planted during the five year period.

> There has been a concerted effort to establish corridors of Birdwing Vines throughout the region by the Richmond Birdwing Conservation Network (RBCN). Over 20 vines have been planted ... to provide potential food for the caterpillars when the butterflies deposit their eggs.

Although the Richmond Birdwing Vine hasn't been identified as occurring along the creek, the site is favourable as a subtropical rainforest patch to introduce the species. The Richmond Birdwing Butterfly occurs east of the escarpment from Kin Kin (Qld) south to near Grafton (NSW). The central part of its range in SEQ has seen a marked decline in occurrence of this rare butterfly partly due to the sparse existence of its larval food-plant, Birdwing Vines *Pararistolochia praevenosa*.

Hence, there has been a concerted effort to establish corridors of Birdwing Vines throughout the region by the Richmond Birdwing Conservation Network (RBCN).

Over 20 vines have been planted along Slacks Creek in Phase 1 to provide potential food for the caterpillars when the butterflies deposit their eggs.

(More information, fact sheets and ways to volunteer from www.richmondbirdwing.org.au) or emailing birdwing@wildlife.org.au.

Habitat Restoration: Glossy Black-Cockatoo

In the riparian zone there are two disturbed patches with varying levels of forest cover. To increase connectivity and enhance the habitat value a high density planting of Coastal Sheoak *Allocasuarina littoralis* was undertaken to create a connecting pathway and food source for the Glossy Black-Cockatoo *Calyptorhynchus lathami*. Once established this planting on the higher ground will adjoin the existing pure stands of Swamp Oak *Casuarina glauca* deeper within the riparian zone.

Species Lists and Plant Procurement

Once the management zones had been mapped and the vegetation community for each zone determined, detailed species lists were made. These formed the overarching plant procurement requirement.

The decisions on species selection were influenced by understanding the reference systems, the target density to reinstate the nominated community, proportion of strata, site specific considerations such as aspect and hydrology, and availability of tubestock.

The native tubestock for GU was ordered from four production nurseries approximately three months prior to planting. A phase 1 total of 7,032 plants were ordered for the allocated eight management zones comprising over 70 species.

Suitable species selection and successful establishment. Photo: Anna Markula

Site Design and Planting Methodology

It can take decades for a reforestation project to exhibit qualities of a reference vegetation system. Phased planting, instead of planting all individual plants at the one time was the preferred strategy to minimize risk and ensure floristic diversity.

The Phase 1 planting was dominated by robust pioneer and primary canopy tree species that are proven to perform. The Phase 2 planting will be an understorey enhancement introducing native shrubs, grasses, herbs and forbs along with difficult to establish species that will receive protection from the emerging Phase 1 canopy.

> A phase 1 total of 7,032 plants were ordered for the allocated eight management zones comprising over 70 species.

In the Arboretum zones the decision was made to plant the linear blocks in rows due to the scale of the project. The average 3 metre distance between each planted row allows access for water trucks, tractors, slashers and maintenance vehicles which is essential throughout a subtropical wet season. Planting density varied between each management zone and was informed by the canopy structure of the reference system.

Project Implementation

Site Preparation

Site preparation started in May 2014 for a spring planting. All management zones, access tracks and exclusion zones were staked on site. Slashing of exotic grass was undertaken several times so that site set-out could occur. In areas where exotic grass had the same function as native grass for bird habitat, these areas were excluded. Spraying was then undertaken at the specified densities in each zone.

One of the groups at the 2014 student-community planting. Photo: Dan Cole

Each planting circle was sprayed to approximately 400mm radius. Throughout the June to August period manual work was undertaken within the sensitive riparian areas. Access Community Services assisted within these zones as part of a program providing work experience to disadvantaged people, mostly Burmese migrants. The hard working group achieved much Lantana removal in the Brush Box zone.

Planting

In September 2014 the plant stock was delivered to site and allocated to each management zone. A professional planting team lead by former Canadian forestry planting contractor, Bruce Duguay, planted the stock in approximately five days. During the planting period a second team followed installing approximately 7,000 corflute tree guards.

Seasonal timeframes and targeting favourable weather conditions (e.g. wet season) are critical aspects of the implementation and very important to the success of the whole project. At GU there was enough soil moisture in September to undertake the planting. However conditions changed as SEQ experienced an extremely hot and dry spring. The planting quality and quality tubestock assisted establishment through a challenging period with only 3mm of rain received in October and 30mm in November. Throughout December and into January (2015) consistent rain occurred with over 400mm received.

Next Steps

Phase 1 has now successfully established ensuring an emerging arboretum in SEQ. In spring 2015 a Phase 2 enhancement planting will be undertaken to increase species diversity including understorey and rainforest species that require shade. Tree stock such as rare or threatened species that could not be planted in Phase 1 due to availability will now be incorporated.

Following on from a successful student-community planting last year another event is planned for spring 2015. The loop trail nominated as part of the Arboretum design needs to be realised. It will be set-out across the linear blocks of the Arboretum to create a walking circuit. To accompany the trail signage, wayfinding and interpretive feature nodes will be incorporated to form destinations on the circuit.

A master plan will be undertaken in 2015 to capture the 'as implemented' living collection detail and Arboretum layout. This will include all Phase 1 and 2 plantings along with the feature nodes and final loop trail layout.

The project team will also work with GU management to create more direct links to the Arboretum. Currently the connection is perhaps too stark, open and hot during summer. Specific advanced tree planting could guide people to an entrance while providing shade.

These strategies along with community engagement and more partnerships will assist the GU Arboretum to hopefully become a regional destination for Logan.

Central court of the campus with the Arboretum in the distance. Photo: Dan Cole