

Abstract:

Presentation Title: Effective public bushland land asset management and its role in the environmental sustainable operation of the City of Newcastle.

Stream: Policy and Planning

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Newcastle is at the mouth of the Hunter River and has grown from a small convict settlement mining coal in 1797 to a vibrant commercial and cultural City, with the largest constructed harbour and port in the Southern Hemisphere. Environmental challenges for maintaining Newcastle port include controlling sediment movement from the catchments and flood risks associated with low lying land adjoining the port. The environmentally sustainable commercial operation of this port is dependent on the effective asset management of the catchments draining to the Hunter River.

In Newcastle City, vegetation on land too steep for development and/or prone to coal mining subsidence is retained as bushland. This retained bushland provides some soil erosion protection during rainfall events. The effects of urbanisation increase the frequency of instream erosive flow volumes and velocities of stormwater flowing to the bushland. The NSW coast is subject to major storm and erosion events with Newcastle receiving more than 400 mm of recorded monthly rainfall in 15 events since 1862.

As a consequence of surrounding retained bushland patches by development, there are increases in soil nutrient and moisture levels especially along watercourses. These changes in soil nutrients result in changes in species composition. The resulting dense stands of exotic weed species such as *Ligustrum* spp. (Privet) and *Lantana camara* (Lantana) out-compete the deep rooted native trees and shrubs (Clements 1983, Rodd *et al.* 2010, 2016) and result in water spreading across creek banks further destabilizing both the landform and the native vegetation. Many of Newcastle's creeks have become highly degraded with banks dominated by exotic species, as indicated by the Newcastle Stream Assessment audit (2008).

There are 82 bushland parcels incorporated in Newcastle's Bushland Asset Register. Due to legislative requirements for environmental protection and ecological sustainability, the 82 public bushland assets have been assessed and priority rankings assigned. Ranking of the parcels influences the funding directed to conserving and enhancing native vegetation cover of these bushland assets.

For each bushland asset parcel, its pre-development environment, the development pattern and consequences of surrounding development contribute to its asset ranking. The pre-development attributes associated with Newcastle's erodible coal-measure soils include slopes and hazards such as mass movement and high water erosion identified by the mapped soil landscapes (Matthei 1995) as well as local knowledge. The post-development changes to the native vegetation structure and species composition, and the extent and distribution of weed invasion contribute to the asset ranking.

Integrated into the management of the bushland assets is the progressive protection of Council's creekline assets, with stormwater management and restoration of fully structured local native bushland in the riparian corridors. These works are not only directed to the control of weeds and restoration of native species, but to the management of creek inflows

from the surrounding developments and to the stabilising of creek beds and banks, particularly with awareness of the impacts of increasingly frequent rainfall events.

Of the catchments flowing to the port, the approximately 3,000 ha Throsby Creek Catchment is the most intensively urbanised, with a drainage network of headwater creeklines within bushland land parcels and an extensive pit and pipe stormwater network located within road reserves. The lower reaches of Throsby Creek are tidally influenced and form the deposition zone for transported sediment. This sediment lens is located approximately 1400 m upstream of the port and is now at a level where it is periodically exposed at low tide creating regularly reported odour and amenity issues. Hunter Water Corporation, Newcastle City Council, and Hunter Local Land Services engaged BMT WBM to investigate the catchment sediment sources, processes, composition, quantities, controls and prioritise initiatives, in particular to address diffuse sediment sources.

The investigation (BMT WBM 2017) indicates not only is the accumulation of this sediment an aesthetic problem, but the change in bathymetry, has resulted in a bottleneck in the creek flow which has led to an increase in flood risk for adjacent low-lying areas. Hydrographic surveys conducted in 2000, 2011, and 2016 have highlighted that during large rain events, such as the 2007 Pasha Bulka event, excess sediment has been flushed out of the tidal reaches of Throsby Creek and into the port, to its detriment as a working harbour.

Dredging of the confluence of the concrete-channelled Styx Creek with Throsby Creek may be a short-term, cost-effective solution. However it may not provide long term sustainable outcomes for catchment management. Application of Newcastle's asset management approach is a proactive, integrated approach to this problem rather than end of line, symptomatic response option, by addressing diffuse sediment before it can reach the downstream tidal depositional area of the catchment. Shifting our views to consider sediment as a catchment asset, such that we tailor effective catchment-wide creek and bushland restoration programs to improve the health and aesthetics of Newcastle's natural waterways and bushland parcels, would limit the primary pathways for sediment and potentially sources of sediment from creek channel bed and bank erosion.

Given the significant historical urbanisation of catchments, the retro-fitting of point discharges (currently strategically placed headwalls with rock lined energy dissipation outlets downstream of headwalls that discharge to urban creek lines) to better mimic natural waterways, also has the potential to reduce erosion and sediment transport within the Throsby creek network. Council has demonstrated that these outlets control volume, velocity, and flow characteristics that improve creek bed and bank resilience in large flow events and protect adjacent civil infrastructure.

Newcastle City views bushland and watercourses as environmental assets. The City's ongoing application of an integrated asset management approach within a catchment context provides a long-term ecologically sustainable element of the suite of measures needed to control sediment movement from the catchments to the port and to reducing associated flood risks to adjoining low-lying land.

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