Christopher Ives – PhD Abstract

Riparian corridors are highly valuable environmental assets in urban areas because of their role in protecting streams from nonpoint source pollutants, enhancing aquatic ecological function, encompassing high levels of biological diversity and promoting the movement of organisms throughout the landscape. For these reasons, local government authorities regularly establish policies to protect riparian corridors in the face of increasing urbanisation and anthropogenic impacts. One of the key components of these policies is the setting of minimum corridor widths in order to achieve various environmental outcomes.

In my PhD, I sought to establish the degree to which current width-based riparian policies effectively conserve biodiversity. To begin, I discussed the concept of biodiversity, its historical roots, and the challenges encountered when seeking to incorporate scientific data and knowledge to local environmental planning policy. From this foundation, I then pursued the central question of my thesis, namely “what is the relationship between urban riparian corridor width and biodiversity?”. In order to assess this, I sampled ant and plant communities from 18 riparian corridors in the Ku-ring-gai Local Government Area, Sydney, which spanned a range of widths from 3 m – 575 m.

Results from this study found that ant and plant species diversity was not related to corridor width, but that the assemblage composition of both groups was significantly different between wide and narrow corridors. The abundance of opportunistic ants and weedy plants contributed primarily to these differences. The changes observed were most likely due to the impact of stream-derived environmental disturbances and edge effects from the adjacent residential landscape. However, a large degree of variability in the data was observed that could not be explained by corridor width alone.

To investigate the source of this variability, I studied the relationships between a range of environmental factors and the biological data from the Ku-ring-gai sites. Perimeter-Area ratio of the reserve and the steepness of the slope perpendicular to the stream were identified as significant predictors of both ant and plant richness, while plant richness was also influenced by vegetation community type and corridor width. Interestingly, corridor width was found to be the best predictor of plant composition, but ant composition was driven more greatly by the proportion of adjacent road cover, vegetation type, and degree of reserve connectivity. Again, the dominance of weeds contributed greatly to the variability in plant data.

Finally, in response to the above results, I tested the influence of adjacent land use on riparian ant communities through assessing differences between ants in urban and rural catchments in northwest Sydney. Surprisingly, no significant differences in ant diversity or composition was observed between the contrasting land use types. Instead, ants appeared to be influenced most greatly by the dominance of weeds within the riparian zone.

This work highlights the complexity of biodiversity patterns in urban riparian systems. Although I identified a link between corridor width and the composition of ant and plant communities, the influence of other environmental factors suggests that environmental managers should not rely solely on setting minimum corridor widths to achieve ecological outcomes. Instead, a holistic, all-of-catchment approach is required that considers the
specific characteristics and threats of different riparian locations. Additionally, through active management of remnant riparian bushland that focuses on habitat quality and controlling weeds, it is likely that good ecological outcomes can be achieved across a range of riparian corridor widths.

List of Publications:


