Tree Succession Planning: Modelling Tree Longevity in Tuttangga/Park 17, the Adelaide Park Lands

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Abstract

Trees represent important living components in many urban parkland spaces. As living landscape entities, they have the capacity for potentially long life spans. As a result of these longevities, issues concerning tree death or senescence are not often engaged until the end of tree life spans have been reached, or are fast approaching. As organisms with finite life spans, tree senescence must be expected at some future point in time, and due consideration of this inevitable change is imperative within an urban parkland context. An understanding of tree longevity in urban parkland spaces must therefore be considered advantageous to subsequent design, management, and planning decisions enacted upon these landscapes. For appropriate decision-making to take place with regard to urban tree populations, figures reflecting expected tree longevity could purvey estimations of future tree senescence, and assist in providing practical information for all stakeholders of urban landscapes. In addition to this, developed models of parkland spaces supplying visual and spatial analysis of future tree senescence patterns could indicate potential landscape scenarios, and highlight tree populations most at risk of senescence within the near future.

The development of models predicting possible future tree senescence patterns required a review of various fields of research in order to establish appropriate models for use, and to assign confidence levels based upon the knowledge of tree growth, longevity, and senescence in predicted landscapes. This thesis examined the subjects of tree longevity and senescence, with a particular focus upon the Adelaide Park Lands region in Adelaide, South Australia. Various tree growth parameters were collected from the field and combined with assigned tree ages to create matrix models that represented expected tree growth trends. Through the incorporation of curves fitted to these matrix models, tree ages could be assigned to tree specimens of unknown age, to determine dates of establishment based upon key growth parameters. Tree longevity figures for each taxon were sourced from a peer reference group survey conducted specifically for this purpose. Through the combination of calculated tree age and predicted tree longevity, senescence patterns for a region of the Adelaide Park Lands were modelled. Interactive structured query-based GIS software was incorporated to display these senescence patterns visually, and to provide interpretations of future landscape scenarios.

Results obtained from the peer reference group survey provided a range of valuable figures representing expected tree longevities for 131 taxa from within the Adelaide Park Lands environment. These longevity figures, combined with matrix models and GIS simulations, revealed that considerable populations of established trees within Tuttangga/Park 17 in the Adelaide Park Lands are at a high risk of reaching senescence within the near future.

Declaration

This is to certify that:

1) This work does not contain material which has been accepted for the award of any other Degree or Diploma in a University or other tertiary institution and to the best of my knowledge and belief, does not contain material previously published or written by any other person, except where due reference has been made in the text.

2) I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

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Table of Contents

List of Tables

List of Figures