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

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Darren Peter

Adelaide

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# Table of Contents

Abstract ........................................................................................................................................... v
Declaration ....................................................................................................................................... vii
Acknowledgements ......................................................................................................................... ix
Table of Contents .............................................................................................................................. xi
List of Tables ...................................................................................................................................... xvii
List of Figures ..................................................................................................................................... xvii

## Chapter One: Introduction ................................................................................................................. 1

## Chapter Two: Change in Cultural Landscapes ..................................................................................... 9

1. Defining Cultural Landscapes ........................................................................................................ 9
2. Dealing with Change in Cultural Landscapes .............................................................................. 11
   2.1 The Community and Change ............................................................................................... 13
3. Conservation and Preservation ..................................................................................................... 14
4. Value of Trees in the Community .............................................................................................. 15
   4.1 Tangible and Intangible Benefits of Trees .......................................................................... 17
   4.2 Community Association with Trees ................................................................................... 17
5. Understanding Change in the Landscape ..................................................................................... 23
6. Types of ‘Time’ ............................................................................................................................ 25
   6.1 Space and Time .................................................................................................................... 27
7. Acceptance of Change in Cultural Landscapes .......................................................................... 28

## Chapter Three: Tree Longevity .......................................................................................................... 33

1. Introduction ................................................................................................................................... 33
2. Tree Senescence ............................................................................................................................ 34
   2.1 The Inevitability of Tree Senescence .................................................................................. 35
   2.2 Programmed Senescence in Trees ....................................................................................... 35
   2.3 The Environment as a Tree Longevity Determinate ............................................................. 37
   2.4 Balance in Tree Systems ....................................................................................................... 38
3. Trees as Generating Systems ......................................................................................................... 38
   3.1 Tree Physiology Changes over Time .................................................................................... 39
   3.2 Tree Defences and Structural Integrity ............................................................................... 41
   3.3 Post-maturity in Trees .......................................................................................................... 42
4. Human Intervention in Tree Longevity ......................................................................................... 44
5. Tree Longevity Figures from the Literature .................................................................................. 45
   5.1 Australian Tree Longevity Figures ....................................................................................... 48
6. Summary ......................................................................................................................................... 50

## Chapter Four: Non-Invasive Tree Age Determination Methods

### Part I: Extant and Expert Resources .............................................................................................. 55

1. Tree History Interpretation ........................................................................................................... 55
2. Extant Historical Records ............................................................................................................ 56
   2.1 Archival Written Records ...................................................................................................... 57
   2.2 Historical Maps, Plans, Lithographs and Paintings ............................................................... 58
   2.3 Historical Photographs .......................................................................................................... 60
   2.4 Aerial Photographs .............................................................................................................. 61
   2.5 Plaques and Monuments ...................................................................................................... 61
4.1.2.6 Historic Events..........................................................62
4.1.3 Tree Age Tables.............................................................62
4.1.4 Expert Estimation of Tree Age..........................................64
4.1.5 Summary (Part I)............................................................64

Part II: Growth Modelling and Tree Mensuration..............................65
4.2.1 Growth Models in Tree Age Determination.................................65
  4.2.1.1 Growth Models as Predictive Tools...................................66
  4.2.1.2 Common Parameters in Tree Growth Models........................68
  4.2.1.3 Modelling Growth Rates and Changes.................................69
  4.2.1.4 Linear Regression Analysis in Modelling..........................71
  4.2.1.5 Extrapolation in Models..............................................71
  4.2.1.6 Accuracy of Tree Growth Models......................................72
  4.2.1.7 Models as Simplified Systems........................................73
  4.2.1.8 Model Testing............................................................74
  4.2.1.9 Forestry and Urban Forestry Models Compared......................75
4.2.2 Parameters for Growth Modelling.........................................76
  4.2.2.1 Tree Girth and Diameter..............................................76
    4.2.2.1.1 Method for dbh Measurement..................................78
    4.2.2.1.2 Tree Diameter in Age Determination..........................78
  4.2.2.2 Tree Height and Canopy Span........................................83
4.2.3 Accuracy of Size-Age Relationships in Trees............................84
  4.2.3.1 Accuracy of Diameter-Age Relationships in Trees..................85
  4.2.3.2 Accuracy of Height-Age and Canopy Span-Age Relationships in Trees..........................................................88
4.2.4 Summary (Part II)..........................................................90

Chapter Five: Invasive Methods of Tree Age Determination.....................97
5.1 Dendrochronology............................................................97
  5.1.1 Definitions of Dendrochronological Terms.............................97
  5.1.2 Purpose of Dendrochronology..........................................99
  5.1.3 Methods of Dendrochronology.........................................99
    5.1.3.1 Tree Coring..........................................................99
    5.1.3.2 Tree Felling.........................................................100
  5.1.4 Accuracy of Dendrochronology.......................................100
    5.1.4.1 Cavities in Trunk Sections........................................101
    5.1.4.2 Slow Growth Rate Associated with Age.........................101
    5.1.4.3 ‘False’ and ‘Missing’ Rings......................................102
    5.1.4.4 Cross-dating Growth Rings........................................103
    5.1.4.5 Estimates of Ring Counts in Cultural Landscapes..............104
  5.1.5 Indigenous Australian Trees and Dendrochronology...................104
  5.1.6 Suitability of the Adelaide Plains Climate for Dendrochronological Study......................................................110
  5.1.7 Summary of Dendrochronology........................................110
5.2 Radiocarbon Dating..........................................................111
  5.2.1 Process of Radiocarbon Dating......................................111
  5.2.2 Accuracy of Radiocarbon Dating.....................................112
5.3 Miscellaneous Methods of Invasive Tree Age Determination..............114
5.4 Damage from Invasive Techniques.........................................114
5.5 Summary.................................................................116
Chapter Six: Adelaide Park Lands History

6.1 Pre-European Vegetation of the Adelaide Park Lands

6.2 Origins of the Adelaide Park Lands Design

6.3 Early Colonial Changes to Park Lands Vegetation

6.4 Tree Planting in the Adelaide Park Lands

6.5 Tuttangga/Park 17 Extant Tree Planting History

6.5.1 Pre-European Vegetation of the South Park Lands

6.5.2 Post-Colonial Tree Planting in Tuttangga/Park 17

6.5.3 Tuttangga/Park 17 Extant Photographic Records

6.5.4 Summary of Tuttangga/Park 17 Tree Planting Records

6.6 Summary of Extant Historical Data

Chapter Seven: Method

7.1 Method Overview

7.2 Field Survey of Tuttangga/Park 17 Trees

7.2.1 Tuttangga/Park 17 Site

7.2.2 Permit to Undertake Scientific Research

7.2.3 Fieldwork Equipment

7.2.3.1 Field Maps

7.2.3.2 Field Data Spreadsheets

7.2.3.3 Diameter Tape

7.2.3.4 Height Measuring Staff

7.2.3.5 Field Data Recording Equipment

7.2.3.6 Safety Equipment

7.2.3.7 Vegetation Sample Collecting Equipment

7.2.4 Field Survey Data Capture

7.2.4.1 Locating Spatial Positions

7.2.4.2 Unique Tree Identification Number

7.2.4.3 Taxonomic Data

7.2.4.4 Diameter at Breast Height

7.2.4.5 Tree Height

7.2.4.6 Canopy Span

7.2.4.7 Health Status

7.2.4.8 Sample Number/Notes

7.2.5 Sample Collection and Identification

7.2.6 Field Survey Data Entry

7.3 Tree Age Determination in Tuttangga/Park 17

7.3.1 Extant Historical Tree Age Data

7.3.2 Expert Estimation Tree Age Data

7.3.3 Dendrochronology

7.4 Tree Longevity Figures from Peer Reference Group Survey

7.4.1 Assemblage of Peer Reference Group Respondent List

7.4.2 Survey Design

7.4.3 Method of Survey Distribution

7.4.4 Tree Longevity Primary Data Collection and Analysis

7.4.5 Returning Primary Data Results to Respondents

7.5 Tree Longevity Projections

7.5.1 Tree Age Matrix Models

7.5.2 Point Matrix Model Construction Method
7.5.3 Matrix Model Testing Using Waite Datasets .......................... 168
7.5.4 Matrix Models for Tree Age Determination .......................... 169
7.6 GIS Model Construction ......................................................... 169
  7.6.1 Creating the Georeferenced Base Map ................................ 170
  7.6.2 Constructing the Field Data Shapefile ............................... 170
  7.6.3 GIS Data Entry ............................................................. 171
  7.6.4 GIS-Based Simulation .................................................. 172
7.7 Summary .............................................................................. 172

Chapter Eight: Results .................................................................. 175
  8.1 Results Overview ............................................................... 175
  8.2 Tuttangga/Park 17 Field Survey Results .................................. 176
  8.3 Tuttangga/Park 17 Tree Age Determination Results .................... 177
  8.4 Peer Reference Group Tree Longevity Survey Results .................. 178
  8.5 Tree Growth Modelling and Longevity Projection Results ............. 184
    8.5.1 Tuttangga/Park 17 Models .............................................. 184
    8.5.2 Waite Arboretum Models .............................................. 185
    8.5.3 Model Testing and Comparison ...................................... 185
  8.6 GIS Simulation ................................................................. 185
  8.7 Summary ............................................................................. 189

Chapter Nine: Discussion and Conclusions .................................... 191
  9.1 Introduction ......................................................................... 191
  9.2 Discussion of Tuttangga/Park 17 Field Survey ............................ 191
    9.2.1 Spatial Positioning of Trees .......................................... 191
    9.2.2 Park 17 Field Survey as a Taxonomic Inventory ................. 192
    9.2.3 Suitability of Park 17 Specimens for Tree Growth and Longevity Modelling ......................................................... 193
    9.2.4 Size Statistics of Tree Population ................................... 193
    9.2.5 Health Statistics of Tree Population ................................. 194
  9.3 Discussion of Tree Age Determination Methods from Tuttangga/Park 17... 195
    9.3.1 Extant Historical Tree Age Data Used .............................. 195
    9.3.2 Expert Estimation Tree Age Data Used ............................ 198
    9.3.3 Dendrochronological Data Used .................................. 198
  9.4 Peer Reference Group Tree Longevity Survey Discussion .............. 199
    9.4.1 Survey Design ................................................................ 200
    9.4.2 Assembling Peer Reference Group Respondent List .............. 200
    9.4.3 Response Rate of Tree Longevity Surveys ......................... 201
    9.4.4 Tree Longevity Figures from the Surveys Returned .............. 201
    9.4.5 Tree Longevity Responses and Comments from the Surveys .... 202
    9.4.6 Use of Self-Administered Surveys .................................. 204
    9.4.7 Changes in Tree Longevity Surveys ................................. 205
  9.5 Discussion of Tree Growth and Senescence Modelling .................. 206
    9.5.1 Tree Growth Models and Curve Fitting ............................ 206
    9.5.2 Regression and Correlation in Matrix Models ..................... 208
    9.5.3 Possibility of Trees Surviving Beyond Predicted Longevity .... 209
    9.5.4 Possibility of Trees Not Reaching Predicted Longevity .......... 210
    9.5.5 Model Testing and Tree Growth Comparisons with Waite Data ... 211
  9.6 Discussion of GIS in Tuttangga/Park 17 Tree Senescence Modelling ... 212
    9.6.1 Representation of Change in GIS Modelling ...................... 213
Appendix 25: Past Planting Dates and Number of Trees Planted for Taxa: Modelled Using Tree DBH/Height/Canopy Span
Appendix 26: Growth Models for Calculating Tree Age from Tree DBH/Height/Canopy Span for Desert Ash (*Fraxinus angustifolia* subsp. *angustifolia*) with Extant Historical Tree Age Data Averaged
Appendix 27: Examples of Tree Growth Models with Curve Extrapolation
List of Tables

Table 6.1: Recommended Tree Planting List from Brown (1880) ........................................ 142
Table 7.1: Climate Statistics for the City of Adelaide (Kent Town weather station) for the 30-year period between 1977 and 2007 ........................................ 151
Table 7.2: Tree health levels recorded in the Park 17 tree survey .................................... 160
Table 7.3: List of ‘fields’ used as attributes to contain separated data for trees surveyed in Park 17 ................................................................. 161
Table 7.4: List of ‘field’ names (coded numbers) used to describe tree attribute observations (notes/comments) recorded in Park 17 trees surveyed ........................................ 162
Table 8.1: Total number of trees, shrubs and palms surveyed in Park 17 ..................... 176
Table 8.2: Numbers of tree, shrub, and palm taxa obtained from the Park 17 Field Survey ........................................................................ 176
Table 8.3: Park 17 field survey results: Miscellaneous field observations of Interest ...................................................................................... 177
Table 8.4: Summary of tree age determination methods used per taxa ....................... 178
Table 8.5: Summary of tree ages determined per taxa .................................................. 178
Table 8.6: Quantity of Park 17 Trees able to be modelled with both establishment and senescence dates from the entire Park 17 GIS modelled tree population .............................................................. 186

List of Figures

Figure 1.1: Diagram of method proposed to model tree growth and predict tree senescence in the Park 17 landscape ......................................................... 4
Figure 2.1: Map of Australia, showing location of the city of Adelaide .................. 18
Figure 2.2: Map of the city of Adelaide, showing the Adelaide Park Lands within direct supervision of The Corporation of the City of Adelaide Council (highlighted), and with Park 17 (highlighted) ........................................ 19
Figure 4.1: The City of Adelaide from Mr. Wilson’s Section on the Torrens, June 1845, by George French Angas .................................................. 60
Figure 4.2: Representation of a sigmoid growth curve .............................................. 70
Figure 6.1: Section of Townsend Duryea’s 1865 panorama .................................. 127
Figure 6.2: Image from Duuryea’s 1865 panorama with Park 17 highlighted ........ 140
Figure 6.3: John Ednie Brown’s (1880) Planting Plan for Park 17 ..................... 143
Figure 7.1: Diagram of method process used to model Park 17 trees ................. 149
Figure 7.2: Aerial Photograph of Park 17 taken in 2002 .................................... 151
Figure 7.3: Lufkin Artisan Diameter Tree Tape C106TPM .................................. 155
Figure 7.4: Brookeades Tree Height Measuring Staff AUST 54/561 .................. 155
Figure 7.5: Measuring trunk DBH using the Lufkin Artisan Diameter Tree Tape .......................... 158
Figure 7.6: Measuring tree height in the field using the height measuring staff .... 159
Figure 7.7: Photograph of growth ring counting on felled tree stump in Park 17 .... 164
Figure 8.1: Bar Graph 1: Mean tree longevity figures arranged from longest to shortest .......................................................... 179
Figure 8.2: Bar Graph 2: Mean tree longevity figures arranged from longest to shortest .................................................................................. 180
Figure 8.3: Bar Graph 3: Mean tree longevity figures arranged from longest to shortest ........................................................................ 181
Figure 8.4: Bar Graph 4: Mean tree longevity figures arranged from longest to shortest

Figure 8.5: Bar Graph 5: Mean tree longevity figures arranged from longest to shortest

Figure 8.6: Graph of exponential model used to determine tree age from DBH for *Eucalyptus camaldulensis* var. *camaldulensis* (River Red Gum) in Park 17

Figure 8.7: Modelled image from ArcScene representing the year 2006

Figure 8.8: Modelled image from ArcScene representing the year 2050

Figure 8.9: Modelled image from ArcScene representing the year 2100

Figure 8.10: Modelled image from ArcScene representing the year 2200

Figure 9.1: Hypothetical image from ArcScene representing the year 2050

Figure 9.2: Hypothetical image from ArcScene representing the year 2100

Figure 9.3: Hypothetical image from ArcScene representing the year 2200