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**Management of the plant collection  
at the Eastwoodhill Arboretum**

**Volume I**

**A thesis presented in partial  
fulfilment of the requirements  
for the degree of**

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## Abstract

Eastwoodhill Arboretum at Ngatapa, near Gisborne, New Zealand, was developed by the late William Douglas Cook (1884-1967). Between 1920 and 1960, Cook planted an extensive range of exotic woody trees, shrubs and climbers throughout 65 hectares of the 130 hectare property. Considered by many to be an important collection in New Zealand, the Arboretum deteriorated during Cook's latter years due to diminishing time and resources for maintenance. An Act of Parliament in 1975 established the Eastwoodhill Trust Board and empowered them to 'maintain and develop the property as an arboretum'. Under the Board's direction, a clearing strategy was initiated to solve the problems of overcrowding and poor plant condition in the Arboretum and to establish a catalogue of the collection.

To meet their obligations under the Act, the Trust Board had to focus their management on the plant collection. The biological value of the Arboretum had to be sustained, particularly with respect to issues of conservation and biodiversity. The visual value of the Arboretum, an important factor for attracting public support, had deteriorated and required intervention. Moreover, as the landscape of the Arboretum was not a natural system and lacked self-regulating processes for renewal of important plants or plant groupings, systematic management was needed to sustain the collection within this human-made landscape. The Trust Board's efforts to address these issues were hampered by a lack of resources and appropriate data.

This research reports the results of an extensive landscape management study of the collection and develops and characterises the data and management processes needed for long term management of the biological value of the Arboretum. Although management frameworks and processes for landscape management have been reported in the literature, most operate at scales inappropriate for single sites and none focus upon the human-made landscape of an arboretum. Thus, while common characteristics of these processes (e.g. inventory, evaluation, development of goals and strategies) provided a basic framework, their application to an arboretum required development.

A complete and current inventory of the plant collection was made. The Arboretum was mapped at 1:200 using a grid square method, and a catalogue formed listing every plant in the collection. A second catalogue recorded the extensive range of accessions that had previously been in the collection but which no longer existed. In addition, about 1200 herbarium samples were made, two potential database formats developed for the data, and a record of management history formulated.

Although the inventory showed that the collection was extensive, its importance could only be established through an evaluation. As an extensive literature search failed to locate a suitable

process for evaluating a plant collection on a single site, a novel process was proposed that evaluated the site using two key concepts, significance and condition, and linked this evaluation to the goals of the Arboretum. Significance, a measure of the importance of a site according to selected landscape values, was determined using various indicators of diversity and rarity. Analysis revealed that Eastwoodhill was the most significant collection of its type in New Zealand, with 1666 species and 962 cultivars of trees, shrubs and climbers, of which 73% were of northern hemisphere origin and 41% of Asian origin. Eighty percent of species and cultivars in the collection were not readily available from commercial sources in New Zealand, and 102 species were on world conservation lists. These data were used to identify the most significant genera in the collection. The second concept, condition, measures health (in the broadest sense) of the site using such indicators as age, density, and maturity. Measurements of age and density showed that condition of the collection was below optimum. Moreover, plant death, particularly of short lived species, had changed the composition of the collection to the extent that about 53% of the plants collected by Cook no longer existed.

The evaluation process also revealed that while the collection had the potential to meet existing goals, condition was not ideal and unless it was improved significance could be lost. This interaction between significance and condition led to the proposal of a new concept for 'landscape category' as a framework for describing the relationship between the two factors. Four categories, each requiring different management actions, were derived and discussed. The mission of the arboretum indicates which category is required, while the evaluation data show which category actually applies. To achieve the role of an arboretum in the long term Eastwoodhill needs to be a category one landscape (i.e. significant and in good condition), but is currently in category two (i.e. significant but with condition below par). This discrepancy between actual category and required category indicated the subsequent management action necessary to bring the Arboretum to category one status.

The second new concept arising from this research was developed as part of the processing stage of the evaluation. As Eastwoodhill is an arboretum, and biological value underpins its primary purpose, both biological significance and condition must be excellent. But vegetation also has aesthetic values, particularly visual qualities, and these play an essential role in many of the human values associated with arboreta. Landscape management paradigms were established to provide a framework for managing the balance between biological and visual value of a site. The paradigms describe a hierarchy for managing the interplay between biological and visual values, and can be configured for either value in the primary position. This concept provides a framework for integrating values and prioritising subsequent management actions. The evaluation data,

landscape category, and landscape management paradigms were used to propose management actions and priorities for those actions.

Three workshops were conducted during the course of this research to address a series of collection management issues. Conducted using a systematic management approach, the workshops involved a panel of experts using the data from inventory and evaluation to prepare three reports outlining plans and decisions for short and long term management of the plant collection. An important long term outcome was an assessment of the collection using botanical and aesthetic rating scales to determine the intrinsic importance of the genera in the collection. These data were used to identify the 'key' genera that would form the focus of collection development and to determine roles for the Arboretum. Detailed operational plans for three parks and two key genera within the Arboretum were also prepared during the workshops. Park plans covered objectives for the park, composition of the park, botanical and aesthetic importance of plants in the park, and future development strategies. Genus plans covered composition of that genus in the collection, status of key plants in the field, and future development policies. A key feature of park and genus plans was a system of rating scales used to determine plant status and prioritise management decisions. Development of park and genus plans led to a proposal for a method for vegetation management in human-made landscapes.

Overall synthesis of the management process led to a proposal for a model for management of a plant collection that could be applied to Eastwoodhill and other plant collections. Understanding of the underpinning principles allows the model to be readily adapted for application to other landscapes.

keywords: arboretum management, botanic garden management, landscape evaluation, landscape inventory, landscape management, plant collection, vegetation management.



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**List of abbreviations**

BGCI	Botanic Gardens Conservation International
CBA	Cost Benefit Analysis
dbh	Diameter at breast height
EIA	Environmental Impact Assessment
FRST	Foundation for Science, Research and Technology
GIS	Geographic information system
GPS	Global positioning system
IDS	International Dendrology Society
ITF	International Transfer Format
IUCN	International Union for the Conservation of Nature and Natural Resources
NCCPG	National Council for the Conservation of Plants and Gardens (Britain)
RNZIH	Royal New Zealand Institute of Horticulture

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