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## Auckland's Urban Forests, Functions and Designs

### Introduction

The Landscape Architecture programme at Unitec, Auckland, New Zealand, is increasingly incorporating ecological components into urban designs and some students are addressing issues of landscape ecology, where interventions at the local scale are intended to have positive ecological outcomes at the wider landscape scale where ecological functioning often occurs e.g. pollination and seed dispersal, population sustainability.<sup>1</sup> In fragmented urban landscapes these landscape designs have an important contribution to addressing the issues of urban biodiversity conservation. This paper overviews the current patchiness of the vegetation in urban Auckland City, and introduces a range of Bachelor of Landscape Architecture student designs that focus on landscape ecology issues.

### Auckland context

If you are a visitor to Auckland, you may have been taken to the top of Maungawhau (Mt Eden), one of the 48 volcanoes in the Auckland region one of the tallest and the closest to the Central Business District (CBD). You may notice from here the harbour and the gulf islands, other volcanoes dotted around the isthmus and beyond, and, despite being within a couple of kilometres of the CBD, the greenness of the surrounding urban and sub-urban landscape – the threads of urban forest.

Auckland's Maori name is Tamaki Makaurau '*Tamaki desired by many*<sup>2</sup>, and the city is the most populated in New Zealand. It was relatively heavily populated by Maori more than 800 or so years ago<sup>3</sup> and provided rich kai moana (seafood) and good quality horticultural soils. The volcanoes were important vantage points for defence and were well-drained sites for food storage. After colonisation occurred in early 19thC, Swainson, New Zealand's first Attorney General in 1841, described

the climate as '*more temperate in summer and milder in winter – compared with Nice – one of the world's most celebrated continental climates – more limited in temperature range and less sudden changes, and longer warm season*<sup>4</sup>. Because of these various characteristics, it still rates as one of the best cities in the world to live in.<sup>4</sup>

Before Maori arrived Auckland was more or less covered in forest<sup>5</sup>, although it may have looked patchy, because every new volcano would have covered the forest with lava or ash and set it alight, causing a return to earlier stages of successional growth. The effect of the volcanic activity was to cover the sedimentary soils in places with lava rock or volcanic ash, and this has created a complex of soil types in the city, and provided a new medium privileging some species more than others, contributing to the patchy mosaic of vegetation.

When Europeans arrived in the 19th Century most of the forest in Auckland isthmus had disappeared due to continual Maori burning. By the time of the first European settlement in 1840, most Maori had been driven out a few decades before by Northern tribes with muskets, and this abandoned landscape had become overgrown. In 1843 the Auckland Agricultural Society describes the isthmus city area '*about one-fourth of the district presents a more level surface, being covered with dwarf manuka, fern, and shrubs... about one-half ...., consisting of undulating ground, is covered in fern and ....possesses a soil of a rich yellow clay, mixed with sand and charred vegetable matter, owing to the frequent burning of the fern, which when broken up and exposed to air, soon pulverised into a fine, rich loam.*<sup>6</sup> In response to regular fire the pioneer species manuka (*Leptospermum scoparium*) covered poorer clay soils and bracken fern (*Pteridium esculentum*) the more fertile volcanic soils. The reminder of the district was covered in native grass with a small portion in trees. Because Cook's Endeavour sailed by in 1769 during a storm and missed the harbour entrance, we don't have earlier written records of Auckland's vegetation from botanists Banks and Solander, who had recorded vegetation in other areas of NZ during this voyage.

During the Maori occupation, good forests had survived beyond the isthmus especially on poor clay soils of west Auckland and North Shore. On the arrival of Europeans these were systematically logged for timber to build houses and, in the mid 19th Century, formed 30%

1 Forman 2008.

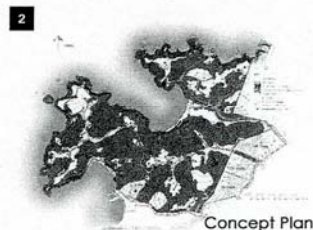
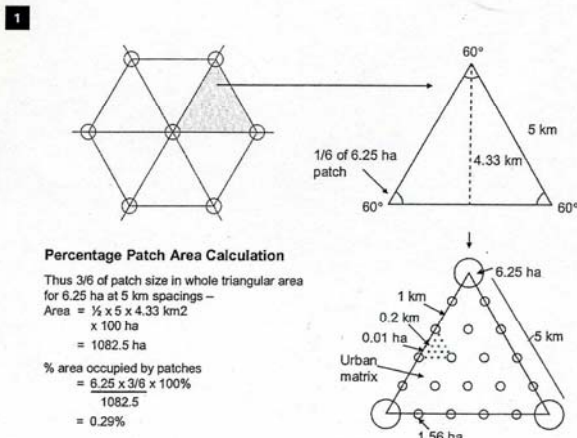
2 Cameron, Hayward and Murdoch 2008.

3 Ibid.

4 Business Week

5 Cameron, Hayward and Murdoch 2008.

6 Swainson 1853.



of the export trade. Patches of these logged areas have regenerated after timber extraction while some areas were farmed and later were either abandoned and regenerated, or were developed for housing. The expansion of the city has impacted on the percentage of forest remaining. While most remnant regenerating forest has protected reserve status, some patches of regenerating forest are awaiting a designated use, (e.g. the now rare gumland manuka forest in the city's cemetery), and are therefore likely to disappear unless their importance is prioritised.

Despite the centuries of disturbance there are populations of large trees surviving in inaccessible places such as steep cliffs or in deep moist gullies on the urban isthmus. Within one kilometre of the CBD, Grafton Gully forest survived until the motorway development in the 1960s leaving only a few individual native trees amongst the exotic plantings. As well, some of the lava flows, such as that from Mt Eden, were very rocky and fairly inaccessible, allowing forest to survive there while the city was built around.

The 50ha rock forest beside Mt Eden is thought to be similar to what Maori may have experienced on their arrival<sup>7</sup>. Large titoki (*Alectryon excelsa*), puka (*Griselinia lucida*), and puriri (*Vitex lucens*) trees grow tall in this rock, that is the result of Mt Eden eruption 19,000 years ago. Only a portion of this 50ha forest remains and two small patches of about 1ha each are reserved. The remainder of this forest exists across the suburban landscape in private properties with houses amongst the trees. James Wallace, one of the city's major art patrons, has integrated his art collection within the forest of his residence. In 1979 Millener a local botanist suggested that 'this unique and very beautiful association is almost

certain to disappear within a generation or so.'<sup>8</sup> One generation on from that comment, and much of the forest is still here but has variable management, and one species in particular has almost disappeared from the canopy in that time, and understorey regeneration is less likely with private owners will to 'garden'. The local council have zoned it 'to protect the spacious and tree-filled qualities of sites characterised by generously sized plots.'<sup>9</sup> Another inaccessible landscape that has retained some original vegetation is the coastal cliff habitat fringing the two harbours, which is a dynamic crumbling environment that the pohutukawa, a long-lived coloniser, is adapted to. Auckland has a long coastline with considerable stretches covered in trees.

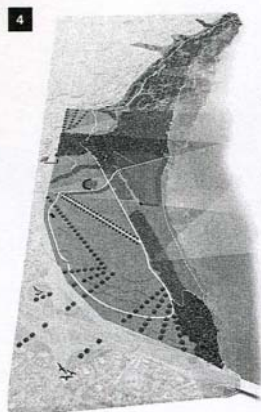
We now have a responsibility and a will to protect our local biodiversity. Birds are our focal animals because in New Zealand, where we have been isolated for so long, we have no indigenous mammals apart from two tiny bat species. The kereru (*Hemiphaga novaeseelandiae*), a large woodpigeon, is one of our iconic species, with a gape (mouth opening) larger than other local species and therefore the only disperser of the large-fruited natives such as karaka (*Corynocarpus laevigatus*) and taraire (*Beilschmiedia tarairi*) which are important canopy species of Auckland forests. These birds need large continuous habitat to breed but may move across a patchy landscape for food. They visit the lava forest in Mt Eden and the alluvial patch on the North Shore – both patches have mature trees and good food rewards. The more common younger forest reserves often don't provide enough food, and are not tall enough, or are too distant to attract woodpigeons. It may be a century or more before the trees which provide rich food sources mature.

<sup>7</sup> Smale and Gardner 1999.

<sup>8</sup> Millener 1979.

<sup>9</sup> Auckland City Council 1999.





1 Urban Greenspace Model by C Meurk & G Hall 2 Waiheke Island Matiatia landscape design by D J Scott 3 Waiheke Island design outcome by Dennis Scott 4 Ecological Connections greenfields landscape design by Jeremy Parlane 5 Ecological Connection design detail by Jeremy Parlane

In the urban context, the reserves are not sufficient habitat and food sources without the support of the urban matrix – such as street trees or tall trees on private property. The biggest threats to both native plants and birds are from mammalian pests, lack of seed dispersers such as the woodpigeon (which are also affected by mammalian predation), and urban intensification where large trees are seen as problematic. Landscape design has a role to play in enhancing habitat and connectivity for local biodiversity.

#### Landscape Design Models

Meurk & Hall<sup>10</sup> have developed a spatial model for increasing biodiversity and ecological health in the New Zealand urban context. They suggest a configuration incorporating three forest patch sizes with the largest patch at least 6ha, large enough to provide some habitat for many indigenous species such as kereru, and have these placed at 5km intervals. Between these are medium-sized patches of 1ha at 1km spacings with clumps of tall trees every 200m. [FIGURE 1]

If we look at the distribution of indigenous forest in the Auckland isthmus, there are six large patches (>6ha). Four coastal forest patches are close together and the other two are within 5km, including the Mt Eden lava rock forest. There are other large areas with significant large trees that are either naturalised exotic/native mix in neglected gullies, or patches of large planted trees in public parks. The latter contribute to the forest connectivity, acting as stepping stones for wildlife moving between indigenous patches.

Landscape architects are increasingly designing in ways that privilege indigenous biodiversity compared to past practise. The subdivision on Waiheke Island

[FIGURE 2 & 3] has converted marginal farmland into lifestyle blocks that integrate covenanted revegetation. This design by Dennis Scott<sup>11</sup> is being used as a model for other greenfield developments in New Zealand. Increasingly, Landscape Architecture students are also integrating biodiversity into their urban designs for a range of scenarios.

#### Student landscape designs

Jeremy's site<sup>12</sup> is a large park development (83Ha) in West Auckland – a greenfield development. He has used the Meurk & Hall urban vegetation patch model to look at the site in relation to the large patch patterns existing in the broader landscape, and has incorporated a 10ha patch into his design in order to fill a gap at the 5km scale, while still retaining social connectivity and significant views from the site. The size and location of this significant habitat patch within the site is a strategic intervention for functional ecology at the landscape scale, while providing a variety of experiences for the park users [FIGURE 4 & 5].

Jane's site<sup>13</sup> is an urban brownfield development, the old brewery site that is planned for mixed use commercial, retail and residential and is adjacent to a highly intensified retail/commercial zone. It sits between the Mt Eden lava rock forest and the city. Jane's aim is to connect the Mt Eden forest to the gully forests adjacent to the CBD. Her mixed-use design [FIGURE 6 & 7] incorporates a small forest patch amongst the retail and commercial buildings on the site with habitats for small birds and lizards, some tall trees that can be seen by birds from a distance and used for perching, and some

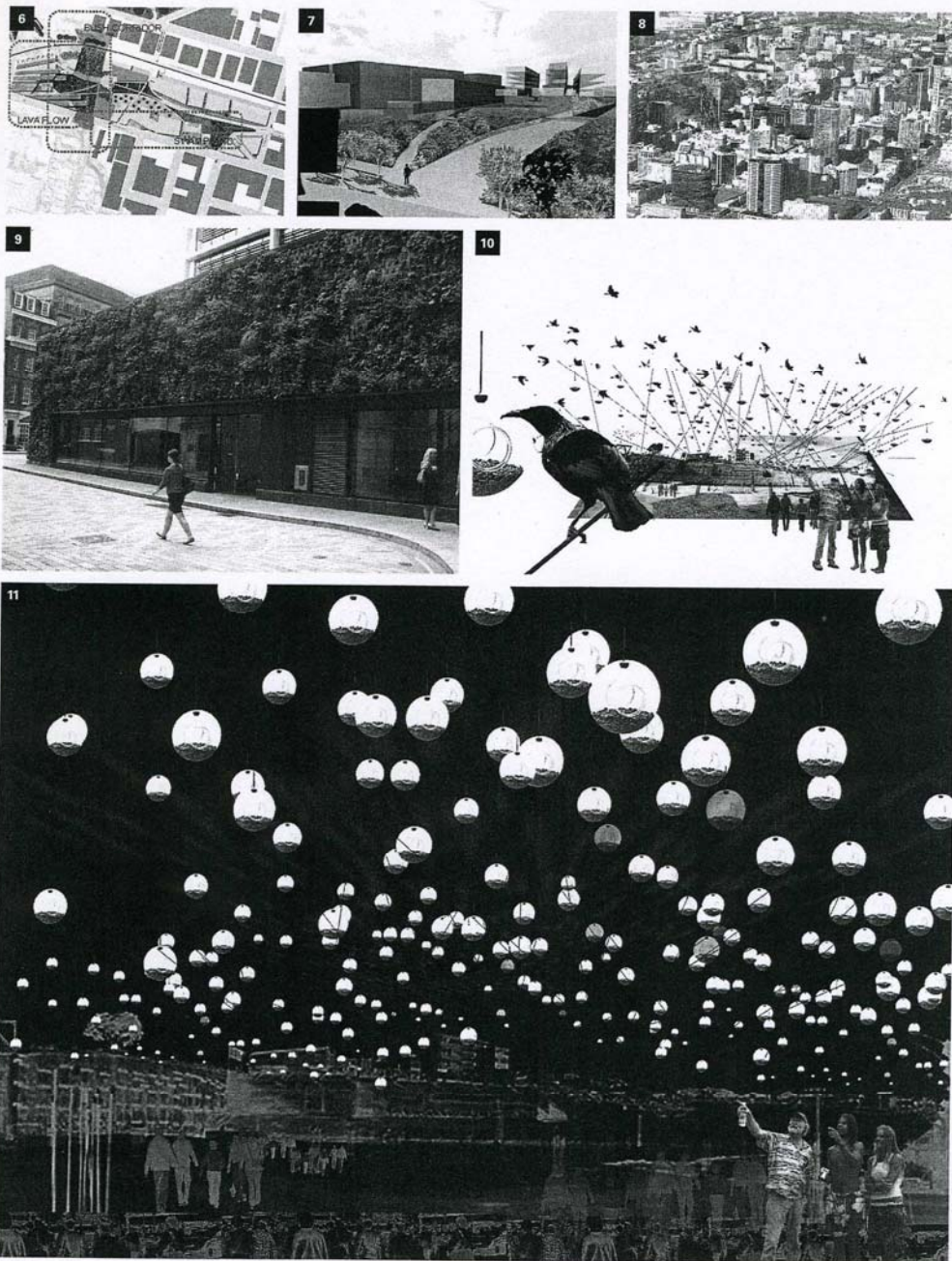
<sup>10</sup> Meurk and Hall 2006.

<sup>11</sup> Scott (no date).

<sup>12</sup> Parlane 2009.

<sup>13</sup> Dumbleton 2008.





6 Transparent Ecology brownfields landscape design by Jane Dumbleton 7 Transparent Ecology detail with kowhai by Jane Dumbleton  
8 Fringes, Ribbons and Veils landscape design by Janet Luke 9 Green wall, New Street Square, London Photo Leslie Haines 10 Bird feeders,  
Soho Square landscape design by Joseph McCready 11 Birdfeeders, nightshot by Joseph McCready

clusters of food trees such as kowhai (*Sophora chathamica*). It is also intended to provide some conspicuousness of the indigenous biodiversity to residents and shoppers.

Janet<sup>14</sup> tackled biodiversity right in the CBD – a highly impervious landscape. The objective was to apply the Ecological Greenway concept to an intensely built space. Her focus was on identifying the existing ruderal ecology, building on this to create new wildlife habitats. She designed a hierarchy of categories appropriate to the scale and character of the site (e.g. fringes, ribbons, veils of vegetation), that could provide stepping stones for indigenous species to move through the city between existing patches of large trees [FIGURE 8]. New technologies for green walls (e.g. central London [FIGURE 9]) and roof gardens are examples to make her design a reality.

Joseph<sup>15</sup> has chosen a more challenging design. He lives in Ponsonby, on the periphery of the Auckland CBD, where the proposed mixed use development has been controversial. The hole in the ground has been abandoned due to the recession, and local 'urban guerrillas' broke into the site and staged a beach party beside the collected stormwater. Joseph used the ecological concept of ruderality in relation to ecological and social outcomes. He follows the principles of Chris Reed's work which 'establishes seeds, catalysts, and agitators that instigate change and transformation, be it ecological succession, urban adaptation, interim occupations ... "generators" ... that evolve and adapt to new circumstances.'<sup>16</sup> How could this abandoned site be colonised by ecology and people, and provide a temporary landscape for, amongst other things, birds that in turn affect the broader landscape? A component of his design incorporated bird feeders strung across the site, which double as lights at night [FIGURE 10 & 11]. As well, a recipe for making 'seed bombs' would be delivered to locals to accommodate the 'guerrilla' in all of us. These interventions are intended to not only provide an interesting interactive temporary landscape, but through Reed's concept of 'agitators to instigate change and transformation', influence any future site development.

So, the trends are positive for urban biodiversity. Each ecological design intervention contributes to the urban matrix and, in conjunction with remnant and regenerating ecosystems, aims to enhance the long-term viability of the indigenous biodiversity.

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<sup>14</sup> Luke 2003.

<sup>15</sup> McCready 2009.

<sup>16</sup> Reed 2007.