



*Tāne's Tree Trust*  
NATIVE FORESTS FOR OUR FUTURE  
Hereherea te Wao-nui-a-Tāne

## WHY URBAN TREES ARE WORTH FIGHTING FOR

*Written by Jacqui Aimers, May 2021*

PEOPLE NEED NATURE BUT SOME OF US ARE MISSING OUT

*A shorter and more topical article on this subject was published in March as part of the O Tātou Ngāhere – Our Forest campaign <https://pureadvantage.org/urban-regeneration-why-trees-are-worth-fighting-for/>*

We saw the carnage play out on our TV News earlier this year. The Canal Road site in Avondale initially contained a grove of 46 mature native trees, including black maire, kawaka, manaoa, rewarewa, rimu, kahikatea, totara and puriri. Despite vigorous protests and multiple arrests (Neilson 2021) all of these native trees have been felled since the section was sold to developers. This is particularly disappointing given the low tree cover and green space in Avondale, and the ecological, biodiversity and visual amenity values lost.



Protestors gathered at the corner of Canal Rd, Avondale, every day since developers moved in on July 10, 2020. Despite fierce protests, all the mature native trees were cut down.

**Photo:** RNZ/ Dan Cook.

Auckland's urban tree loss has been under increasing scrutiny over recent years, with some arborists describing it as a "chainsaw massacre". Auckland's average tree cover is only 18%, which is moderately low relative to comparable international cities (Golubiewski et al. 2021) so any loss of trees is concerning.

How can this happen? Changes to the Resource Management Act (RMA) in 2012 by the previous National-led government, led to the removal of blanket tree protection of trees in 2015 (EDS 2015). This means that trees without formal protection on private land can legally be removed, regardless of their age or their biodiversity values. Developers have rushed to take advantage of this across Auckland, leading to the loss of many trees.

Our very survival is dependent on the natural world – we all need food, water and shelter. And there is scientific evidence that green spaces make us happier and healthier. Urban trees are a primary form of contact with Nature for most city residents (Meurk et al. 2013).

*How can we quantify the value of urban trees and use this to leverage their protection?*

### **The benefits of urban forest**

Urban trees provide a myriad of benefits related to environmental services, cultural values, community health and well-being. New Zealand is one of the world's most urbanised countries, with 86% of the population in cities and towns (OECD 2017) so investment in urban forest makes economic sense.



City to Sea Walkway,  
Wellington.

**Photo:** Jo White.

Trees on public land are particularly important in New Zealand because they generally have much better protection than trees on private land, as there is less risk of conflict with housing and infrastructure initiatives. This is particularly relevant since the changes to the RMA removed blanket tree protection. Also, more people have access to the benefits of urban trees on public land, which are even more important in neighbourhoods where there are high population densities and higher levels of socioeconomic deprivation.

In a study of the perceived value of urban trees in New Zealand (Vesely 2007) the benefits of aesthetics, having Nature in the city, habitat for wildlife, and fresh air – were rated important or very important by over 80% of respondents. Shade, carbon storage and protection from wind and noise were rated important or very important by 60% to 70% of respondents. Out of the seven listed negative effects, only one registered a higher level of importance (62%) than the lowest-ranked benefit, i.e., ‘causing drainage problems’.

### **Environmental services of urban trees**

Urban tree cover provides a wide range of environmental services, which are increasingly important in an era of climate change.

## Climate moderation

Not only do trees sequester carbon and mitigate against climate change, they also provide shelter and ameliorate the local climate. Trees provide shade, protect people from harmful ultraviolet radiation and reduce the risk of heat stroke. And the cooling effect of trees, due to evapotranspiration and provision of shade, reduces the urban heat island effect (Salmond et al. 2016).

Tree canopy cover makes leafy parts of Brisbane up to 7 °C cooler than treeless areas (Brisbane City Council 2019).

Pohutukawa, near Te Papa, Wellington.

Photo: Susan Bergin.

## Green infrastructure

Lack of natural vegetation in urban areas reduces interception and ground infiltration of precipitation. This increases the speed of run-off and the risk of flooding. Green infrastructure counteracts this, taking pressure off downstream stormwater systems, alleviating flooding, and protecting water quality (Forest Research 2010).

Green infrastructure is created by either strategically retaining natural vegetation in urban planning, or by planting trees and restoring wetlands, as opposed to creating manmade infrastructures. It is effective, economical, and has many other benefits that enhance quality of life in urban areas (Forest Research 2010). These natural systems often perform more efficiently and cost-effectively than manmade 'hard' infrastructure (Auckland Council 2018).



## Improved air quality and health outcomes

Trees and other vegetation are also effective in the interception of airborne particulate matter (PM) and absorption of gaseous air pollutants, resulting in improved air quality and lower incidences of respiratory and cardiovascular diseases, fewer hospital admissions and lower health costs (Nowak and Crane 2000; Fisher et al. 2007; Tiwary et al. 2009; UK National Ecosystem Assessment 2014).

The many tonnes of air pollutants estimated to be removed by urban trees in Christchurch and Auckland is worth tens of millions of dollars in terms of health benefits, largely due to reduced exposure to PM (Cavanagh 2008, cited in Roberts et al. 2015; Cavanagh et al. 2009).

A recent New Zealand study demonstrated that exposure to natural vegetation can protect against asthma in children (Donovan et al. 2018). This was based on a longitudinal study of 49,956 New Zealand children born in 1998 and followed up until 2016. Children who lived in greener areas were less likely to be asthmatic. Exposure to a greater number of natural vegetation-cover types provided an additional increment of protection; however, exposure to gorse and exotic conifers was found to be a slight risk factor for asthma.

### **Biodiversity values**

Cities are often biodiversity 'hotspots' because they frequently sit astride convergences of several biomes (Meurk et al. 2013). Remnants of natural vegetation commonly remain in gullies, floodplains, and aquifer protection zones. They provide habitat and ecological corridors connecting mountains to the sea.

Native forest is important for native fauna, particularly fruit and nectar feeders such as tui.

**Photo:** Sharon Lye Photography.



While many ecosystem services may be provided equally, or sometimes better, by introduced tree species in urban areas, it is native biodiversity that underpins our unique sense of place (e.g., silver fern), cultural values (e.g., harakeke), and adds to tourism, international obligations and New Zealand's reputation (Meurk et al. 2013).

### **Urban trees, cultural values, and well-being**

#### **Spiritual and cultural services**

Cultural and spiritual services provided by urban forests are difficult to value economically but are highly valued by most urban residents and contribute significantly to quality of life, social capital, and mental well-being (Vesely 2007; Forest Research 2010; Meurk et al. 2013).

Our identity suffers when recreational opportunities and connections with Nature are lost, natural ecosystems are degraded, and native species become locally extinct (Ministry for the Environment & Stats NZ 2019). Volunteering in ecological restoration and involvement in activities in natural areas benefits health and well-being and is a unifying force in

communities (Townsend 2006; Forest Research 2010; Blaschke 2013; Meurk et al. 2013; Roberts et al. 2015).

### **Nature is important for well-being**

In 1984, a pioneering clinical study showed how Nature influences our well-being. The recovery rates of patients after surgery were compared relative to their views from their hospital rooms. Some patients looked out to a garden and grove of trees, while others had a view of a brick wall. Patients with a natural view spent fewer days in hospital and used less medication (Ulrich 1984).



International clinical studies show that contact with nature improves well-being.

**Photo:** Canopy Tours, Rotorua.

Since then, there has been a wealth of international research on the importance of Nature for human well-being. A review of international epidemiological studies found evidence for a positive relationship between green space and population health (Forest Research 2010). People living in urban areas tend to experience more stress and have poorer mental health. However, green space in urban areas helps counteract this by providing a restorative environment that alleviates stress and mental fatigue. This has important economic implications because a healthy population is more productive and has lower health costs.

Ecotherapy is an increasingly popular treatment programme that utilises the restorative effects of green space to benefit mental health and well-being (Forest Research 2010).

Researchers in two clinical studies provided scientific evidence of the positive effects of walking in Nature on well-being, compared with walking in a purely urban setting (Hartig et al. 2003; Bratman et al. 2015). Even sitting in a room with views of trees resulted in a rapid decline in diastolic blood pressure, compared with sitting in a viewless room. These results suggest that having access to natural areas may be vital for mental health in a world that is rapidly urbanising (Bratman et al. 2015).

### **Recreation**

Urban forests provide general amenity and ambient environments for recreation, which benefits the physical and mental well-being of city residents and visitors.



Mountain bike trail in a restored riparian zone, Huntington, Hamilton.  
**Photo:** Mel Ruffell.

A prime example of a New Zealand urban forest utilised for recreation is the 5600 ha Whakarewarewa Forest in Rotorua. Two studies estimated recreational values to exceed the value of the potential annual timber production from this forest (Yao et al. 2013).

### **Amenity and aesthetic values**

Native trees can add distinct character and identity to cities. This makes urban centres more appealing to live in and visit. Trees can be strategically planted to benefit local residents, e.g., street trees can help calm and slow the flow of traffic, and trees can be planted to create shade at local parks or playgrounds.

Urban trees are also associated with enhanced property values (Peper et al. 2007; Forest Research 2010; Meurk et al. 2013).

### **The bigger the better - mature trees provide more benefits**

Many of the benefits attributed to urban forest are disproportionately provided by larger, mature trees (Trees and Design Action Group 2014). This is because:

- they create more shade.
- they intercept larger amounts of particulate pollutants and absorb more gaseous pollutants.
- they intercept more rainfall due to larger leaf areas and assist with the reduction of volume and rate of surface water run-off entering the drainage system.
- they contain more carbon and generally have higher carbon sequestration rates.

- residents often have strong emotional connections to landmark mature trees and are more likely to mourn the loss of large trees.
- they provide better habitat and biodiversity values; and some native species, such as kaka and bats, prefer taller trees.
- they are less susceptible to vandalism and can be pruned to provide higher canopy clearance over roadways and footpaths.
- they contribute more to calming and slowing traffic on local streets than small trees.

There is concern over a surge in the felling of mature trees on private land across Auckland, after the removal of blanket tree protection in 2015 (EDS 2015). This loss of mature trees is somewhat counteracted by local government and community initiatives. The Auckland Mayor's Million Trees Programme, launched in 2016, succeeded in planting over a million trees across Auckland in 3 years (Auckland Council 2018). Many community groups are involved in tree planting. However, it will be many years before the benefits of increased tree planting can compensate for the loss of mature trees.

### **COVID-19 highlighted inequities in urban tree cover**

Restrictions have been imposed on people worldwide due to the COVID-19 pandemic, with many confined to their neighbourhoods for months on end. While the pandemic has had many negative repercussions, there have been a few silver linings. It allowed many of us to step back from our hectic lives, slow down, take stock, and connect with Nature.

But not all of us live in neighbourhoods with flourishing gardens, tree-lined streets, parks with well-established trees, and nearby native bush reserves. Significant inequities in tree cover are evident in many big cities worldwide, including Auckland; i.e., good tree cover in affluent suburbs versus low tree cover in poorer areas.



While some Aucklanders were confined to leafy, pleasant neighbourhoods during lockdown, other Aucklanders in less affluent suburbs were not so lucky.

**Photo:** Lynn Grieveson.

## **Auckland's tree cover is moderately low by international standards**

Auckland's Urban Ngahere (Forest) Strategy, launched in 2019, aims to increase average canopy cover from the current 18% to 30% and reduce inequities in tree cover (Auckland Council 2019). Most of the cities comparable to Auckland, which score consistently high in international indices of liveability, have relatively high tree cover and ambitious urban forest strategies and targets.

**Vancouver** launched the Greenest City Action Plan in 2010 after urban development led to a decline in tree cover to 18%. Ageing street trees were replaced and 150,000 trees were planted in 10 years on private land and parkland, to improve residents' access to nature (City of Vancouver and Vancouver Park Board 2018).

**Melbourne** has a target of 40% tree cover by 2040, an almost doubling of tree cover from 2012 (City of Melbourne 2012).

**Sydney** has initiatives to increase canopy cover from 16% (2013) to 23% by 2030, and then to 27% by 2050 - increasing tree cover in road corridors, parks, and private property (City of Sydney 2013).

**Canberra** plans to increase canopy cover from 21% to 30% by 2045, aiming for equitable distribution of tree cover across the city (Australian Capital Territory 2020).

**Brisbane** has an astonishing 44% tree cover, much of which is on public land (Brisbane City Council 2019). And tree canopy cover makes leafy parts of Brisbane up to up to 7 °C cooler than treeless areas. Its urban forest stores an estimated 1.9 million tonnes of carbon.



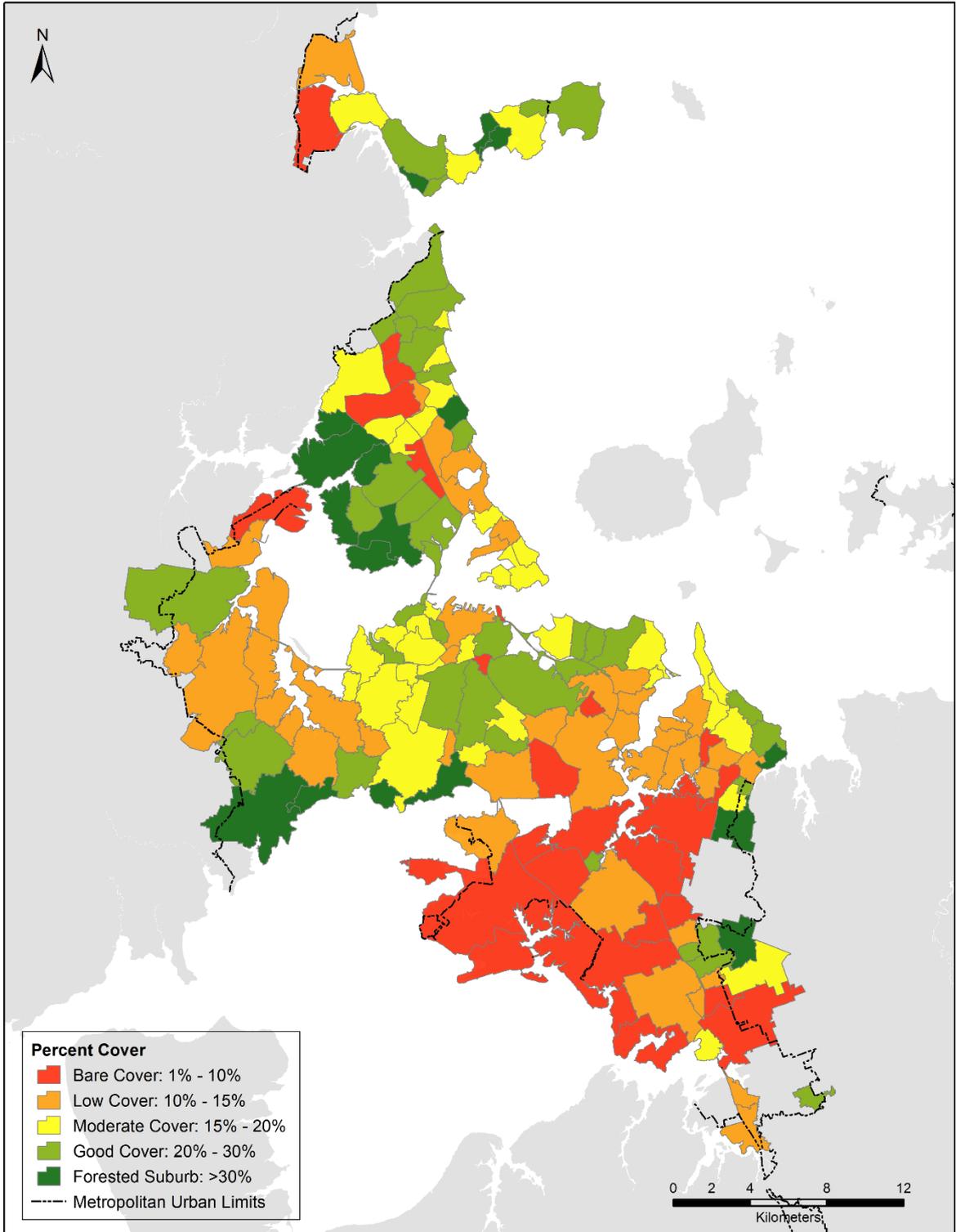
Brisbane is one of the leafiest cities in the world with an astonishing 44% tree canopy cover.  
**Photo:** Rob Wiggan.

### **Significant inequities in tree cover across Auckland suburbs**

Based on LiDAR data captured in 2013, it is evident that Auckland's urban forest is unequally distributed, with low canopy cover in the less affluent southern suburbs, and relatively high canopy cover in the more affluent northern and western suburbs. The inequity in tree cover (see map below) mirrors deprivation levels in suburbs across Auckland (see Map 2 - Deprivation Index, Auckland Council 2018).

LiDAR stands for Light Detection and Ranging technology has been used to quantify the urban forest resource in Auckland (Golubiewski 2021). LiDAR is an airborne, optical remote-sensing technology. In this context, urban forest comprises all the trees (native and exotic) within a city, including in parks, public places, coastal cliffs, riparian zones, private gardens, and streets.

The 2013 LiDAR data also indicates that the majority of Auckland's urban tree cover (61%) is located on privately-owned land (Auckland Council 2019). The remaining 39% is on public land, i.e., parkland, road corridors, and other public green space such as school grounds. The type of land tenure class that urban trees are situated on is important. Trees on public land in New Zealand generally have much better protection than trees on private land, particularly since the changes to the RMA were enacted in 2015.



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### Urban Forest Canopy Cover by Suburb

Map Produced by  
Research &  
Evaluation Unit,  
Auckland Council



Auckland's urban forest canopy cover by suburb, in 2013, based on LiDAR data

## **New data indicates loss of mature trees, particularly on private land**

LiDAR data captured from 2016 to 2018 is being used as a comparison with the 2013 data, to determine how tree cover in Auckland's urban forest is changing and identify issues to action. The 2016-18 LiDAR aerial survey captured over 88 billion data points. Subsequent data processing, analysis and interpretation have been time-consuming.

The 2016-18 data also shows the inequity in tree cover across Auckland (Golubiewski et al. 2021) as was evident in the 2013 data. Further work is needed to clarify changes in tree cover, but preliminary analysis indicates the following:

- In 2016-18, the average urban canopy cover across Auckland was 18%, well below the 30% goal.
- There were considerable changes in tree cover across land tenure classes and local board areas.
- There were losses in tree cover on privately-owned land and rural areas.
- There were gains in tree cover in parks, other public land and road corridors.
- **Canopy cover ranged from 8% to 30%** for the local boards, with 11 of the 16 local boards meeting the minimum threshold of 15% canopy cover.
- There was a **net decrease of tree canopy area in five local boards** and a **net increase in 11 local boards**.
- Kaipātiki, with a canopy cover of 30%, was the only local board that met the Urban Ngahere Strategy's target canopy cover of 30% with Upper Harbour close at 27%.
- **The five south Auckland local boards were under the 15% minimum threshold**, with Māngere-Ōtāhuhu (at 8%) and Ōtara-Papatoetoe (at 10%) particularly low; and these boards also have the highest levels of deprivation (Auckland Council 2018).
- The biggest net changes in canopy cover between 2013 and 2016/18 were in the following boards:
  - Hibiscus and Bays – a net loss of 5%
  - Māngere-Ōtāhuhu – a net gain of 4%
  - Devonport-Takapuna – a net gain 4%
  - Ōtara-Papatoetoe – a net gain of 6%
  - Papakura – a net gain of 6%
  - Manuwera – a net gain of 9%
- the 2016-18 data was skewed further towards the lower height classes – indicating a **loss of larger mature trees and well-established vegetation** but further analysis is needed to confirm this. Some of this change was due to the loss of exotic forestry land cover.

## **Actions needed to protect and enhance Auckland's tree cover**

Investment in urban forest makes economic sense. There are a myriad of benefits related to the environment, cultural values, community health and well-being. Urban trees help counteract the negative effects of urban intensification and are fundamental to the environmental, social, and economical sustainability of urban areas. And tree cover is particularly important in an era of climate change.

Auckland has a moderately low canopy cover relative to comparable international cities, and its urban ngahere is under threat. Auckland's Urban Ngahere (Forest) Strategy, launched in 2019, aims to increase the overall average canopy cover from 18% to 30%, with no local board area having less than 15% canopy cover (Auckland Council 2019).

### **Inequity in tree cover and loss of mature trees in Auckland**

LiDAR data captured in 2013 and again in 2016-18 shows that Auckland's urban forest is unequally distributed. Another concern is that the 2016-18 data is skewed further towards the lower height classes, indicating a loss of large mature trees and well-established vegetation since 2013 (Golubiewski et al. 2021), which reflects the recent surge in the felling of mature trees across Auckland. However, further investigation of tree distribution and crown structure is needed to understand what this means and what can be done to address these concerns.

In the meantime, retention of existing, larger-growing trees should be a priority, particularly in densely built-up areas where the associated benefits are high, and opportunities are limited for new plantings (Trees and Design Action Group 2014; Auckland Council 2019).

Legislative changes are needed to protect urban trees, particularly mature trees and native species. Central and local government need to include urban trees in housing developments for human well-being and environmental sustainability. This includes prioritising retention of existing mature trees, establishing new plantings where needed, and protecting or creating green infrastructure.

### **Priority Areas for urban forest**

Auckland Council and local boards have considerable work ahead, to equitably increase the overall urban tree canopy and grow the scale of Auckland's ngahere to help offset the recent loss of mature trees.

Efforts to increase tree cover would benefit from a focus on:

- Efforts to retain larger, well-established trees, particularly in densely built-up areas.

- Encouragement of Aucklanders to plant suitable trees in their yards, such as small to medium-sized native trees to provide habitat for native biodiversity, including food sources for native birds, and floral resources for honey bees and native pollinators.
- Promotion of green infrastructure, including retention of existing vegetation during urban development, and restoration of forest and wetlands in urban settings.
- Tree plantings where there are:
  - currently low levels of tree cover, i.e., south Auckland.
  - greater population densities, particularly higher numbers of children.
  - higher levels of socioeconomic deprivation.
  - flood-prone areas.
  - requirements for shelter and protection, e.g., shielding houses from heavy traffic.
  - environmental values to protect, such as riparian zones and ecological corridors that connect natural areas of high value.
  - amenity, aesthetic landscape, cultural and recreational values that would be enhanced, e.g., in playgrounds, public parks, school grounds, and at historic and culturally important sites.

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