Effective governance of New Zealand's urban forest: Governance and legislation

A thesis submitted in fulfilment of the requirements for the Degree of Master of Forestry Science at the University of Canterbury

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Abstract

This research presented in this thesis seeks to understand the context of urban forest management within New Zealand. In particular, it focuses on examining the understanding of local government authority (LGA) employees and the interactions these people have with urban forests. It also explores how central government plays a key role in supporting this resource. While this research is situated across New Zealand, it is designed to assist the global understanding of using trees in urban environments.

Concerns regarding the shift in population from rural to urban life has generated discussion about the use of the environment and its natural capital. As this becomes a new life for human populations, there is a need to understand how nature can be used to combat some of the new challenges. It also aims to examine how stakeholders have different perspectives based on their values and how this supports or hinders urban forest management. Drawing on the literature used for this topic (both qualitative and quantitative), this research is interested in understanding how urban forests are supported by local council and the impact of central government on this type of green infrastructure.

Acknowledgements and reflection

Firstly, I wish to acknowledge and thank, Dr Justin Morgenroth and Professor Emeritus Eric Pawson. Throughout this journey, we have definitely had our challenges! But, I am in debt to the energy, hard work, patience and time you have given me. This thesis would not have been a possibility without the support from you both. Thank you for everything.

Next, I'd like to recognise the participants who have been involved in contributing to my research. Without the contribution and support of you, this research would not have been nothing. I am extremely grateful for sharing your perspectives about urban forests and have learned so much from sharing your viewpoints on this topic.

Finally, I wish to thank the important people in my life who have been with me throughout this journey. It has been one of the most challenging experiences of my life – to put it lightly. But you all understood and motivated me to contribute to a space of research that holds significant value to me.

Reflecting upon the past two years, this experience has become one of my greatest achievements. As a person, I have risen to the challenges of academic life and managed to produce a thesis in which I am proud to present to the academic community and the public. I've learnt multiple lessons that hold significance and have learnt a lot about myself in this process. However, I feel as I have reached the end of this journey, this is now the step for me to continue to grow and become a better researcher and person.

Glossary of terms

Bylaw: A local law made by a local government authority which applies only to its jurisdiction.

Central government: The New Zealand central/federal level of government.

District Plan: A document prepared annually which details the activities and implementation of a council for each financial year. This is complimented with a Budget from each LGA, detailing the financial costs of council operations.

Local council/government/LGA: Local government authorities within New Zealand, commonly referred to as local council.

Local Government Act 2002: This Act provides the general framework local councils in New Zealand must adhere to under New Zealand legislation.

Plan: A document that includes the activities and implementation responses for a council. This will tend to involve the use of the District Plan for each council.

Policy: A set of common rules and regulations which informs the daily activities of a government.

Resource Management Act 1991: The central government Act related to environmental management in New Zealand.

Strategy: A set of concentrated actions and plans that are used to achieve an organisation's roles goals and objectives.

Urban forest: The collective care, management and planning of the entire tree canopy population (all vegetation) within a city or town. This includes the private and public urban

forest space.

Chapter 1: Introduction and research context

Introduction

The urban forest is a critical part of urban green infrastructure and provides many ecosystem services for people and cities worldwide (Dwyer et al., 1992). With cities mainly dominated by grey infrastructure (buildings, roads and streets), the addition of green infrastructure assists cities in generating ecosystem services and benefits. Cemeteries, forests, gardens, street trees and parks are examples of green infrastructure can assist in generating ecosystem services and improving the health and quality of life for urban residents. One component of green infrastructure is the urban forest: the inventory of trees and vegetation located on private and public land located in cities (Konijnendijk et al., 2016).

Personal statement

My interest in urban forests has become a significant part of my life as I work towards understanding the relationship between nature and myself. The first memorable experience of nature originated from a personal experience when I was about 14 years old. Upon being extremely unwell and having been in Christchurch Hospital for weeks in isolation, I was able to go outside for a short period of time. My parents took me outside to the back of Christchurch Hospital and I sat along the Avon River by the Christchurch Botanical Gardens. The view of the majestic trees and beautiful flowers coupled by the river flowing through the area made me feel calm and at ease at a time in which I was very overwhelmed. Although I didn't understand it fully at the time, it was the beginning of a journey – a constant and organic interaction with the natural world.

As I began my journey into academics, research began to explain what I couldn't fully put into words. Two courses – Environmental Psychology and Geography of Health highlighted the importance of these natural spaces are for physical and mental health. This made me

aware of *how* and *why* I felt a strong connection. It made me consciously aware of every time I interacted with nature – whether in an urban park or garden, on a walk throughout a city street, I felt more at peace.

This has been a common theme through my life and since then, it has become a particular research area of interest. Therefore, the undertaking of this work is very important to me and generates multiple thoughts around how I can provide a more in-depth understanding of how urban forests are important in cities and towns.

Aims and research questions

The overarching aim of this thesis to understand how urban forests in New Zealand are affected by bylaws, plans, policies, stakeholders and the public. This will be done by examining how urban forests are supported by central and local government. The support or absence governance of urban forests will provide an insight into how this infrastructure is managed across New Zealand. Currently, there is no current support from central government. Therefore, there is a need to understand what is hindering the support of urban forests to generate a better picture of how to progress this resource.

This thesis seeks to answer the question: *How is the urban forest managed and supported in New Zealand with respect to bylaws, plans, policies and stakeholders, strategies and the public?*

To achieve this purpose, eight research questions have been identified:

1. What existing bylaws, plans, policies and strategies at central and local government influence urban forest management?
2. What barriers and challenges do local councils view as impacting on current and future management and support for urban forests?

3. What stakeholders (external and internal) impact on urban forests in local council settings?
4. How do local councils engage with the community/public on urban forest related issues?
5. How has the 2007 reform of the Resource Management Act (1991) impacted on urban forest management?
6. Are there any frameworks, documents or initiatives currently in development in any local council?
7. What could assist New Zealand to assist in working towards supporting urban forests?

Thesis structure

This thesis is comprised of 7 chapters. Chapter 1 presents the introduction to the research and presents the relevant context to this research. Chapter 2 and three details the literature of interest and the context of New Zealand. Chapter 2 begins with a focus on ecosystem services, which leads on to exploring the theory and application of green infrastructure and importantly, urban forests in cities and towns. From this, Chapter 3 discusses common management and planning approaches to urban forests and human (legislation, policy) approaches to governance and management. This comprises the influence of community engagement, stakeholders and other relevant issues which must be considered. Following on, Chapter 4 outlines the method and methodology of the study, researcher positionality and the approach taken for this work. Chapter 5 provides the first section of the results, presenting information about urban tree planting, planning and current directions in New Zealand local council. Chapter 6 will show how councils are engaging with stakeholders,

including the public and provide information about how these participants assess the central government support. The final Chapter presents a general overview of the research, policy limitations and future directions for this research.

Chapter 2: Urbanisation, urban forests and ecosystem services

Introduction

Chapter 1 has introduced the topic and research context and understanding the role of urban forests. This literature review has two sections, starting with providing the context of urbanisation, which is based on the shift from traditional, rural lifestyles to highly urban environments. Following this, an overview of urban ecosystem services is provided, with literature discussing the four identified services (and disservices) and their relationship to urban forests. This gives a general overview of urban and natural dynamics that are involved in the management and planning of trees and vegetation. Finally, theories of green infrastructure and its application are mentioned, to highlight the integrated approach needed by cities to generate nature-based solutions to environmental challenges.

The value of an urban forest is only essential if the benefits gained are equal to the implementation of the forest (McPherson et al., 1997; Gerhold, 2007). The ability to quantify the benefits is essential as it can demonstrate the functioning of the forest in terms of goods and services. Recent studies have managed to comprehensively analyse and quantify all the services and the benefits which provides the academic community and public a better understanding of urban trees (Gerhold, 2007; Dobbs et al., 2011).

Urbanisation

Urbanisation and the impact of this process has had a significant effect on the provision of ecosystem services globally. As the human population shifts away from rural settings to urban environments, the natural environment is altered for cities and their expansion. However, the alteration of the landscape has caused irreversible damage resulting in a decline of ecosystem services at multiple scales (Millennium Ecosystem Assessment, 2005;

Tratalos et al., 2007; Niemelä et al., 2010; Seto et al,, 2011; Seto et al., 2013; Elmqvist et al., 2015).

The most direct impact of urbanisation is the extensive change in land use to prioritise the expansion of urban areas (Elmqvist et al., 2015). Although research shows that urban areas cover less than 3% of the Earth's surface, the spatial distribution and location of these areas significantly impact biodiversity and ecosystem services (Muller et al., 2013). This is because the land is often altered to suit cities and may involve activities such as land clearing, disturbing natural environments and removal of existing natural habitats. Unfortunately, it is believed that more than 25 per cent of endangered or critically endangered species will be affected (either directly or indirectly) by the results of urban expansion by 2030 (Elmqvist et al., 2015). With urbanisation only projected to increase, the quality of global and local ecosystems is important to ensure that ecosystem services can be provided.

Urban ecosystem services: Theory and application

Urban ecosystems are mainly thought of to be comprised of different green spaces within a city fabric. When building on the work surrounding this topic, the Millennium Ecosystem Assessment (2005), considered ecosystem services to be the benefits people obtain from various ecosystems, and land uses. The research of Bolund and Hunhammar (1991) identified that ecosystem services were under threat as a result of an increased population living in urban environments. This degradation of natural areas to prioritise human habitats

resulted in a conflict between the natural environment and urbanisation of cities (Bolund and Hunhammar, 1991).

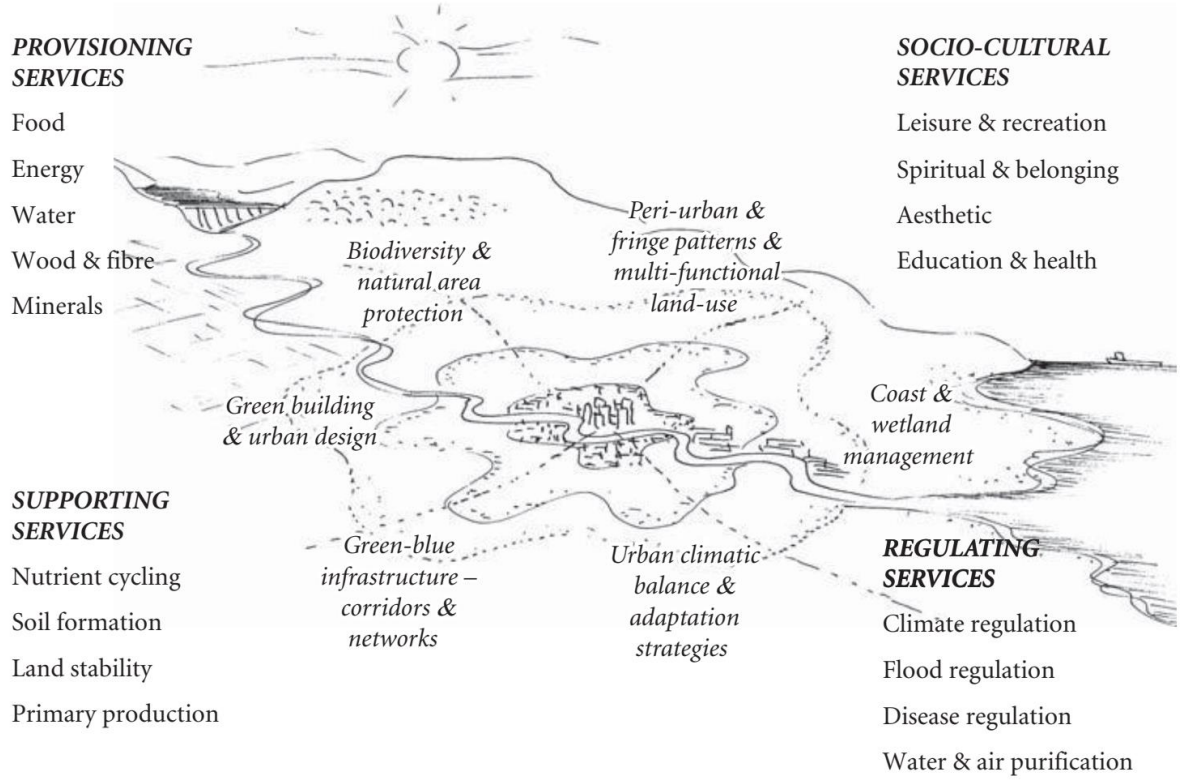

Figure 1: Urban ecosystem services within urban and peri-urban landscapes.

Source: Source: Millennium Ecosystem Assessment (2005).

The world is currently experiencing one of the fastest periods of growth in human evolution. With this increase in not only humans but the demand for resources, cities have become the preferred location for human habitation. Between 2009 and 2050, the UN project that the world's population will increase to 9.1 billion, with 6.3 living in urban environments (United Nations, 2014). Over the next 40 years, this shift will increase urban areas by double by 2050 in both developed and developing regions resulting in political power needing to recognise

and respond to this challenge (Elmqvist et al., 2013). This rapid growth in population has and will result in significant environmental problems on a global scale (FAO, n.d). As typical land uses such as agriculture begin to be removed for urban expansion, this will continue to cause a loss in biodiversity and ecosystem services.

Provisioning services

Provisioning services are considered to include the use of materials in the landscape for humans. When applied to urban forests, this can consist of trees and plants that produce food (Hurley & Emery, 2018). With most food provided for cities produced on distant agricultural land and having food produced in cities has been shown to increase healthy food consumption (Clark and Nicholas, 2013). Public owned gardens such as community gardens can assist in food production, whereas private garden spaces can utilise rooftops Other aspects of provisioning services are essential but are not relevant to this research.

Regulating services

Regulating services in the context of the urban forest is related to the environmental aspects involved with providing trees in cities and towns. Growing concern about the impacts of climate change on urban environments has created an interest in how the use of this service can provide some practical solutions to the effects of urbanisation (Andersson et al., 2014).

Within urban environments, regulating ecosystem services are predominantly provided by trees and vegetation in and around these areas (Konijnendijk, 2003, Davies et al., 2017). This is because when compared to other types of infrastructure, plants and trees are effective at reducing air temperature through evaporation and shading (Doick and Hutchings, 2013),

reducing stormwater runoff through inception and adsorption (Armson et al., 2013) and improving air quality by removal of harmful pollutants. However, regulating services does not impact this research and is therefore not a focus for this academic work.

Cultural services

The relationship between cultural services and urban forests is the values related to humans and their experience with trees (Davies et al., 2017). In the context of urban forests, environmental and natural spaces include areas such as gardens, parks and streets. Within this idea, cultural services explain the connection between trees and human beings. These spaces can provide the environment where people can perform multiple activities including bird watching, recreational sports, or just an environment for people to enjoy (Nowak et al., 2001; Ordóñez and Duinkerk, 2010). Even the presence of nature can help improve hospital recovery, mental health and stress (Kaplan and Kaplan, 1989; Ulrich et al., 1991; Hertzog, 2003; Townsend & Weerasuriya, 2010; Davies et al., 2017). Theories such as the Biophilia Hypothesis and the Attention Restoration Theory suggests that any interaction with a natural environment can assist in restoring people's wellbeing and focus, often in times of stress. As a final thought, the cultural experience that people have with urban forests can extend to tree planting at significant moments in time, often in a professional setting. This can be even seen at the University of Canterbury, where a Lone Pine tree was planted to mark the 100th anniversary of ANZAC Day (University of Canterbury, 2016).

Ecosystem disservices

As crucial as ecosystems are to provide for people in the environment, there is a need to acknowledge the negative impacts of ecosystems, and specifically, urban forests.

‘Ecosystem disservices’ and are thought to be the “functions of ecosystems that are perceived as negative for human wellbeing” (Lyytimaki and Sipila, 2009). There are only a few studies that analyse the use of urban forests concerning these disservices

Reported by Delshammar, Ostberg and Oxell (2015), these impacts can be categorised into three classifications;

1) Ecosystem service performances – specific smells, sounds and behaviour of animals and plants can be an irritant, creating a dislike for trees (Roy et al., 2012)

2) Disservices experienced by humans – infrastructure damage, risk of injury and human safety (Dobbs et al.., 2011)

3) Disservices derived from humans and their actions – neglecting spaces or trees, creating an opportunity for multiple other disservices to occur (Plieninger et al., 2013).

These ecosystem disservices must be considered in contemporary planning approaches to cities and towns. Although it is not possible to remove all disservices, it is best to use a method that utilises the infrastructure while creating awareness in the community about the benefits of urban forests.

Green infrastructure: Application in urban environments

Research on urban ecosystem services has identified green infrastructure as an integral part of restoring ecosystems in cities (Bolund and Hunhammar, 1991). The concept of ecosystem services can be thought to include and support urban landscape planning techniques that reflect the human perspective while emphasising the interactions between biophysical and social structure present in urban environments (Hansen et al., 2014). Using blue (water) and green (vegetation) can use engineered and natural systems to mimic landscapes. In

combination, using a large-scale vision can help create an interconnected inventory of natural systems in multi-functional spaces (Kimpton, Gedge & Grant, 2012).

Green infrastructure can be applied at different scales within a city or town – from the household scale to a dedicate urban landscape (American Rivers, 2017). At a small size, this can include any vegetation on properties, private or public gardens, community gardens and street trees. On a more substantial and more resource intensive scale, botanical gardens, urban forests and parks, green roofs and wall can be utilised. Both scales can provide multiple ecosystem services to cities – however, this is dependent on the application.

As research is continuing to identify how and the benefits of using green infrastructure, it is essential for cities to understand it's benefits to creating interconnected ecosystems throughout the landscape. This is vital for local and central governments to comprehend as the health and state of cities worldwide is dependent on ecosystems (Whitford et al., 2011; Dobbs et al., 2011).

Unfortunately, most of the research on urban forest policies have focused on European or North American cities, which highlights the history this infrastructure has had in urban planning (Phelan, Hurley & Bush, 2018). Studies have found that within local councils, the ability for urban forests to be supported depends highly on the resources available (Conway & Urbani, 2007). This means that the extent of support available will vary and is dependent on multiple factors influencing its provision in the environment.

Chapter 3: Urban forest governance and New Zealand

Introduction

Despite the fact that the identified evidence highlighting the effectiveness of green infrastructure, specifically trees, the opportunity for legislation and policy has been inadequately In New Zealand. At present, several countries and local councils in these communities (including New Zealand) do not have any existing provisions in place. It is possible that authorities have used 'green infrastructure' as a loose or have ignored other functions and types and highlighted only one kind of encompassing infrastructure.

Citizens and the wider public

The level of support for urban forests from citizens is highly dependent on many factors, including the general discussion of how and why the public need to be incorporated into this form of governance. Understanding the values of the community is vital in providing an opportunity to discuss the urban forest in cities (202020 Vision, 2014). Interacting with the community will enable further engagement and create an open dialogue and trust with the public. To achieving this outcome, having a transparent interaction process with the community is vital. Furthermore, as trees will grow and reach maturity with time, the need to ensure its support guarantees its survival (Nowak & Dwyer, 2007; 202020 Vision, 2014).

Engaging the public on issues such as the urban forest is a challenge identified by many councils (Sheppard et al., 2017). Genuine engagement allows for the two-way process of exchanging information and feedback between experts and the public. Experts can understand varying perspectives the public has, and in exchange, the people can participate in decision-making in their community. This mutual relationship allows for proper engagement and open communication, which results in more dialogue between all parties,

resulting in better decision making (Sheppard et al., 2017). This is important as it has been hypothesised that engaging the public in conversations that involve the urban forest may potentially increase environmental awareness and participation from citizens (Hostetler, 2015; 202020 Vision, 2017; Trees and Stormwater, n.d). This ultimately, this open dialogue allows for more robust engagement and is vital for continuing support for the growth of an urban forest. (Sheppard et al., 2017).

Involving members of the public is important to the government (at any level) to be assured that the public supports and feels represented by an interested party. One aspect of interacting with the people on public issues is through consultation. Consultation occurs when public opinion is sought on a particular subject by decision makers (Sheppard et al., 2017). Techniques that are relevant to the urban forest can include feedback surveys, public hearings and town hall meetings. These techniques are purposely designed to elicit communication and participation from the public by allowing dialogue to be established.

In comparison, public engagement is another aspect of interaction available for councils to engage with the public. Achieving high levels of engagement is crucial as it facilitates community cohesion and communication in a community. This process builds on fostering relationships between interested parties to build trust and have an open dialogue about important issues. This is a form of participatory engagement which allows communities and stakeholders to be involved in public decision-making.

When there is a lack of open dialogue or one-way communication between council and stakeholders, distrust can be created. This may have a detrimental effect on the relationship between the two parties, creating negative engagement. This often goes beyond disengagement and instead, results in negatively motivated and targeted actions.

Unfortunately, some councils engaged with the public negatively, creating distrust and anger amongst residents with councils taking adverse action against the vegetation. In the case of Sheffield City Council (located in the UK), members of the public were arrested after protesting the controversial removal of trees in city streets (Perraudin, 2018). Part of a more extensive Sheffield City Council policy to potentially remove half of the street trees to maintain other infrastructure (footpaths and roads), this created frustration amongst residents who felt that the trees should be protected. Although justified by the council as a necessary move for improving species diversity and preventing trees from damaging other infrastructure, members of the public believe that this approach is ineffective as it removes mature trees with no intention of replacing the vegetation at the same stage of growth (saplings were replacing the trees). Overall, this example demonstrates the need for the council to engage with the community and the need for the public to be informed about decisions involving the city.

Stakeholder engagement and input

As part of any project, the involvement of stakeholders is critical to the success of any work. The inclusion of stakeholders can be an individual or collective but will focus on contributing knowledge and value to help make a project successful. The actions of stakeholders can lead to positive outcomes and results for the community, which is why interested parties highly value this input. In the context of the urban forest, there will be many diverse perspectives from varying interest groups. This can mean that stakeholders can be internal or external to the council (who is often the party involved in this infrastructure). Internal stakeholders can consist of councillors, council board members and staff who are concerned with the management and operations of the council. In contrast, external stakeholders can include

any individual or party and can consist of arborists, business owners, developers, government agencies (at central or local level), members of the public, nursery growers, NGO's, park and recreation groups, private landowners, residents' associations and schools (Loci Melbourne, 2015).

Having more stakeholder engagement and input has been noted to create a more robust urban forest, according to advocates (Van den Bosch, 2014, pp. 42). It is possible that having multiple stakeholders can create challenges for ensuring all perspectives are valued. However, with proper engagement processes and providing regular interaction with stakeholders, this can be avoided. It is important to note that although stakeholders have a vital role, they are only involved in the overall running of a council and its activities and not the daily operations and overall management decisions and therefore are only included when requested (Konijnendijk van den Bosch, 2016).

The City of Melbourne: Case Study

There are many successful urban forest engagement projects worldwide, but one of interest is the City of Melbourne in Victoria, Australia. A period of extended drought (1998 to 2010) and water restrictions saw the city's tree population decline in health. This in addition to the 2009 and climate change saw the City of Melbourne address the urban forest with the development of an Urban Forest Strategy (City of Melbourne, 2014; National Urban Forest Alliance; 2014). This Strategy is a 20-year vision (2012-2032) with specific goals and objectives about the growth and survival of the urban forest across the council (Centre for Public Impact, 2016). These challenges have helped create the strategies and targets for the City of Melbourne (see Table 1) over the next 20 years.

Table 1: Strategy and targets of the Urban Forest Strategy (City of Melbourne, 2014).

Strategy	**Target**
Increase canopy cover	Increase public realm canopy cover from 22% at present to 40% by 2040
Increase urban forest diversity	The urban forest will be composed of no more than 5% of any tree species, no more than 10% of any genus and no more than 20% of any one family
Improve vegetation health	90% of the City of Melbourne's tree population will be healthy by 2040.
Improve soil moisture and water quality	Soil moisture levels will be maintained at levels to provide healthy growth of vegetation.
Improve urban ecology	Protect and enhance a level of biodiversity that contributes to a healthy ecosystem.
Inform and consult the community	The community will have a broader understanding of the importance of our urban forest, increase their connection to it and engage with its process of evolution.

Because of the Strategy and the identified targets, the City of Melbourne was recognised with the Award of Excellence by the Australian Landscape Architecture Awards in 2016. The Strategy was determined to have transformed the way municipalities and the public view urban forests by showcasing how to manage the urban forest effectively (Architecture Australia, 2016). This has also provided an exemplar for other local councils that might be interested in creating their policy document throughout Australasia, including New Zealand.

Public consultation and engagement

Melbourne's first Urban Forest Strategy was developed with consultation from the local community about improving and managing the infrastructure (City of Melbourne, 2014).

Stakeholders and members of the public were invited to engage with the council and provide feedback on developing the Strategy. This information provided the council with the information required to tailor the Strategy to the needs of the community.

The City of Melbourne identified that community support can include many different interest groups and that these parties may have different perspectives on an issue (City of Melbourne, 2014). During the extensive engagement process, the CoM undertook different methods to generate widespread community awareness about the consultation period (November 2011 - April 2012) (City of Melbourne, 2014). Outreach was not aimed at a specific target, but different campaigns purposely attempted to engage the community using different techniques. However, the City of Melbourne has been involved with local community groups to reach a common goal. Furthermore, continued engagement is imperative for the continued backing of the urban forest. This engagement, although extensive, ultimately benefits the council's objectives to meet their targets while ensuring communities are consulted.

As part of my own experience in urban forests, I have been fortunate enough to have travelled to Melbourne and seen their urban forest and interacted with staff from this council. During my travels, I came across a critical aspect of urban forest management that surprised me (Figure 2) that does consider all aspects of how effective management comes from communication.

Figure 2: City of Melbourne tree removal notice

Upon walking in the city, I saw this near the State Library Victoria. This made me reflect on how within councils, there is often disengagement amongst the public, which affects the outcome of any activity. But seeing the notice for the removal of this tree just really made me feel that the city is working towards a more robust approach to engaging with people living in the city. The reasons justified given made it easier to understand the need to remove this tree and replace it.

An initiative from the City of Melbourne that was successful was assigning email addresses to its entire inventory of public trees. The intended action was to provide a direct link for people to report vandalism or unhealthy trees to the CoM. However, the trees were sent emails that were mostly positive with comments showing an appreciation for the urban forest in the city and its positive impacts on the environment and the people (Kendal & Wilson & Pearce, 2015). The positive emails sent to the trees encouraged city engagement with the urban forest and provided an outlet for people to share their view on nature in the city. This initiative was launched in combination with the City of Melbourne: Urban Forest Visual, which shows vital information about each tree within its municipality (City of Melbourne, 2016). These engagement tools have been recreated and implemented in the City of Knoxville, Tennessee, highlighting the success of the initiative (Duda, 2016).

The CoM also launched 'Melbourne BioBlitz' in 2016, which is a 24-hour event that connects experts with the community to create a snapshot of the biodiversity within the city. This event often runs every few years and attempts to engage the public to participate in citizen science. The benefits that citizens receive from participating in this activity and the level of engagement between parties can be just as vital as the data that is collected within this time (Ives, Lynch, Therlfall, & Norman, 2015). This action saved expenditure costs for the council but enabled the public to be directly involved in managing the urban forest. Therefore, the mutual relationship is beneficial for both parties and can be utilised further if required.

The third example of community engagement initiatives is the 'Citizen Forester Program'. This program invites volunteers to participate in citizen science relating to the urban forest. Different from Bioblitz, this program is ongoing with members of the public to further achieve the goals set by the UFS. Volunteers can connect with experts and other volunteers

to conduct data collection and collect statistical information for the CoM (Ostberg & Morgenroth, 2017; City of Melbourne, 2018). The direct engagement between experts and volunteers relies highly on a transparent level of community engagement to ensure the relationship benefits both parties (Sheppard et al., 2017).

New Zealand context

In New Zealand, the responsibility of the public urban forest is placed on local councils in the absence of any central government support. Currently, there is no supporting documentation of policies that assist any council in any specific urban forest activities. Therefore, it is theorised that a starting point for New Zealand is to generate an understanding of the importance of urban forests from the central government in the hopes it will start a process within local councils. However, it is essential to distinguish that other countries have generated support without any central government assistance. But, given the population and funding in New Zealand, it could be deemed that this is the best starting point.

At present, New Zealand has relied exclusively on informal and voluntary means to undertake climate change mitigation. Under New Zealand central government legislation, the environment is governed and managed by the Resource Management Act (RMA) (1991) (Environment Guide, n.d; Legislation New Zealand, 2018b). This Act is based on prioritising sustainable management practices and aims to regulate infrastructure and land use (Ministry for the Environment, 2018a). However, this does not explicitly guide the activities across the country but instead relies on local councils and regions to manage their jurisdiction (Environment Guide, n.d). This Act can be critical to urban forests as it could be

used to help enact any urban forest actions that central government may wish to undertake – if it was to support this infrastructure.

The source of funding for any green infrastructure typically comes from a municipal fund in the form of rates. In New Zealand, a council (either regional or territorial) charges rates against a property for the use of public services. Rates are calculated differently depending on the household itself but ultimately contribute to the city's assets.

The Local Government Act 2002 gives the council the power to set rates and use the funds for the council area (Department of Internal Affairs, 2011c). Although some people may view the rates as inefficient and expensive, the aim of rates is to use that money to spend on the community.

Governing local councils in New Zealand is the Local Government Act (LGA) (2002) (Legislation New Zealand, 2018a) and regulates activities within each council and region. Similar to the Resource Management Act, this Act focuses on sustainable development and promoting the wellbeing of the community through providing 'quality infrastructure' (local infrastructure and services) (Department of Internal Affairs, 2011a). Within the Act, councils are required to produce a Long-Term Plan (LTP), which details the activities of each council, every ten years (Department of Internal Affairs, 2011b). This must be produced every three years and must allow for consultation processes with the public. From the document, councils are then made to use the LTP to create an Annual Plan for the jurisdiction. Consultation must also occur at this level when it is going to be adopted as well as any changes to by-laws within the plan (Porirua City Council, 2018). However, any activities concerning the environment a council wishes to undertake must also adhere to the Resource Management Act.

The Resource Management Act does not explicitly guide the urban forest but does govern the protection of trees in New Zealand. Before 2009, councils could nominate species of trees to the Ministry for the Environment (MoE) which would then be 'blanket protected' under the RMA (Ministry for the Environment, n.d; McCreadie, 2017; Quality Planning, n.d). However, Amendments made by the previous National Government (in 2009 and 2013) removed this protection for trees, except for reserves and locations in which a conservation strategy exists where trees are on public land managed by the Ministry (Ministry for the Environment, n.d). At the time, Environment Minister Nick Smith from the National Party justified the actions as being necessary after considerable resource consents needed for simple tree actions (Gibson, 2009).

This resulted in trees no longer having the same status of protection and being placed at risk for removal from 'blanket protection'. According to the Ministry for the Environment, this was intended to save councils on the cost of applying for extensive resource consents for blanket protection (Ministry for the Environment, n.d). Today, the removal of blanket protection is now replaced with councils now required to approve and nominate trees within their council before being referred to the MoE. However, it has been criticised as being inefficient as it requires more administrative and legislative tasks rather than dealing with tree protection (McCreadie, 2017).

Critics of the removal of blanket protection mention that urban trees are now insufficiently protected as there is no legislative protection for the trees as a result of legislative changes (Brown, Simcock & Greenhalgh, 2015; Goff, 2015; McCreadie, 2017; White, 2018). Research has identified that the current protection possible for trees are ones who are listed as 'significant' within local councils under each District Plan. These are trees that have been

nominated explicitly by councils that are cultural, historical or important trees that add value to a city or town. However recently, councils have been asking for input from the public to nominate trees of interest to assess what people see as essential and of significant value (Littlewood, 2018; Auckland City Council, 2019,).

As a result, currently, towns and cities have only one approach to protecting urban forests which are the Schedule of Notable Trees (list of protected trees) (Wyse et al., 2015). This technique allows for trees can be nominated by a council or an individual to be protected, and if approved by the Ministry for the Environment, they will be protected under the Schedule itself. It is important to note that this is different from blanket protection as this form of protection can include protecting an entire species of trees. Wyse et al. (2015) further mentions that because of the policy change, the Schedule of Notable trees has become the only policy that can preserve the urban forest because it is able to give some form of authoritative protection (compared to having no protection from a council). Additionally, as a requirement, councils must detail their protected trees within their jurisdiction in District Plans.

Documentation and responses

Local governments do have some documentation in place that relate to urban forests. This is an important recognition as there is some work in this space towards protecting the urban forest canopy. This may include street tree, tree planting and vegetation guidelines but nothing that encompasses the entire urban forest structure as a resource in addition to no standard for any urban forest management.

Current approaches that are being used to manage the urban forest are focusing on the planting, protection and allowing the community to participate in activities. As an example,

Auckland City Council has created an Urban Forest Plan towards protecting the heritage trees and work towards the 1 million trees planted goal set by Auckland mayor Phil Goff (2015). However, as the city is the largest in the country, the city has had to rise to other competing infrastructure attempting to remove trees. Massive felling projects have been seen as damaging to the inventory of trees and the public have been vocal in their opposition (Gibson, 2013). This activism towards better protection has been successful as the council changed their stance and responded 5 years later with the protection of 6000 trees (Auckland City Council, 2017). Claims have since suggested that the urban forest is still being reduced with unverified reports stating the council has removed 1/3 of it's entire canopy (Wilson, 2018). Therefore, there is still a lot of discussion needed between council and the public about the intended activities (Wilson, 2018).

The Wellington City Council has a similar target that aims to increase the planting of trees within the city (Wellington City Council, 2018). The city implemented a target of 2 million trees planted by 2025. At the end of 2017, the council had stated 1.6 million native trees had been distributed across the Wellington area over 15 years. Upon looking at the website with all the relevant information, the council has worked with other businesses, corporates, schools and volunteer groups which all are working collaboratively to achieve the same target. This response does place the responsibility on the council to ensure the target is achieved. But, it is also allowing other interested parties to contribute to the common goal. It is with these types of collective approaches that the urban forest can be supported by interested parties.

The Upper Hutt City Council already had an existing place in place for protecting the urban forest before the removal of blanket protection But, when the amendments came into

force, the city responded by changing parts of the District Plan (Plan 41, 2013). The decision was made by councillors to implement a series of rules that protects specific groups of trees. This plan was adopted in 2015 and has since been in effect (Upper Hutt City Council, 2019).

Chapter 4: Research methodology and methods

Introduction

This chapter presents the methodological approach and the specific methodology used in this research. Reiterating the aim, this research explores issues of urban forest governance and management by central and local government in New Zealand. It also focuses on how these government levels engage with other stakeholders and the public.

Positionality

Positionality seeks to assess how different characteristics of the researcher and topic can influence the research and its processes (Finlay, 2002). Research suggests that personal characteristics of the researcher such as their beliefs, identity and values influence how a person experiences the world which extends to their status and perspectives (Sánchez, n.d).

My own positionality (as a researcher and student) has provided me with insight and knowledge from people who work at different levels of urban forest management but, has shown me how the positionality of others working in this field is different than my own. During this thesis, I was fortunate enough to attend two conferences which emphasised the diversity of roles involved in this field. The conferences (2017 EcoCities Conference: Melbourne and 2018 International Urban Forest Congress: Vancouver) was a gathering of individuals focused on environmentally resilient and sustainable cities that includes green infrastructure. My area of interest is community engagement and local council activities to support urban forests which was different to others. People I met held different interests: tree planting, removal, open space, community gardens, psychological health. The diverse interests can be seen to create a network of collaboration between invested people and a common interest. Although there will be tensions amongst these parties, it still enables the opportunity for robust discussion and the sharing of information and viewpoints.

The diverse perspectives at different levels of urban forest management became an interesting idea to explore in how varied approaches can yield different responses. The discussion of community engagement came up in a conversation with academics, policy makers and local council employees. Personally, I have admired the City of Melbourne for their approach to getting the public involved in understanding the importance of urban forests. The approach of using citizen science (through Bioblitz) has been one resource used to bridge the gap between government and public involvement. But, one person from a council said that this doesn't translate into planting and instead, creates more tasks for staff. This intrigued me as most of the urban forest canopy is on private land and without public support, urban forests have little chance of success. Therefore, it is better to have the public engaged and involved where possible, to generate conversation and hopefully, support.

Influence of positionality on thesis

During this research, my positionality was a constant focus as I engaged with this topic and my work. Personally, my passion for adding trees into urban environments to improve liveability has led me to undertake this academic work. I have broad knowledge about the use of green infrastructure to assist cities in addressing environmental challenges, having done a lot of undergraduate work on the subject. However, my experience was formed around academic work, and I felt that there was a connection missing between the science and understanding the different roles people have in making thriving urban forests. In spending time in multiple cities, I was always in awe of the trees and the different values placed on this infrastructure (native vs exotic, biodiversity, etc.). This further drove me towards the research as I wanted to understand the actions of local councils in New Zealand

regarding trees within their jurisdiction. This interest influenced the direction of this research, and it meant that I had to go into this work with an open mind, as it was possible to encounter values that clash with my ideas. Additionally, I needed to ensure that I was attentive and respectful of the participants as each was sharing their personal journey/work with their employer. This was paramount as it was imperative that I do not create any problems between the participant and the council of employment as they are respected individuals in their line of work.

As part of this research, my interaction with the participants was either a) frequent and personal contact or; b) no interaction with the participant as contact was only with the local council. However, I was aware of how my own identity would shape the interactions possible with participants. During the initial process of contacting councils via email or contact boxes, I sent formal messages detailing who I was, my education background, research context and criteria for participants. I was attentive to the language used in interacting, the perception of myself, and how, as an outsider, I want to investigate the inner workings of a council. This type of formal contact was done intentionally to appear professional as an academic, rather than an ad-hoc combination of words.

When it came to produce the questionnaire, my time as an undergraduate and postgraduate student assisted me in understanding how to generate responses that were tailored to the research topic. A large portion of my academic life focused on community engagement, which helped me in placing myself in the position of the researched as a researcher. Simple tasks such as providing a glossary, questions that aren't wallowed down in academic jargon and allowing people to share their perspective without judgement were considerations that I considered to enable participants to feel that they were valued

contributors to my work. As it is well established that the worldview of the researcher can impact the language, questions and responses, I always reflected on how I was being perceived by participants who had no prior knowledge about myself or my positionality.

The research process of being present in all aspects of my work helped me become more aware of how my own experiences and values would interact with the participants – either consciously or subconsciously. As stated by England (1994) "Positionality is about being embodied and embedded in the shifting processes and practices of identity formation, affect and power". Undeniably, the process of reflecting on this research allowed me to be open to change some of my values and be open to the different perspectives shared. As a large portion of my academic work has focused on the benefits of trees, I have an inherent appreciation and love for all trees. But, after reading the responses from participants, I realised that people have different ideas and values with this type of nature and although it might not be similar to mine, these perspectives still shared how trees are thought as essential or not relevant to people and those who make decisions in local government.

All of these considerations and reflections provided me with the opportunity to become more present in my research and understand how participants see me as a researcher and how I view myself as someone conducting academic work.

Research criteria

The eligibility criteria for people to contribute to this research was determined by their likelihood of interacting with urban forests in their occupation. Done intentionally, this was aimed to gather perspectives from people who were either a) working with trees/vegetation daily or b) is employed in a field that would likely interact with urban forests.

It is understood that people at various stages of the lifecycle of a tree would be involved in the management and planning of urban forests. However, this was seen as being able to be overcome with people responding to this research if there is involvement for them in their occupation.

Occupations of interest

1. City arborist/urban forester

This occupation would likely be involved in the planting and removal of trees and vegetation. It is assumed that consultation with internal and external state holders are commonplace. The employment of arborists in New Zealand can be (a) local council, (b) externally contracted or, (c) self-employed. If any urban forester position exists within a New Zealand council, this is identified within the research.

2. Ecologist

An ecologist role would engage with trees based on ecosystem services and assessing for diversity and organisms. It is thought that within this role, the understanding of multiple needs and spaces for urban forests is understood in the context of finding the best-suited outcome for the environment. The purpose of ecologist can be diverse with individuals choosing to focus on one specific ecosystem such as trees or waterways or using an integrated approach. Therefore, there is a need to consider that this role could use different ecological research and technique to provide multiple perspectives supporting urban forests.

3. Landscape architect

Landscape architects are responsible for the design of open spaces across cities and towns. Often, this role can be involved in the proposal for more new natural environments and systems into urban settings. The history of landscape architecture plays a role in how urban forests can be perceived – as integration between social and environmental processes (Davis & Vanuchchi, 2014).

4. Parks Ranger

The purpose of a park ranger is daily maintenance and protection of urban and regional parks. People within this occupation are typically 'on the ground' and work across a council at different sites. Their role can be thought to extend planning, but people are usually located in the field working on daily tasks for the council. Therefore, it can be assumed that these responses will come from a workforce orientated towards the maintenance of areas such as gardens, parks and reserves rather than the planning involved in establishing these spaces.

5. Urban planner

Urban planners specialise in land-use planning and the allocation of spaces for different purposes (commercial, natural, residential). Planners are directly involved in bylaws and adhering to the policy regarding environmental and resource consent. The development of this role has become multi-functional to include an understanding of built and natural systems that can be incorporated into the city or town environment.

Human Ethics

As part of the University of Canterbury requirements when engaging with human participants, Human Ethics Committee approval was required before any field work (see

Appendix D). The Committee did not grant permission on the first attempt as two issues were needing to be rectified. First, more consideration was needed to protect the privacy of participants and their opinions regarding their employment at their council. The solution to this problem was not to identify participants and the council but instead, categorising councils by size into three groups while still allowing the occupation of participants to be shared. The second issue was that there was a need to incorporate Maori cultural knowledge (mātauranga), stewardship (manakitanga) and values as urban forests are a natural resource in the environment (taiao). A suggestion was made to contact Dr Abby Suzuko from Kaiārahi Māori – College of Engineering who could assist in Maori consultation and engagement. As ¼ Maori (from Nga Puhi), it was an oversight that I did not incorporate any indigenous perspectives or questions. But, meeting with Dr Suzuko allowed me to discuss my research, and in turn, I was given valuable insight and feedback on issues that could be asked and how different aspects of Maori culture and heritage can be incorporated into this research.

Pilot study

The use of a pilot study allows the researcher to trial the intended research in preparation for the real examination. As a research tool, it can identify potential issues and provides an opportunity for constructive feedback about the research approach, design and technique used. During the beginning of the research process, I undertook a pilot study after the creation of the questionnaire. This was performed on one participant from a large council who had significant input into the management and planning of urban forests in their LGA. I was fortunate enough to have been given this contact due to previous interactions with this individual, my supervisor and his work in this field. This practice identified shortcomings in the questionnaire, which could be seen as impacting on gaining valuable insight into how

urban forests are supported. There were multiple issues identified that as the researcher, I was biased towards my work. As an example, my questions were too broad and didn't capture the research objectives I was trying to achieve. Therefore, I relooked at my research objectives and re-evaluated the questions to ensure that I would generate the best responses. Using this pilot study was a crucial step in my research, and this was an invaluable experience for my academic work.

Implementation

Two approaches did the first contact with participants (see Appendix A). In the first instance, if a contact form was available on the council's website, this was used. If this was unavailable, I located the general email available for contact and requested information.

The original form of communication used an email template that had been created, which detailed the research, information about me, eligibility criteria, Human Ethics and contact information for myself and supervisors (see Appendix B).

This preliminary contact generated two types of responses;

a) Customer service representatives provided contact information of eligible participants or managers in the occupation of interested

This response was the most common – councils provided contact details of either participants or their managers to discuss the possibility of participating in the questionnaire.

b) Contact information was withheld and sending questionnaire was required via email.

Various councils expressed concern about the sharing of employment details of relevant participants due to wanting to protect participants and also not wanting to identify who these people are in their council. This was a fantastic response from councils but was

understandable given the nature of the research. Therefore, I was required to consult with customer services representatives to ensure the investigation was being given to eligible participants, and all the information I had provided was received.

The implementation of the questionnaire adopted the Tailored design method (Dillman, 2000). This method was chosen for its likelihood of high response rates from participants. As both situations for contacting participants were beginning to become complex (different forms of communication and often frequent correspondence), I used the same method of implementation for each part. At the time of application, I sent the consent form for participants (Appendix B) and the questionnaire URL (Appendix C). These were attached in PDF formats with information about the research.

The research was sent to all councils who had responded to the initial communication and all participants. The cover letter started with the request for assistance in this research and then subsequently explained why the participant received the questionnaire, the usefulness of the research approach, confidentiality, contact information and a short thank you. This was done during the space of 90 minutes on 1st October 2018. A reminder email was sent on the 15th of October, which was more of a personal approach. This reminded people that there were another 15 days to complete and also reattached the participant consent form and the URL to the questionnaire. Upon analysis on the 30th October, an executive decision was made to extend the questionnaire by another two weeks. This was justified as necessary to gather more data and allow people not to be rushed to complete this work.

Data analysis

All questionnaires were analysed using the traditional qualitative research approach of coding. Coding is the process in which the researcher is identifying concepts, themes and topics of interest and finding relationships between them (Gibsons, 2017). For this research, I utilised a combination of thematic analysis and keywords to understand the responses from participants. During the entirety of coding, I became more conscious of the intricate detail of the responses and began to understand the complexities about this topic. The systematic process of coding was analysed with the help of separating each topic of interest into five sections in the questionnaire. From the initial coding analysis, the next step was to read and re-read responses to ensure that all critical data is captured and that all information given by participants is considered. As this research focuses highly on the reactions of participants and their perspectives, it was essential to retain the richness of the responses as it provides the most excellent detail.

However, the most challenging aspect of any qualitative research is to put the findings into a coherent and understandable format. Given that the responses allow for complex and provoking thoughts, it is evident that weaving out the ideas and opinions into the following findings would take time. But, as this is part of the research process, it enabled me to be more involved in the research and to understand the perspective of the researched better.

Conclusion

This Chapter has outlined the research methodology and methods used, as well as discussing the importance of understanding research positionality when conducting any form of academic work. From this, the research approach, criteria, human ethics considered were mentioned, which leads on into the journey of practising the research to conducting it. Data analysis techniques are indicated with the use of thematic analysis and coding to

understand how the study will be interpreted. The following two chapters explore the results of these based on the themes around urban forest awareness, current and future local council actions, community and stakeholder engagement.

Chapter 5: Urban forest management: Local council actions in New Zealand

Introduction

Chapter 5 presents the first section of results – the current situation of urban forest management in New Zealand. This Chapter addresses the primary objective, understanding the existing bylaws, plans, policies and strategies in LGA's across New Zealand.

Information is provided detailing the characteristics of the questionnaire responses, representation of councils, and how responses will be interpreted. From this, it will follow on to present the four themes of understanding urban forest management in New Zealand.

Characteristics of questionnaire responses

The questionnaire yielded a total of 45 responses, with eight omitted due to incomplete reactions. The 37 complete questionnaires represent 15 local councils across New Zealand. Table 2 displays the location of participants based on their regional location. As per the recommendation of the University of Canterbury Human Ethics Committee, no individual council can be identified.

Table 2: Participant responses based on regional location

Regions in New Zealand	Responses
Northland	3
Auckland	0
Waikato	3
Bay of Plenty	2
Gisborne	1
Hawke's Bay	3

Taranaki	1
Manawatu-Wanganui	2
Wellington	5
Tasman	0
Nelson	1
Marlborough	1
West Coast	3
Canterbury	9
Otago	3
Southland	3
TOTAL:	37

The occupation of participants was found to be diverse with multiple roles surveyed. As Table 3 displays, the highest occupation response was from 'city arborist/urban forester' with eight people compared to the role of 'landscape architect' which had only four participants. The use of the 'Other' category emphasised an aspect of councils that hadn't been fully explored by me as a researcher. People who selected this occupation had varying job roles that involved a department in which they reported to, but their job title was a flexible and often, was a diverse position. As Human Ethics required the identify of participants to not be identified in any capacity, it was decided that it was best to not detail each 'other' role as it is possible these are specific to each council.

Table 3: Occupation of participant responses

OCCUPATION	RESPONSE
City arborist/urban forester (or equivalent)	8
Ecologist (or equivalent)	5
Landscape architect (or equivalent)	4
Parks ranger (or equivalent)	6
Urban planner (or equivalent)	6
Other (or equivalent)	8

The responses have been categorised based on the size of the community living in each council. Intentionally, this was done to protect the privacy of participants and their council as well as providing a simple method to understand the impacts of different council activities.

Small: up to 50,000 people

Medium: 50,000 to 100,000 people

Large: 100,000+

General understandings of urban forests

As a baseline to understanding the context of urban forests in New Zealand was to explicitly ask how the term 'urban forest' had been used within their council and in their occupation (Q3). The majority of respondents expressed that their LGA did not use this term within their operations. However, some people acknowledged that as part of their occupation, the discussion has occurred surrounding the definition. It was also recognised that formal and

informal conversation settings were spaces for these discussions. The consensus for participants who said it had been used recognised it was a new term, but it was becoming a more common term across many councils.

One contributor who works in a large council emphasised the role in which their council has used urban forests:

> "The urban forest relates predominantly to the trees and forests growing in the public realm. [This includes] streets, parks, waterways and other areas of public open space…But, it also recognises the that private trees are a significant contributor to the services provided by the trees" – Biodiversity specialist, a large council

Another participant stressed that within their council, this term had mainly used in conversations about urban nature and diversity:

> "[Urban forests] is used to define the canopy cover within cities boundaries…to talk about urban biodiversity and urban novel ecosystems" – Ecologist, a large council

Urban forest planting

As the first aspect of urban forests, the planting of this infrastructure is the first step towards urban forests. Identified in Chapter 2, the use of bylaws are regulations governing the operations of an LGA. Within the framework of urban forest management, the guiding rules influence both local government activities and the public.

Table 4: Tree planting bylaws and policies and strategies

	Bylaws (4b)	**Policies and strategies (Q7b)**
Yes	5	20
No	17	10
Unsure	15	7

The use of bylaws concerning tree planting was found not to be represented in widely represented in this theme. Five participants selected Yes, but when asked to provide further information, there was no evidence supporting their selection. Upon examining those who were able to identify relevant data, two participants were able to recognise the bylaw within their LGA and provide a statement supporting their response. These participants were able to understand the planting of any plant or part of any tree must not be done on any council land, without the consent from the local council.

Paraphrased to protect the identity of the participant, one city arborist/urban forester stated:

> "The [large council] Parks and Reserve bylaw states: Without prior permission by an authorised officer, no person may (in a park or reserve) plant any shrub, tree or plant of any kind" – City forester/arborist, large council. (sic)

Given the assumption that bylaws are only used to guide a council activity (in consultation with the public), it was assumed these responses would only detail the public's responsibility to this topic.

However, when compared to policies and strategies, responses showed that there was an increased awareness of this type of management approach. These were found to be more

representative of the entire urban forest infrastructure (parks, plants trees) rather than one specific element. 20 participants questioned selected yes, which can be considered to be working knowledge of participants and their role in the council. Upon providing names and relevant details (Q7b), responses indicated that participants could recognise this information. These responses detailed:

- Bequest and donations policy
- Biodiversity Strategies
- District Plans
- Open Space
- Parks policies
- Reserves management plan
- Street tree management/policies and strategies

Participants across all occupations and council sizes were able to demonstrate that their capacity of knowledge about urban forest planting within their work. Although no specific reason was given for its use, it could be hypothesised that within New Zealand, the understanding of planting trees is seen as a response for councils to undertake rather than a guide for local government authorities to follow. However, these were found to be more related to the policies currently in the participant's several councils, rather than by laws. Additionally, it is assumed that the use of bylaws is not seen as a normative approach to planting more trees and vegetation across the country.

The knowledge of urban forest planting was found to be more represented in roles that would have direct interaction with this action. City arborist/urban forester and urban planning positions were more able to identify this subject and share that within their council, these existing plans are impacting on urban forest management.

Urban forest tree conservation and protection

Table 5: Urban tree protection and conservation

	Bylaws (Q5a)	**Policies and strategies (Q8a)**
Yes	16	12
No	5	8
Unsure	16	17

The interest of tree protection and conservation relates to understanding and maintaining trees within the urban forest canopy. As the urban fabric changes landscapes and creates new environmental issues, working towards protecting the existing canopy is a worthwhile endeavour. The results from this part of the questionnaire found that bylaws were more recognised as techniques for conservation and protection of existing trees. As Table 3 demonstrates, the most substantial portion of participants indicated existing bylaws for their LGA. Sixteen participants could identify relevant bylaws that involved District Plans, Parks and reserve and general public amenities bylaws. In line with findings from Stobbart and Johnson (2012), protection of trees was found to be more prevalent under protection guidelines such as the Notable Trees section than the identification of one tree within the area to be protected under any legislation. One participant highlighted the need to

understand the distinction in local councils between guiding tree planting through bylaws and policies and strategies;

> "[My council] works following the Notable Tree Policy and protection structures in place [as well as] a policy that protects trees from removal…These are more on policy than bylaw provisions."
>
> – Respondent, medium council.

Upon examining the occupation in context with this question, again it was found the city arborist/urban forester role was able to identify relevant bylaws and plans, policies and strategies. Further information shared detailed the Schedule of Notable Trees and their own District Plans in use within their jurisdiction. However, other roles in council such as landscape architects and urban planner positions did express and share relevant information.

Current and future urban forest plans in New Zealand

The future of urban forests is important to understand as it will set a precedent for the use of this infrastructure for years to come. Current plans in development for urban forests in New Zealand were found to be represented with a focus on plans, policies and strategies. The use of bylaws did not register significantly with participants with zero individuals selecting this option. Unfortunately, when asked to provide further comment, many people chose not to respond.

Table 6: Current and future urban forest knowledge[1]

	Bylaws (Q6a)	**Policies and strategies (Q9a)**
Yes	0	9
No	15	4
Unsure	12	16

The results when asking about plans, policies or strategies yielded responses that indicate this is under development across some councils (Q9a). Elaboration of these responses emphasised two different types of ideas. The first response was that some councils were currently reviewing relevant documentation. This included District Plans, Open Space policies and strategies, Reserve Management Plans and Street tree plans. Secondly, all participants from one large council identified that under development is a specific plan relating to urban forests. This plan was seen as a significant shift in environmental management for this council with a move towards combining tree policies and a focus on urban forest canopy and long-term tree health. The diversity of occupations who were aware of this policy was surprising and highlights the involvement of different departments of the council working together for a common approach/goal.

Occupations in this role who could identify current or future responses came from urban planners, parks rangers and city arborist/urban forester roles. Individuals who had selected the 'Other' category for occupations who worked in roles that can be considered to be

[1] This question was found to have a lack of responses from participants. Therefore, the total of 37 people is not represented.

involved in biodiversity, climate change and ecology did have the ability to identify relevant documentation that is considered to be a future direction for their council. However, it is unknown whether the knowledge of these responses come from awareness from the job or, shared information across departments.

Chapter 6: Urban forest engagement and support in New Zealand

Introduction

This Chapter focuses on the broader management of urban forests and the use of stakeholders (including the public) to be included in this thesis. As part of this research, four types of collective and individuals were recognised as valued and essential for better contribution and participation. First, the role of the public in urban forests is examined with responses discussing how councils communicate and what methods are useful for achieving results. Next, stakeholders internal and external are analysed to understand these roles interact with the council. The purpose of the central government is then discussed with the impact of the Resource Management Act reform as it is a significant contributor to how urban forests are represented in New Zealand. Finally, suggestions for mutual support and future directions of urban forests are presented.

Citizens and public input

As acknowledged in Chapter 3, the public is one of the most valued stakeholders for any local council. Given that urban nature has different meanings for people, a significant consideration is the implementation of an approach that engages people and allows for discussion about this resource. Question 10 asked about effective engagement techniques used to engage the public on tree/urban forest-related issues. The results showed two distinctive themes of responses; LGA's and the responsibility to engage with the public (under central government legislation), and direct engagement with communities. The use of council operations and the requirement of New Zealand councils to provide consultation opportunities were mentioned by multiple participants as the most effective. The use of public submissions was found to be the most common response with the shared idea across participants that it allows for open discussions with the community. This outlet was also

recognised as the most varied in terms of allowing people to have their say with multiple formats (in person, online, written) which allows for multiple people to have their say. However, it must be acknowledged that the use of the Local Government Act 2002 requires local councils to engage with the public on any current and future activities.

The use of practical techniques for creating direct engagement with people includes; community drop-in sessions, education outreach, meeting with interest groups (community groups, schools, stakeholders), planting days, seed swap initiatives, street and park meetings were mentioned by respondents. This proactive approach was cited as one of the main successes for one council, acknowledging that it allows for citizens to have direct interaction with the council and crucial issues relating to their city/town on a more 'personal' level. Along with these positive responses, two participants were unaware of any engagement techniques. This could be attributed to a lack of awareness based on the occupation of respondents, or it could be due to the lack of interaction the participants have with urban forests in their councils.

Two follow-up questions were asked inviting to participants to share their perspective on why the methods listed have been successful or unsuccessful. The successful engagement was mentioned by a respondent citing;

'Dealing with interest groups is more likely to lead to tangible results' – city arborist/urban forester, large council.

This emphasises the need to have the right people involved and similar values for creating a shared vision in a council and community. This was further echoed by another individual noting;

'Interested and affected parties [tend to] give full and frank feedback'. – Parks planner, unknown council

As important as the real successes are of engagement, unsuccessful methods must be discussed and shared to highlight how these systems can be better supported. One response identified that when it is helpful to have those people who already have an invested interest in the natural environment but, it can be challenging to capture people who are disengaged. This was found within this council when planting days would occur. Therefore, there is a need to encourage different people from all walks of life to participate in these activities. The next response shared that this council has limited trees that are protected within the District Plan. Therefore, people are often removing trees which could be nominated for protection but are not classified as 'significant'. This was seen to be a significant factor in which the private urban forest is needing better protection as the entire canopy extends to the private realm. The final response which relates to this question is that the method of using the internet and a council's website can be an issue as one participant views their site as ineffective for engaging people. With the new technological revolution and means of communication happening via the internet, this response can be extended to all councils. Without easy-to-understand and straightforward methods of communication, this can severely hinder the capabilities of people to engage actively. Even though councils use multiple forms of media, the internet is one resource that is now easily accessible (over other formats). Therefore, it is a must that councils work towards ensuring that any form of communication is not complicated to engage the public.

Maori consultation

The importance of consultation and engagement processes are vital tools used to support the relationship Maori has with local authorities across the country. As different

arrangements happen, the inclusion supports the essential exchange of information and knowledge between the two stakeholders.

First, participants were asked to share their knowledge regarding effective consultation and engagement techniques used with Maori. Traditional tools were recognised as the central theme in most responses, with the acknowledgement the need to respect indigenous culture and values within New Zealand. This consideration led to answers identifying that involving Maori and local iwi at the start of any process will result in successful engagement. This, and in combination with meeting onsite and in-person was a frequent action often used to aid inclusive and open communication. Oral communication was mentioned as the most effective technique with participants citing that Maori and other indigenous cultures recognise this to share ideas and knowledge. Another response shared by two participants (medium and large council) mentioned that a charitable trust and environment agency assists the local authority under the Iwi Management Plan. This was a fantastic response that I had not considered, and upon further research, these participants acknowledged an external organisation that balances the responsibilities of a local authority and the values of the iwi in the community. As mentioned earlier, the use of the Iwi Management Plan is relevant to resource management issues of the rohe (district/region). But, as iwi or hapu prepare these, it is only used as a guide to help local authorities. Furthermore, given that only several authorities have access to a plan, those few are likely to benefit from this resource. The remainder of responses shared specific strategies within local authorities and included sections which discuss legislative processes councils are required to undertake.

The need to understand unsuccessful techniques is queried with only one response. This answer from an employee in a large council who expressed that only one regional

representative was responsible for the voice of Maori people of the area. Having no local iwi input from this area, which covers a vast geographical region was an unpredicted finding – raising many questions. Unfortunately, this response did not provide any justification for their viewpoint. However, after this research concluded, this council appointed Maori representatives to different committees to increase Maori representation across the local authority (Hobsons Pledge, 2019). This can be considered a positive shift for, and with more time, the representation of Maori can be interwoven into all areas of this council.

Stakeholder input

Over time, it is clear that there has been a shift in the focus of urban trees from focusing on individual trees within a city to the entire urban forest canopy. This results in the need to discuss how all trees in cities and towns are managed and how the involvement of stakeholders can hinder or support any activity undertaken by the council. Therefore, it is vital to understand who and how these individual or collective parties represent diverse standpoints.

External stakeholders

The scope of external stakeholders that are incorporated in urban forest management is diverse and often, complex interaction. The identification of external stakeholders yielded responses that were inclusive to the idea that multiple interest groups and organisations do have an invested interest in urban forests. If we break this down into the occupations of respondents, all occupations could identify some capacity of involvement form.

Table 7: External stakeholders

Advisory boards/groups	Botanists
Community groups/organisations/trusts	Developers
Arborists	Ecologists
Government departments	Local iwi
Developers	Power companies
Tourists/visitors	Private property owners/residents
Schools	Transport operators

Upon examining the participant's responses, the most identified stakeholders were community organisations and private property owners/residents. This could be hypothesised as the most common interest for people in urban forest-related fields. Interestingly, the least common answer was the identification of local iwi, which was an unforeseen result, as the importance of Maori contribution is a crucial consideration.

Internal stakeholders

Based on occupations alone, participants identified multiple council operations involved in any urban forest activities undertaken (Table 7).

Table 8: Internal stakeholders

Arborists	Biosecurity
Capital operations	Developers
Landscape architects	Park officer/ranger
Property	Roading
Recreation and sports	Urban designers and planners

The representation of the surveyed occupation revealed that the profession of participants influenced some of the answers. As an example, a Parks and Ranger officer working for a medium sized council identified departments such as arborists, developers, property, landscape architects/design, roading and urban planners as part of the operations in council. If we compare this to a response from an urban planner (large council), the recognition of different departments was different. This participant acknowledged roles that are likely to be interacted with such as capital operations, developers, landscape architects, property, roading and urban designers and planners.

It is unclear whether these responses are due to engagement within their council with these departments, or if this is common knowledge to individuals. But, it can be thought that within these roles, the cooperation of several different areas of the council is needed to progress the part of urban forests in New Zealand.

Conflict in urban forest management

As part of urban forest management, there is a need to acknowledge how different perspectives can conflict with the ultimate goal of protecting the urban tree canopy. For example, different community groups and institutions will often have conflicting goals for different urban greenspace areas (Douglas and Ravetz, 2011). Since urban green infrastructure includes various types of greenspaces, it will interact with many different

stakeholders, or actors involved. Strategic, long term orientated approaches will often conflict with short-term gains from economics.

The first question relating to this topic asked participants to identify challenges that have been faced when engaging with multiple and sometimes, conflicting perspectives within stakeholder engagement. The main expressed viewpoint by participants was the need to balance conflicting interests with the overall goal of any engagement. Often, people felt that within their, processes having to balance these multiple needs were often challenging. It is understood that trees are sometimes a controversial resource, but numerous participants noted that it is hard to protect the entire canopy.

One participant who is employed within a small council mentioned that the actions of the public could have negative consequences for urban forests and often, those used to protect trees are confused at how the conflict occurs:

“One individual poisoned a row of elms in [council], but we did not have enough information to prosecute. Other healthy trees have mysteriously died quickly, usually where they are blocking a view from a property” – city arborist/urban forester, small council.

Unfortunately, this is not the only case of urban forest infrastructure damage. Recently, media has reported that many trees (often natives) have been poisoned or completely removed without any suggestion as to why this has occurred (Local Matters New Zealand, 2018).

Allowing for fair representation of perspectives and values is an essential part of council engagement, and often with engagement not being a linear process, this was seen as often creating some disengagement, rather than collaboration. This perspective extends to the

public with one respondent sharing that in one situation, the public wanted to preserve the tree, but the health of it was not viable to continue its maintenance. Another case provided shared the experience of having trees attacked and killed on public land for unknown reasons. Unfortunately, these challenges are often a long-term process with trying to balance these viewpoints but also ensuring that the goal of any councils intended activities are met. The final response mentioned that the lack of staff available to deal with these challenges and assist in working towards better management. This can be considered to be a reasonable response as within any occupation; there will be a need to have more human capital to ensure that goals are met. Finally, a lack of technical knowledge was emphasised as often; there is a need to tone down the use of academic and scientific ideas to the community as people were unable to understand the use of these tools.

When looking at external stakeholders and their role in urban forest management, the challenges of competing interests (especially occupations that provide essential services) can impact on any tree related activity. Participants identified that roles such as developers, maintenance workers and other necessary utility providers only view trees as a potential negative impact on infrastructure. This, coupled with political pressure to have trees removed for the development of a more urbanised environment, often enhances these challenges.

Overall, the challenges faced can be seen as a balance between allowing for multiple viewpoints to be shared and working with all interested parties to achieve a compromise.

Central government actions

The need to understand central government activities is critical understanding urban forest management at the local level, as the effects of this level of government will influence the activities and outcomes of local councils.

The response to the question "Are you aware of the recent legislative changes to the Resource Management Act that has impacted on the management of trees in your local council?" found that 95% of responses were aware. Across the occupations of interest, all jobs were represented in this answer. The impact of the reform was understood to involve the removal of blanket protection, in favour of councils conducting their processes first before any central government approval of trees. When asked to provide further comment about this change, multiple participants expressed that their council responded with a review of relevant documentation (mainly District Plans) and removed blanket protection. One participant who is an urban planner stressed that the change in blanket protection meant their council had to change rules to fit better with the law change;

> "We (our council) already [had] specific trees listed before blanket protection. This list has recently been updated, with the public being invited to nominate trees" – Urban planner, unknown council

Another participant also working as an urban planner, recognises the shift within their work;

> "[Council] responded with a change in [relevant] plans to identify certain tree groups following the RMA. [Now], we have removed blanket protection and [instead] have a list of trees on a property basis" – Urban planner, medium-sized council

The most discussed challenge is getting LGA's to understand the importance of urban forests. Participants recognised that at present, there is a gap of knowledge between trees and its associated benefits. Multiple people also shared that this gap is hindering its optimal management. From these results, it can be theorised that more recognition will create a

flow on effect into other resources. Gaining better support for urban forests will allow for better allocation of resources target towards urban forests.

Collective support for urban forests

With urban forest increasingly been being managed, planned and developed through governance collaboration, it can be thought that this resource is finally being understood to incorporate multi-interest and disciplinary groups (Konijnendijk van den Bosch, 2014). However, in many cases, urban forests will still require a government approach to enable to a shift from purely government acting in the best interest, to a collaboration with interest groups and the public towards a common goal.

In line with Britt and Johnson (2008), this research identified that restricted funding, knowledge, human capital and resources were often cited as constraints to adequate urban forest management and this study is no exception. As frequently as there is support for this infrastructure, there is a constant challenge to provide the level of support needed for those in occupations, which enhances and protects the canopy.

Participants were asked what collectively, all councils could do to assist in generating better support in the future for urban forests. The three themes of responses identified precise methods that would make a significant difference to any tree management. As a starting point, the recognition of the benefits of urban forests and the generated ecosystem services needs to be communicated better with the public. As one participant shared, protecting the private urban forest is a challenge as there is no ability to ensure any trees or vegetation is maintained as well as seen as valued by the community. Following on from this, better advocacy was needed to maximise the positive and minimise the negative impacts related to infrastructure provision. As essential as multiple services are to providing urban

environments, the need to raise awareness about the importance at the individual, community and broader public level offer opportunities for everyone to engage effectively and understand the role of trees. Finally, the sharing of information and better communication between councils was seen as one technique in which councils can collaborate and discuss how the urban forest can be protected better and how the activities of different councils can highlight different approaches, ideas and techniques that could be applied to other areas in New Zealand. Although there will be real opportunities for councils to meet as such the LGNZ Annual Conference, having a dedicated network of individuals who work in this field who can engage and share their perspectives. This will ultimately; a) improve the relationship between councils regarding supporting each other b) will allow better sharing of information and ideas and c) help ALL councils work towards better urban forest management.

Chapter 7: Discussion and conclusion

This Chapter concludes this piece of academic research and considers the key findings concerning the research aims and existing literature. Furthermore, it presents future research opportunities for this space and how this work can impact New Zealand.

A significant portion of research has identified that within urban settings, the contribution of trees and vegetation improves the environment and people. However, it is still evident that there is still a significant gap in terms of the research acknowledging this fact and the action of councils to plant, protect and manage urban forests. Therefore, we need to comprehend this situation entirely to be able to progress forward towards support in New Zealand.

This research looked at how the urban forest is supported in New Zealand, by central and local government authorities. Local councils were asked to contribute to this research space by allowing people in urban forest-related fields to participate in this work. This data was intended to focus on a mixed method approach, but the contribution of proper, qualitative data yielded better results and a deeper understanding of the participants. The data provided insightfully and sometimes, unexpected findings that highlighted how and why urban forests are not well supported across the country.

The proper management of urban forests as a resource in cities and towns is vital to enhance liveability and its value. The increasing awareness of this type of green infrastructure means that skilled professionals are needed to manage and sustain this type of public resource (on private and public land). Therefore, identifying the knowledge of people who work in the public field of urban forests is needed to perform crucial tasks that will continue to provide long-lasting benefits for citizens. With this, it means that the most

benefit can be obtained from urban forests and employees can keep up with the ever-changing space of using science to help generate more awareness and plans for supporting this infrastructure.

Research questions

The first question was to understand what existing bylaws, plans, policies and strategies at central and local government influence urban forest management. The use of bylaws was found to be only prevalent in protecting urban forests and used more as a tool by councils to ensure adequate protection is given to significant trees. Plans were representative in all themes with the consideration that future urban forest projects may use a plan to help as a guide. The use of District Plans was commonly referred to within tree protection as the Schedule of Notable Trees are required to be indicated annually. Policies were a typical response in many councils to urban forest management and with consultation, was found to be used often when LGA's want to ensure there is input from all relevant parties. Finally, strategies reveal a more in-depth response to the intentions of a council and the activities that are taken by different departments and their viewpoint.

The second research question required participants to share what barriers and challenges are impacting on the current situation and future development of urban forests. Responses indicated that three main key ideas of thought exist regarding obstacles and difficulties. Firstly, conflicting interests by multiple parties were found to be a typical response. The ability to find a comprise that still represents the interested groups or individuals often can be challenging, as participants shared. But, there is an awareness that without proper engagement, it would be near impossible to have a thriving urban forest that is supported by the public and stakeholders. Challenges with the current situation of urban forests included the lack of awareness within the public about the benefits associated with trees,

and its importance. Unfortunately, responses did share that negative actions such as vandalism and removal of trees can occur and often, this does not lead to prosecution. Therefore, the idea of education and communicating effectively with the public is suggested to help work towards generating support, instead of disengagement.

The third question involves identifying external and internal stakeholders and their impact on the local council. Respondents shared that external stakeholders can include parties such as arborists, community groups, central government departments, local iwi, private property owners/residents and schools. Depending on the value held by these groups, it can impact on the actions of the local council. The most diverse perspective in this question can be considered to be the public, as it involves the entire community, which represents multiple perspectives. But, this was seen as not a bad thing – as it creates more robust discussions and engagement.

Internal stakeholders indicated that the multitude of departments is diverse and sometimes, conflicting with the idea of trees in cities. Examples such as capital operations and developers were found to be the department that could create conflict between interests of planting trees compared to using more land and resource for housing and providing essential infrastructure for the increase in urban populations. But, there is still the consideration that other departments can also create tension between occupations which support green infrastructure and those which hold a very different perspective.

The fourth research question was to understand how local councils engage with the community/public on urban forest-related issues. Multiple forms of communication and media were recognised but holding discussions and talks, and opportunities for submissions were found to be the most effective. This was seen as often people were able to express

their personal opinion on a deeper level and be open to expressing their perspective within a respectful space. The shared idea that allows people to communicate on a level that provides equal representation of views was seen as an invaluable resource for councils.

The fifth question asks how about the impact of the Resource Management Act reform in 2009 on managing urban forests. These responses identified that there is no sufficient protection of urban trees at present and the current process of approval by councils before nomination to central government creates more tasks for councils. The understanding that trees now are going to be challenging to protect places responsibility on the local government level to adequately govern trees in it's jurisdiction.

The sixth question focuses on identifying if there are any frameworks, documents or initiatives in development across any council. The answer to this question is: YES! Although the New Zealand Council is required to review all documentation under the LGA Act 2002, a few councils across the country have begun the process of creating new plans and policies. These responses have come from large councils who have a large population and sizeable urban sprawl to contend with in these areas. As a point of highlight, during this research, Auckland City Council released the 'Auckland Urban Ngahere (Forest) Strategy' providing goals for the future to achieve. This identified how this research space had given the councils some assistance in justifying the protection of urban nature. After already having the 1 Million Tree program (Auckland City Council, 2018) to plant an entire forest in Auckland, this adds more justification for urban trees. Moving forward, it is hoped that this trend will continue, and the contribution of science and evidence-based research can further progress urban forests.

The final question asks people to suggest what could assist in providing better support for urban forests in New Zealand. The answers to this question were obvious – communication with the public, advocacy and improved communication between councils were suggested. Communicating effectively with the public was not seen as a fantastic response as it is a constant and complicated process that requires multiple tasks and responsibilities. Advocacy was more seen as an approach to communicate how the public can recognise urban forests as an essential component of urban life: research has shown nature is beneficial to us but, we need to advocate and communicate this to the broader public and even stakeholders who will have an interest that is not the same. In terms of council actions, the corporate entity that is a local government in this country can be a driver in the shift towards better urban forests. Communication between councils will happen naturally as people in these roles interact with each other. But, there was a strong desire expressed by respondents that having a network of councils who share information and collaborate will yield better results.

Additionally, it will provide an outlet for people to share the successes and failures about how to govern urban forests. The support from central government support will assist significantly in the form of different avenues. But, as local councils govern how our cities are guided and supported (or hindered), this needs to be consistently recognised. Local Government New Zealand, which is responsible for overseeing all council activities can also be the forefront of ensuring that trees and space for this green infrastructure are considered essential for urban life.

Policy implications

The outcomes of this research have identified some policy implications that are going forward, can be used to help advance urban forests in New Zealand. As an initial point to this research, the support for this infrastructure by local councils is an essential contributor to how cities can enhance their urban fabric and spaces with nature. However, there is still a gap between how the central government could assist in driving this shift and the actions that could improve the situation for local councils to manage trees in their jurisdiction. The Resource Management Act reforms has impacted the urban forest negatively by removing blanket protection and creating more hoops for councils to go through to achieve the security that only protects significant trees. However, there is still a possibility for trees to have other forms of provisions based on it's importance. Furthermore, as councils are starting to work towards better management practices and strategies for protection of trees, the central government are able assist and further develop this process.

Further research questions

Given the nature of research, it is only a reasonable consideration to ponder how different or new items can change the outcome and perspectives in your research.

1) Understanding how and the frequency of participants (in their occupation) has some involvement with urban forests

   The level of involvement within these roles will likely be dependent on their support. Therefore, understanding how often these interactions occur can highlight how supportive a council or role supports trees.

2) Questioning how a participant has been employed in their current position.

This could significantly influence the impact of how experience within a role can allow someone to engage more directly with urban forests.

3) Questioning participants about how they were aware of the 2009 Resource Management Act reform.

It can be understood that the 2009 Resource Management Act reform did have significant impact on the protection of trees. But, understanding how people working in these fields became aware of the changes could assist in showing how the management approach used by central government was announced.

4) How the use of different communication methods impacts the contribution of citizens and their engagement with urban forests

Identifying the type of communication methods was one research question that yielded responses that were unexpected. As written submissions were found to be the most effective, it can be thought this does require councils and people to share their perspective on projects. But, this research did not identify how the contribution of the public has on engagement. As a question, how do different communication techniques impact the contribution? Is it possible that with the use of other forms of engagement would generate a different response? This can be seen as more looking outside of traditional engagement techniques and focusing on how people are currently engaged in other areas of council work. As other councils have worked on including people through council driven activities specific to trees, it would highlight how New Zealand could use these different methods to engage the public.

5) How can the urban forest be better supported within the private realm?

Given that the majority of the urban forest is located on private land, the role of council activities on public land extends so far. Trees on private land are able to contribute the same ecosystem services on private land – the only different is the location. Enabling the public to enhance and protect trees on private land through possible advocacy, education and outreach could be productive. However, more research would need to identify supporting tools for protecting the private canopy.

Limitations

As an important of any academic research, acknowledging the weakness within any work is an essential component of understanding improvements. Throughout this research process, I have reflected on the work I have conducted and how my positionality and understanding of my field of interest has been impacted.

If this research were to be built upon and improved, it would be appropriate to offer some reflections on the questionnaire.

Firstly, the process of recruitment did impact on the contribution of participants to this research. Using a two-method approach (council form / email) was not overly effective as responses from councils would often be slow. The council form approach did allow for a reference number to be given for further contact (upon initial communication) but at multiple times, there was no response from an authority. This was found evident in the contact with multiple councils: after sending multiple initial communications, there was still no response. This was also found to be a common occurrence with email communication. When it was decided to release the questionnaire, these councils still had not communicated and therefore, had to be excluded.

The nature of this study utilised the questionnaire collection approach using online software to collect and analyse data. Considering the limitation of allowing people only to be engaged through this type of media, it can be seen as not allowing for other options to be considered. Further research could establish multiple methods of communication, in the aim to understand also how people who work in the council can be interacted with. As the use of email and online questionnaire can be seen as the normal technique to conduct human research, other techniques could be utilised to offer different options for participants.

Secondly, a limitation is the participant's occupations selected to participate in the questionnaire. Given that the urban forest is a multi-functional resource, multiple departments in council will have contact with trees. But this questionnaire only looked at council roles which will support the establishment and planning of trees. As a result, it is not fully understood how the views that conflict with vegetation, can be discussed to help a better understanding of how to reach compromises, rather than create tension between different areas of the council. Possible questions that could provide a response could include simple questions such as ‘Given the conflicts associated with urban forests within other local council departments, how could other departments interact better to achieve a common goal of protecting urban trees?’ or ‘How could the urban forest be prioritised as important infrastructure by other departments who may have conflicting views?’

The next limitation is that the questionnaire focused on people who worked in urban forest related occupations. As a result, participants were likely to hold a position that supports trees. However, this does not provide a representation of those who have conflicting standpoints. Therefore, further research could aim examine how opposing viewpoints can

generate conflict. These roles could be examined from identified stakeholders with conflicting views from this research. However, it is possible to also examine roles in the wider community. This could include contracted work which has no employment within a council such as power companies, businesses, property developers or even arborists. Given the diverse perspectives that are part of urban forests, there is a need to understand how these roles can challenge the urban tree canopy.

Conclusion

This thesis examined the role of urban forest related occupations and the knowledge of these roles in relation to governance and legislation. This was done by investigating the knowledge of governance processes and legislation related of people occupying these roles. Urban forests have been well researched with emphasis on the importance of this infrastructure in cities. However, understanding the context of governance, stakeholders and relevant parties is essential for creating diverse urban forests.

During this thesis, I researched seven research questions focused on understanding the knowledge of occupations involved in urban forest management and the diversity of stakeholder interests and engagement processes. This research found that a) existing knowledge of urban forests is known but different occupations have a varied understanding of how this resource is utilised within council. Additionally, it found that b) external and internal stakeholders involved in urban forest management is diverse which impacts on the delivery of urban forests.

The contribution of this research is to further advance the understanding of how urban forests are managed with the integration of relevant stakeholders and governance approaches. A multitude of academic articles have been discussed the ecosystem services generated from trees but, minimal research examines how planting, protecting and management of urban forests occurs so it can provide these services. Therefore, this work aimed to bridge the gap by providing information about the New Zealand context while discussing management approaches within LGA's and the use of stakeholders to create a robust urban forest.

The results from this research could lead to further advancements for this field of work. As a starting point, it could generate discussion and exploration about the effectiveness of governance approaches and how interested stakeholders work together collaboratively to advance the urban forest. This could lead to a shift in the understanding of how different occupations are involved in urban forests and how various roles are excluded or included in the management, depending on their position. Finally, the impact of this research could extend to the New Zealand government in response to assisting local councils. This research identified that multiple participants felt that the removal of blanket protection created a vulnerability in the protection of urban forests. As a result, this could generate a conversation about how this reform could be amended or possibly removed to regain protection of urban trees. Moreover, as the identified barriers to adequate management include funding, human capital and resources were seen as barriers to adequate support. The central government could assist in providing these resources to help advance New Zealand cities and towns towards adequate urban forest management.

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Appendices

Appendix A: Emails to council

Hello [Council name],

My name is Stephanie Fong and I am a Master of Forestry Science student at the University of Canterbury in Christchurch. At present, I am studying a research-based thesis titled 'Establishment of New Zealand's urban forests: Governance and legislation'. This investigates the role of local councils in New Zealand in protecting and planting the urban forest. I am under the supervision of Dr Justin Morgenroth and Emeritus Professor Eric Pawson.

The main aspect of my thesis is a questionnaire aimed at people who work for the council in an urban forest related occupation. The reason for this is that participants will have a more diverse viewpoint allowing for a stronger basis for understanding the issues in urban forest management in New Zealand. All local councils in New Zealand will be invited to participate in the questionnaire as it will create a broader dataset and a wider viewpoint.

I am contacting all councils to start the process of finding suitable participants for this research. I would like the names and contact details of four individuals from each of the following occupations (if available):

1. Landscape architect
2. Parks ranger
3. Urban planner
4. City arborist/forester

For the ideal participant for this research is a person who is involved in day-to-day activities related to trees and greenspaces managed by the local council.

As a request, may I please have the contact details of the people who are suited to the requirements of this research?
If you have any questions, please do not hesitate to contact me or my primary supervisor, Dr Justin Morgenroth.
Email: stephanie.fong@pg.canterbury.ac.nz,
justin.morgenroth@cantebrury.ac.nz

Thank you very much,
Stephanie Fong

Appendix B: Email to participants (consent provided)

Good afternoon,

As previously indicated, you or your council expressed an interest in participating in a Master of Forestry Science thesis project titled 'Effective Management of New Zealand's urban forest: Governance and legislation'.

Depending on the communications between the council and myself, I am sending this email to inform you that the questionnaire is available for responses.

If you are unaware of this research, please speak to your employer. However, you are welcome to contact me, and I will happily discuss this research before your participate.

The questionnaire has been officially been opened today (1st October) and will be open for 20 working days (closing 28th October).

Please visit the following
URL: https://canterbury.qualtrics.com/jfe/form/SV_0jNr4AJzUiVI0lL

If you are unable to complete the questionnaire within the specified timeframe, please let me know and I will endeavour to accommodate your requirements.

Thank you very much for your participation,

Stephanie Fong

Appendix C: Questionnaire reminder

Good morning,

RE: Urban forest management in New Zealand: Governance and legislation

You were recently invited to participate in a questionnaire, aimed at understanding urban forest governance and legislation in New Zealand. The questionnaire focuses on understanding the current New Zealand context as well as community consultation/engagement, governance, legislation and policy.

This is a reminder: The questionnaire will end on Friday 26th October (tomorrow) at 11:59pm.
The questionnaire takes approximately 10 minutes to complete and is strictly confidential and anonymous.

Your feedback is critical as this research will contribute to the understanding of how urban forests can be better managed and protected.

If you have any queries or comments about the questionnaire or the research study, please contact me.

Thank you again for your valued contribution to my research!

Stephanie
0272322980

Appendix D: Questionnaire

Default Question Block

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School of Forestry
Forestry Road
University of Canterbury
Christchurch
Phone: (03) 369 3500
Stephanie Fong
Phone: 0272322980
Email: stephanie.fong@pg.canterbury.ac.nz

Effective management of New Zealand's urban forest: Governance and legislation

You have been invited to participate in a research study about New Zealand's urban forest. This study is conducted by Stephanie Fong - School of Forestry, University of Canterbury as part of the Master of Forestry Science degree. The title of this research is "Effective management of New Zealand's urban forest: Governance and legislation".

Due to your employment and occupation within a local council, you have been identified as having a key role to urban forest management.
If you choose to participate in the study, you will answer an anonymous questionnaire relating to governance and legislation around urban forests managed by local councils in New Zealand. There are five sections to this questionnaire which will take no longer than 15 minutes to complete. Your completion of the questionnaire will be considered as consent to participate in this research.

Participation is voluntary, and you have the right to withdraw at any stage throughout the questionnaire without penalty. If you withdraw, I will remove all information relating to you. Furthermore, you may ask for your raw data to be removed or destroyed at any point. With the anonymity of the questionnaire, removal of data will involve identifying yourself and I will remove the data from the research. However, once analysis of raw data begins, it will become increasingly difficult to remove your data.

The results of this research may be published, but you may be assured of complete confidentiality of data gathered in this investigation. This survey gathers no identifying information about you as an individual participant (e.g. name, age, gender) with the only identifiable information gathered is the council you are employed by and your occupation. This is done specifically to distinguish viewpoints between local councils and various urban forest issues/topics.

Data gathered from this research will be stored on the University of Canterbury server, Qualtrics (software) server and a back-up located on a password-protected USB. The USB will be stored in a locked cabinet on the University of Canterbury (on campus) or will be in the possession of Stephanie Fong (off campus). As per the University of Canterbury Human Ethics Committee requirements, all data will be destroyed after five years.

Access to the results from this questionnaire will be shared with two academic supervisors, Dr Justin Morgenroth and Emeritus Professor Eric Pawson.
A copy of the results can be provided to participants upon request which will summarise the responses by participants.

Justin Morgenroth and Emeritus Professor Eric Pawson are able to be contacted via email: justin.morgenroth@canterbury.ac.nz and eric.pawson@canterbury.ac.nz

If you have any questions regarding this research, please contact my senior academic supervisor in the first instance: justin.morgenroth@canterbury.ac.nz

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

Participants should address any complaints or concerns to:
The Chair - Human Ethics Committee
University of Canterbury
Private Bag 4800
Christchurch
OR: humanethics@canterbury.ac.nz

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GLOSSARY

Bylaw: Regulation or rule which is made by a local government authority.

Legislation: A law (Act) made by a Government.

Plan: Sets out the plan in which a strategy will be implemented.

Policy: A course of action that will use the principles of any Plan.

Stakeholder: A person, group or organisation that has a vested interest on an issue.

Strategy: Outline of aspirations for a council designed to achieve a long-term aim.

Urban forest: Collective term used to describe all trees and vegetation located on private and public land in urban areas.

SECTION A.

. **SECTION A: The following questions relate to your occupation and bylaws within your local council.**

Q1.
Select the local council you work for:

Q2. What is your occupation/position at the respective local council?

- City arborist/forester (or equivalent)
- Ecologist (or equivalent)
- Landscape architect (or equivalent)
- Parks ranger (or equivalent)
- Urban planner (or equivalent)
- Other

Q3. In what ways has the term 'urban forest' been used in your local council?

Q4a. Does your local council hae any current by laws related to tree planting?

- Yes
- No
- Unsure

Q4b. If yes, please provide names and brief details of the relevant bylaws:

Q5a. Does your local council have any current bylaws relating to tree protection or conservation?

- Yes
- No
- Unsure

Q5b. If yes, please provide names and brief details of the relevant bylaws:

Q6a. Are there any bylaws that are currently being developed by your local council that relates to urban forests?

- Yes
- No
- Unsure

Q6b. If yes, please provide names and brief details of the proposed bylaws:

. **SECTION B: The following questions relate to your occupation and plans, policies and strategies in your local council.**

Q7a. Does your local council have any current plans, policies and/or strategies related to tree planting?

- ○ Yes
- ○ No
- ○ Unsure

Q7b. If yes, please provide names and brief details of the relevant plans, policies and/or strategies:

Q8a. Does your local council have any current plans, policies and/or strategies relating to tree protection or conservation?

- ○ Yes
- ○ No
- ○ Unsure

Q8b.
If yes, please provide names and brief details of the relevant bylaws:

Q9a. Are there any proposed plans, policies and/or strategies that are currently being developed by your local council that relates to urban forests?

- ○ Yes
- ○ No
- ○ Unsure

Q9b. If yes, please provide names and brief details of the relevant plans, policies and/or strategies:

SECTION C.

. **SECTION C: The following questions relate to stakeholders invovled in local council and urban forests.**

Q10a.
What methods are you aware of that have been effective for engaging with the public about urban forests?

Q10b. Why have these methods been sucessful?

Q10c. What have these methods been unsuccessful?

Q11a. What internal stakeholders interact with urban forests in your local council?

Q11b. In what ways are these stakeholders interacting with your local council?

Q12a. What external stakeholders interact with urban forests in your local council?

Q12b. In what ways are these stakeholders interacting with your local council?

Q13a. What methods are you aware of that have been effective for engaging with Maori and local iwi about urban forests?

Q13b. Why have these methods have been successful?

Q13c. Why have these methods been unsuccessful?

Q14a. What challenges has your council faced when engaging with multiple stakeholders?

Q14b. Have you encountered any stakeholders whose interests conflict with urban forests?

- ○ Yes
- ○ No

Q14c. If yes, please provide information about the challenges associated with this issue:

SECTION E.

. SECTION E: This Section asks questions about the relationship between local and central government and urban forests.

Q17.
What legislation are you aware of that impacts urban forests in New Zealand?

Q18. Are you aware of Iwi Management Plans created by local iwis across New Zealand?
If unsure, please move to Question 20.

- Yes
- No
- Unsure

Q19. How does your council use the Iwi Management Strategy by local iwi to guide urban forest decisions in your local council?

Q20a. Are you aware of the recent legislative changes to the Resource Management Act that has impacted on the management of trees in your local council?
This is specifically referring to the removal of blanket protection for trees and instead requiring local councils to nominate notable and specific trees before approved for protection.
If unsure, please move onto Question 21.

- Yes
- No
- Unsure

Q20b. How have the recent legislative changes to the Resource Management Act impacted on the management of trees within your local council?

Q21a.. Would a better understanding of legislative Acts (including the RMA and LGA) help support planning and/or management of urban forests?

Q21b.. How would this assist with your work in local council operations?

Q22.. What support could central government provide (e.g. funding, policy statement, research) that would assist local councils in supporting urban forests?

Appendix E: University of Canterbury Human Ethics Committee Approval Letter

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN ETHICS COMMITTEE
Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2018/58/LR

24 September 2018

Stephanie Julia Fong
Forestry
UNIVERSITY OF CANTERBURY

Dear Stephanie

Thank you for submitting your low risk application to the Human Ethics Committee for the research proposal titled "Effective Management of New Zealand's Urban Forest: Governance and Legislation".

I am pleased to advise that this application has been reviewed and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your emails of 27th August and 10th September 2018.

With best wishes for your project.

Yours sincerely

pp. R. Robinson

Professor Jane Maidment
Chair, Human Ethics Committee