



OPTIMIZING THE SELECTION AND PLACEMENT OF ORNAMENTAL PLANTS IN URBAN DESIGN

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Abstract :

The paper describes the findings of a survey conducted to determine the relationship between certain ornamental plant arrangements and landscape preference as well as perceived restorativeness. This study can, therefore, supply a lot of information on what aesthetics and psychology are capable of producing in respect to particular plant associations and hence suggest better ways for making an urban environment more restorative. Discussion will be centered on both general conclusions and case-specific ones with regard to their implications for urban greening including recommendations for research-based landscape design and future studies.

In order to collect all the available information on urban landscape plant selection and use, a literature review was undertaken. The purpose of this review is to put together research findings and recommendations on plant selection and use in urban areas. Plant attributes like size, form and function are considered along visual and functional aspects of landscape aesthetics. This paper discusses how important it is for plants to adapt themselves to the site where they are grown or planted so that they can grow well with little maintenance. This review seeks to serve as a valuable resource for urban land developers who desire information about choosing appropriate plants, in order to design and maintain low-cost, visually appealing, and eco-friendly city landscapes.

Keywords : ornamental plants , urban design , optimization , green spaces , landscape architecture

I. Introduction

Ornamental plants and trees have been widely used in urban landscapes for centuries. They are used for more than just beautifying the urban environment; they serve the useful purposes of providing visual screens, reducing glare and reflection, and creating an ambient feel. It is therefore difficult to separate plant planning from other aspects of urban planning. It is generally considered one of the elements that contribute to the success and appeal of a website, and can be a relatively inexpensive way to make a website more aesthetically pleasing. In many cases, thoughtful plant selection and placement can increase the overall value of a property more than the cost of plants and their maintenance.

For these reasons, urban planners must carefully consider the use of ornamental plants in addition to traditional methods of shading and framing. Changes in the availability of certain plant species should not be forgotten as a new limitation for urban planners. For example, the invasion of the emerald ash borer in parts of the United States and the resulting destruction of ash trees forced planners and designers to consider alternative species for street trees. Finally, when looking at plants in an urban environment, one must recognize that plants are living creatures and their lifespan is limited. This can have a positive effect because certain plants can be selected for a specific life cycle, with their size and shape accentuating the site and other plants can be planted after them. On the other hand, because plants are prone to damage and disease, this can sometimes lead to the unexpected removal of a plant and its replacement by less desirable vegetation.



1.1 Importance of ornamental plants in urban design

In order to offer clean and definite statistics about the significance of ornamental plant life in city design, step one on this paper is explaining the position of city layout itself. A good urban layout isn't always only seen visually but it has to include practical and aesthetic values. But it's no longer an clean activity to create an excellent urban design that follows the Milton Keynes Goals of Purpose for Urban Design that is to create an appealing environment with a sturdy individual identification, a well-designed

and nicely-built place with appealing public areas, buildings and facilities, an surroundings that has a excessive popular of amenity for both present and future generations, an available surroundings that is secure and smooth to move around, and an environment that should be green to support viable and sustainable groups. Based on the dreams above, we are able to conclude that both city layout and the goals want a serious attempt to gain it. One of the simple efforts that may provide a vast effect on the urban layout is via including decorative flowers.

Usually, people are given a clean description of the function of ornamental flowers is just for ornament. But when it is pointed out in a primary idea, the decoration isn't simply an art. It has to give a supportive environment or environment to the region. And that is the factor where the decorative flora have a great position in developing a great urban design.

1.2 Benefits of optimizing plant selection and placement

In order to demonstrate the full potential of landscapes in urban design, there have been many studies that have shown the positive impacts that landscapes can have. Consider a study done which involved a number of families living near a public housing estate. It was found that broken areas of turf, intermittent or no pavements, lack of public parks, and a lack of landscaping were all associated with higher levels of fear and stress among the residents.

This confirms that landscapes can greatly impact the way people feel about a certain area. Another study was conducted in East Perth on the effects of streetscape and landscaping on the perceived housing environment. Questionnaires were taken by residents before and after landscape redevelopment of specific streets. Results showed that the importance of streetscape to the overall environment of the area was increased after redevelopment and there was a significant increase in the preference to invite friends to the house. All of this helps to prove that landscapes can have a significant impact on people's interaction and quality of life.

Urban landscapes have the potential to be notably enhanced by the addition of healthy, well-placed ornamental plants. This can greatly improve the ambience of streets, plazas, and other areas where people might gather. Landscapes that have many trees and high-quality landscapes are perceived to be higher in quality, better maintained, and a more inviting place. Landscapes can also impact people on an emotional level, create a positive reaction, and therefore reduce stress and anxiety. Improving the visual amenity of a place can result in people interpreting the area as a safer place. This can lead to more use of public spaces and increased interaction between members of the community.

Placing more unique trees and landscapes can lead to an increase in the identity of an area. This can be particularly important for tourism or in the gentrification of areas looking to boost esteem and economic investment. It is necessary to take into consideration several environmental factors when it comes to plant selection to increase urban sustainability. An example includes the use of trees and shrubs instead of grass to promote water-efficient landscapes. Stressed too are the many benefits gained by increased urban greenery and high-quality landscapes, and the need for consideration of plant selection and placement to achieve this.

II. Factors to Consider in Plant Selection

The species and cultivar chosen for a site depends on several factors, all of which might also impact the plant's growth and survival. Climate and environmental factors restriction the types of plants which can be used to panorama a particular web page. Without proper consideration of these elements, this system is probable to encompass plant life with the intention to now not survive or perform properly ensuing in better maintenance fees and viable plant alternative.

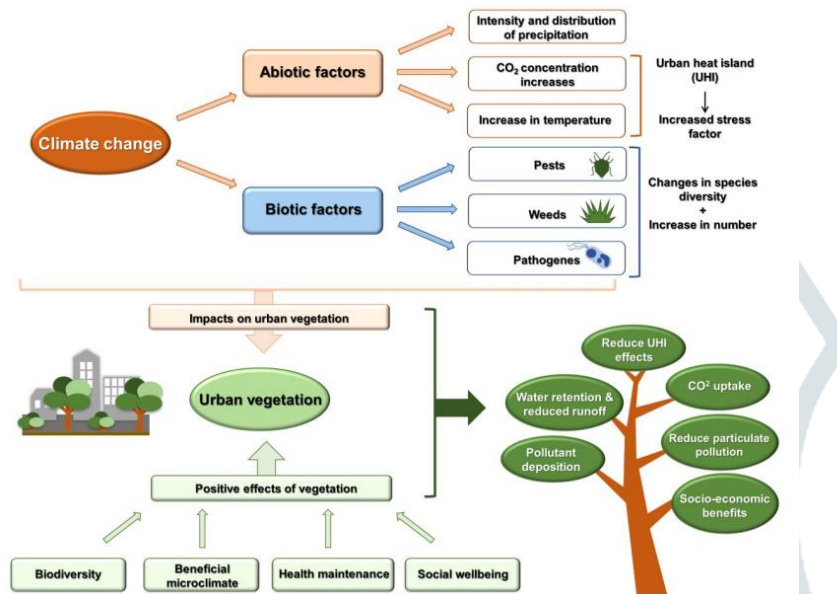
Temperature extremes, both excessive and coffee, are critical factors to recall when deciding on vegetation. High temperatures restriction plant choice by using limiting the number of appropriate species to those which could tolerate the high warmth. Similarly, low temperature extremes may be a restricting issue for plant choice, particularly while a website is located in a region which reviews subfreezing temperatures. Duration and severity of temperature extremes can similarly restriction plant choice to most effective the most hardy species.

Precipitation and soil moisture are also critical factors to don't forget while choosing flowers. The quantity and frequency of a website's rainfall or irrigation regime may also restriction plant selection to the ones which are both drought tolerant or tolerant of excessive soil moisture. Soils with bad drainage can even restriction plant selection to species that can tolerate moist toes. Windy web sites can situation flowers to mechanical damage so cautious consideration must be given to plant choice in these regions.



2.1 Climate and Environmental Condition

As well as climate, soil conditions play a massive component in figuring out plant achievement and can often be a limiting factor. Often city areas can have heavily modified or even closely polluted soils which have very little resemblance to the original soil prior to urban improvement. This can impose stresses on plants, with the intention to have tailored to herbal environments and unique native plants. Highly acidic, alkaline, or saline soils which might no longer typically be related to city development may be a end result of industry and may impose severe boundaries to plant boom, regularly developing poisonous conditions for plant life by means of affecting nutrient uptake and plant metabolic strategies. Ashworth et al. (2004) gives a great contrast among copper tolerant and non-tolerant populations of *Festuca Rubra* in regions surrounding motorways in Britain. Other soil obstacles may be structural, along with soil compaction normally discovered in city and peri-urban turf areas, and recent studies has looked at the results of soil compaction on tree root boom and fulfillment. The improvement of environmentally pleasant composts and soil conditioners has caused the promoting of the use of mycorrhizal fungi inoculation, that's essential for plant boom on urban websites with poor soils.



Discussion of climate is essential in determining appropriate plant life, and equally the most critical aspect in ensuring plant fulfillment in urban areas. Climate can be characterised by environmental elements inclusive of mild, temperature, wind, and moisture. All at once affect plant growth and survival through changing basic physiological functions inclusive of photosynthesis, transpiration, and respiration. A quantifying information of a plant's climatic requirements can handiest be carried out if the precise climate parameters of an area are acknowledged. Recently, Geographic Information Systems (GIS) generation has been used to create consumer-pleasant climate maps by means of masking records maps of kingdom and weather variables including temperature and rainfall. This has been used to increase weather statistics analysis to fit plant requirements in software program packages including CLIMEX and Soil Plant Analysis Development (SPAD). Stepney et al. (1999) discusses suitability of tree planting in Adelaide by the use of SPAD to examine moisture necessities of *Eucalyptus* species with area soil moisture deficits. Recent research has additionally checked out results of weather and developing situations on plant purposeful and eco-physiological attributes which might be possibly to become an critical area of research due to the upward thrust of world climate alternate and the need for plants to provide essential environment offerings.

2.2 Maintenance necessities

The protection necessities of a plant are critical as they make a good sized contribution to the general cost of a panorama. According to Bumgarner (1989), "Rigorous pruning and care may additionally have a quality charge of return for the ones plants with lower initial, status quo and replacement costs." The remark displays the importance of a plant's average aesthetic to its cost. Fromm (1998) gives an in depth instance of preservation prices over the lifestyles of a plant. The instance was derived from a upkeep fee sheet for the town of Beverly Hills, California, USA. It information the prices of a 15-gallon smaller Australian fern pine and a 24-inch field-sized Eastern Redbud over a ten-year length. Each plant were evaluated in categories which blanketed: people compensation and legal responsibility, personnel' hourly pay which include advantages, town hired studies and seasonal plantings, general device fees, repair and alternative device prices, and overall plant supplies. The expenses for the fern pine were approximately \$2100 a year totaling over \$21000. The charges for the Eastern Redbud have been approximately \$250 a year totaling \$2500.

Maintenance necessities confer with the overall care a plant wishes as a way to sustain its health and an acceptable degree of aesthetic for its supposed use and anticipated lifestyles span. Although this could be difficult to quantify, there are many forms of general upkeep that have direct costs. These include guy hours for responsibilities along with pruning, irrigation, fertilizing, and pest/sickness manage. Other expenses may additionally encompass the acquisition of specialised device, restore and replacement of broken device, and the greater renovation and protection provisions around flowers that may be risky to the general public or employee fitness.

2.3 Aesthetic enchantment and design objectives

In relation to visible impact, the important thing objectives are regularly to enhance the appearance of an area (e.g., a street, vehicle park, park) to make it greater inviting and/or to create a specific identification which separates a particular region from its surrounds. Enhancing the advent of an area is an apparent and common goal and is frequently tied to the introduction of a place wherein people want to gather. The significance of identification to a particular area is much less commonly recognized; however, it's miles regularly the maximum successful method of reaching a clear difference from purposeful outcomes. An vicinity with a strong identification will become a vacation spot in itself and can acquire better visitation costs than comparable areas without wonderful identification. Higher visitation costs have implications for social outcomes and upkeep of the vicinity in query.



Design targets are regularly implicit and undefined. However, an know-how of the relative significance of every objective is important in prioritising areas for planting, selecting suitable species, and attaining the favored final results. While the difference between function and visible impact isn't always usually clean, aesthetic concerns underlie all planting choices. The visible attributes of colour, shape, texture, and sample are the primary equipment to be had to designers in growing the desired visual effect. Visual effect will have purposeful effects, which include the use of tree-covered avenues to evoke a sense of grandeur and occasion. Such avenues grow to be vital routes and establish strong neighborhood identities, for that reason achieving functional consequences through visible way. Nevertheless, it is normally beneficial to consider visible effect as a separate outcome to be sought from planting.

III. Strategies for optimal plant placement

Understanding site conditions and constraints is important in the planning process to determine plant growth potential, which is necessary for the success of any planting project. The acquired information is also needed to prioritize and set goals for green infrastructure functions. Knowing the climate and microclimates of an urban area assists greatly in the plant selection process. This includes the prevailing winds and associated wind chill, sunlight and shade patterns, and average temperatures. Climate can have a significant impact on the types of plants that will succeed in an area, and therefore affect the types of people or wildlife that will be drawn to a particular location. Warm microclimates can be created on the north and west sides of buildings, while cool microclimates can be found on the east and north sides of buildings, as well as areas with higher moisture content in the soil. The moist, cool environment at the base of a wall might be a good place for ferns, whereas, at the front of the same building, the hot, dry conditions of the unshaded southern exposure will provide an entirely different environment beneficial to cacti and succulents. Wind patterns can also be an important site condition. Wind can be channeled between tall buildings, creating a high wind environment, while plants in an open area can be subject to abrasive, dusty conditions caused by wind. These plants subject to harsh winds may incur higher maintenance costs.

The presence of contaminants, toxins and pollutants in the soil or air is one type of constraint that has received some attention in the realm of plant selection for bioretention. Certain species of plants have been tested and proven to be effective at removing specific pollutants from the soil. For example, members of the plant genus *Salix* (willow) have been shown to accumulate heavy metals from contaminated sites. Qualities of tolerance to water inundation, drought, temperature extremes and poor soils are all important to plant growth potential, and can also be thought of as plant selection criteria.

The first-hand assessment of site conditions and constraints is always a valuable method. For example, when planning for a tree planting project, taking a soil sample analysis can directly determine whether or not the selected species of tree will have a suitable soil environment to meet its growth requirements. Taking the time to perform such assessments and develop a detailed site plan may seem a tedious and time-consuming process, but will ultimately increase the probability of the success of a planting project, and the longevity of the plants selected.

3.1 Understanding site conditions and constraints

Site conditions set both possibilities and limits to what can be grown in a particular location. If a match between the plant requirements and the site conditions is not achieved, it is likely to result in plant stress and poor growth, or in high resource input to maintain plant appearance and health. A plant growing in conditions to which it is not adapted may require high inputs of water, nutrients, and pest control, yet still have a poor appearance and/or suffer frequent pest and disease problems. An understanding of the full range of plant requirements and a diagnosis of site conditions can be achieved using information found in the literature and consultation with horticulturists or other plant professionals. The use of inappropriate plants is a common problem in urban landscapes and a key cause of high maintenance requirements.

Site conditions and constraints have a major impact on the selection and placement of ornamental plants. A good understanding of the nature of a site is useful in selecting plants with the most appropriate visual and functional characteristics, but it is particularly important in determining the potential effects of the plants on the site and vice versa. Changes to site conditions may involve depleting the soil of moisture and nutrients, compaction or submersion by flooding, all of which may predispose plants to particular problems. Replacement of existing vegetation should be considered in terms of the balance of the ecosystem and the potential for soil and water conservation. Changes to site conditions are often an attempt to conform the site to a particular image via urban design, but this often raises the maintenance requirements and costs for the site.

3.2 Creating visual focal points

The overall objective of this paper is to provide practical, theoretical, and scientific knowledge about the selection, placement, and maintenance of cultivated plants in urban areas. These suggestions are targeted towards urban planners, landscape architects, and homeowners who want to add to the sense of destination within their community by using and creating an identity through the use of ornamental plants.

I will go through most of the ornamental plants that are used in urban settings, focusing on trees, shrubs, groundcovers, and perennials. Most of the methods and plants suggested in this paper are directed towards those of temperate climates, where plant life already in place can be quite enhanced and where there is greater opportunity for the collective result to be significant. This is not to say that the concepts cannot apply to subtropical or tropical climates, rather, it is focused on the author's home city of Seattle. Many subtropical and tropical urban areas are already full of lush plant life and sometimes these areas could benefit from a simplification of the landscape where temperate areas can learn to use these plants in an urban setting.



3.3 Incorporating native and drought-tolerant species

Urban areas typically have vast amounts of impervious surfaces, usually in the form of buildings, roads, and sidewalks. These surfaces effectively shed water, meaning that a disproportionate amount of precipitation actually leaves the urban area. Enhancing the water retention capacity of urban areas minimizes the impact of this water loss. While it is not possible to essentially restore the water balance of natural areas in urban areas, it is possible to minimize the effects of disrupted water balance. This can be accomplished by using plants to enhance the water retention capacity of urban areas. The strategy involves maximizing the use of evapotranspiring plants and minimizing the use of impervious surface. By increasing the presence of plants in the urban area and providing an irrigation system, it is possible to support more vegetation than would survive using only available rainfall. The excess water that would have left the urban area can be replaced from other water sources, thus increasing the water retention capacity of the area. Native and drought-tolerant plants are recommended, as they require minimal maintenance once established and can survive on available rainfall. This can be a cost-effective strategy in the long-term, as modern irrigation systems can be costly to maintain and can represent a continuous expense.



3.4 Balancing diversity and coherence

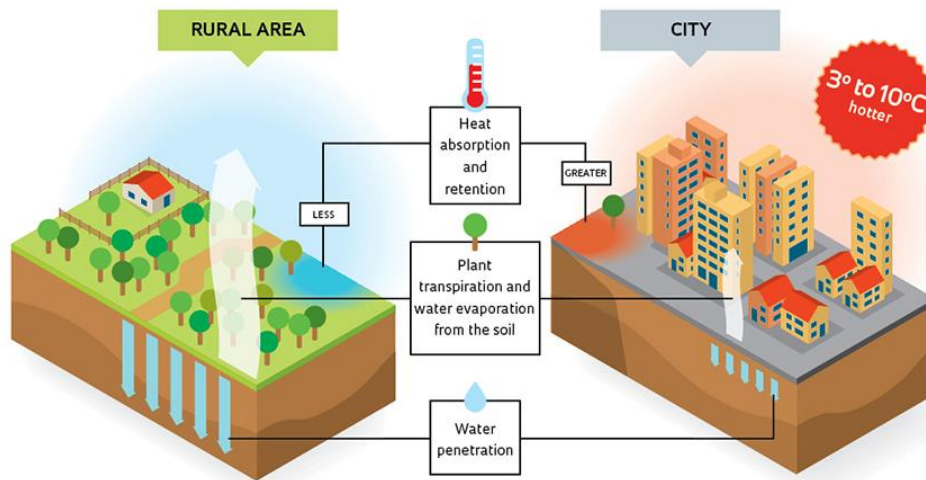
Plant selection must result in a composition that the viewer perceives as diverse. This is widely considered to be fundamental. Garden users invariably report that the visual richness of planting is a key feature of gardens that are liked and remembered (Relf, 1988; Kaplan, 1985). One of the advantages that planting design has over many other urban design features is that it can be appreciated in detail over sustained periods of time. This provides opportunities for repeated aesthetic experiences and discovery of new features. An intricate and varied planting may also encourage attachment by reinforcing a sense of place distinctiveness (defined as the special and unique visual and physical characteristics of a community that are now widely recognized as desirable for tourism and local identity, Jackson, 1994, Ap). However, a strong emphasis on variety has potential disadvantages. It may detract from a sense of unity and coherence within the overall landscape. This could be a problem as an overall unity of space is a key landscape architecture objective (Mid, 1961; Bourassa, 1998). It may also inhibit restorative experiences such as fascination, being away and extent, as these can be diminished by information overload and a lack of clearly distinguishable content (Kaplan and Kaplan, 1982).

IV. Challenges and limitations in optimizing plant selection and placement

Ornamental plants can knowingly cool urban microclimates through the evapotranspiration process. Transpiring plants act as a natural air conditioner, exchanging water in their leaves for carbon dioxide in the air to form carbohydrates. The evaporation of water from the soil and plant surfaces and the release of water vapor through plant pores carry heat from the environment, cooling the air in the process. Ambient temperatures in urban areas can be up to 10°C higher than rural areas due to human activity and the concentration of buildings, roads, and other infrastructure that absorbs and retains solar energy. Excess heat around buildings (especially on their western and southern sides) and in paved areas can cause discomfort and health problems for residents. Identification of areas with high potential heat stress and the strategic placement of trees and shrubs is essential in minimizing heat-related illness. Knowledge of local microclimates and the ability of plant species to establish in different environmental conditions are vital in targeting specific areas of urban heat islands. Failure to select plants that survive and grow to maturity in stressful urban environments can result in wasted resources. High urban pollution levels often exacerbate heat stress by impeding plant growth and reducing transpirational cooling.

4.1 Urban heat island effect

Urban heat islands (UHIs) have become a serious environmental problem in recent years. In Kotkin's terms, it is an area "whose apparent temperature is warmer than its rural surroundings" and the temperature difference will be more pronounced at night. UHIs have a significant impact on the environment and quality of life. Increased air temperature, increased cooling energy consumption, air pollution, and greenhouse gas emissions are among the factors that contribute to adverse effects on the environment. Although UHIs have no significant negative effect on human health, the fact that they increase ground-level ozone, which adversely affects lung function and increases the chances of heart-respiratory problems, makes the case worse. UHIs



cause an increase in energy consumption on cooling appliances, especially during the mid-day and afternoon. It was estimated that every degree increase in air temperature will increase electricity usage for air-conditioning by as much as 10%, and sometimes it can contribute to peak demand on electricity and result in power failures. High air temperature will also volatilize air pollutants and produce another type of pollution called smog. The adverse effects that UHIs will pose on the environment and human health will greatly affect urban residents' quality of life. Usually, landscape architects introduce shade from trees and vegetation to reduce UHIs in a certain area because UHIs and the heat absorption by non-living objects can still be reversed.

4.2 Limited space and urban density

Urban centres are witness to densely packed built formations crowded with people, population, and activity, and often characterized by rigorous functional zoning which separates residential, commercial, and industrial activities. This type of urban form developed in Europe and North America during the 19th and early 20th century driven by the industrial revolution, resulted in major shifts in population from country to city, and a corresponding shift from rural agriculture to urban industrial employment. Since that time, increased global urbanization has ensured that such urban forms are now widespread across the world. The combined effect is a domination of outdoor space by buildings, roads, and other forms of infrastructure. For example, in urban areas of the United States, gardens, trees, lawns, and other vegetation comprise on average some 15 percent of unbuilt land, and at the other end of the spectrum are cities such as Tokyo where public space is less than 3 square meters per person. Residence in such areas can lead to feelings of confinement and isolation, and many seek solace in their local urban environment and public spaces to find some respite from the dense, crowded, and built-up world in which they live and work.

The evidence linking green space and improved mental and physical health is now well established, as is the economic and social benefit of healthy urban environments through increased use of public spaces. Enhancing the quality and biological diversity of urban green space through informed plant selection and design is our main line of attack in this quest to deliver better urban environments through greenery. However, it is in the urban environment where it is often most difficult to utilize plants effectively that this effectiveness is most undervalued. This is linked to limited understandings of plant ecology and biology by urban decision makers, but also by numerous challenges and constraints as we seek to fit plants into the nooks and crannies of our existing urban landscapes.

4.3 Maintenance and long term sustainability

The best way to avoid this cycle and wasted resources is to take a proactive approach, enhancing knowledge about selecting the right plant for the right place, such that it will thrive and look attractive with as little maintenance as possible. Buttrick (1986) provides a comprehensive breakdown of plant attributes and their relative maintenance needs in his book "The Making of the European Landscape" and suggests that all designers should have this knowledge as an intrinsic part of the design process. This would require education in basic horticultural principles for design professionals or the development of a decision support system that can provide this information in a readily accessible format. A database and tool created by the Cooperative Extension of the University of Georgia, "Right Plant, Right Place," aims to fulfill this need by providing a searchable library of plants for the southeastern United States and a set of criteria to aid in selection based on ecological and site-specific attributes (Yeager and Dorney, 2001). Such a proactive approach will save time and money and lead to a more functional and attractive landscape.

One generally overlooked factor of urban vegetation is long-term viability, as well as the maintenance of attractiveness and function (Brenneke, 1981). Beautiful design can be quickly marred by weed-choked flower beds or unhealthy trees. Maintenance can be a significant cost, particularly if plants are poorly chosen for their location and require excessive labor input to remain healthy and attractive (Walker and Rosen, 2004). Public land maintenance is often a low priority budget item, and public works employees may lack horticultural knowledge (Walker and Rosen, 2004), making it less likely that best practices in plant selection and care will be implemented. If a plant fails to meet the public's expectation or becomes an eyesore, it is not uncommon for it

to be replaced by the same species, perpetuating the cycle of poor selection and prompting wasteful spending of public funds (Walker and Rosen, 2004).

V. Case Study on successful plant selection and placement

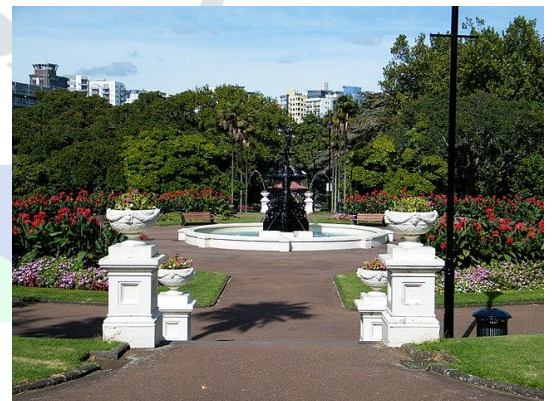
A documented case study can be seen in the urban park, New Farm Park, Brisbane. The New Farm Park is an established popular park set on the Brisbane River, with a good mix of active and passive recreational spaces. This project case study investigates the relevance of existing tree canopies and their ongoing management in relation to their impact on the passive recreational community and infrastructure. The information extracted from this case study was obtained from various sources in the form of interviews with the parks staff, and personal observation by the author. An analysis trees and debris removal project carried out as an attempt to enable social infrastructure in the form of picnic communities and the impact this had on the community is examined. This case study is ideal because New Farm Park remains popular amongst the Brisbane residents and the information obtained will be relevant to the ongoing management of the park and future similar projects.



Beginning the search for successful examples of plant selection and placement of ornamental plants in urban design, it is useful to look at the plant function in these landscapes, and then to trace the sequence of the design process. This can be done by going to the site and/or through documented case studies. Either way, it is important to try and access the genesis of the initial plant selection, moving through to the final stages in the plants (ageing process) and why they are either still serving their purpose effectively or in contrast failing in their mission.

5.1 Urban park and recreational spaces

National Park is a medium-sized suburb located northeast of the Auckland CBD. Despite having a strong natural character, the amenity value of the town centre and surrounding park areas was rated poorly by local residents. An investigation revealed that this was due to an uncoordinated and ad hoc approach to planting in the town centre. Many plants had been donated by the community or planted by local groups in an attempt to improve the look of the area. While the intent was positive, the plants were typically placed in high-use areas or in spots where they would soon be crowded out by other vegetation. The perceived value of the plants was further lost due to poor maintenance, often resulting in damage or death of the plants. In response to this, the National Park enhancement project was carried out with the goal of identifying and enhancing the aesthetic value of the town centre and park areas through the selection and placement of ornamental plants. This was to be carried out in a way that would not detract from the practical functional value of the areas.



Park and recreational spaces are notoriously difficult to plant and maintain appropriately since they cater for a wide range of social and recreational activities, each needing different types of functional space. For example, a BBQ area will need an open space with a large durable surface, whereas a children's playground will need a softer, more natural surface. This is especially prevalent in a park setting where the aesthetic value of plants must be balanced with their practical function. The utility of an area and its amenity value are essential considerations in the decision to plant and the selection of species to fulfill a particular role. In many cases, it may be more appropriate to exclude planting if the desired function of an area is best achieved with a durable, low maintenance surface. If planting does occur, selection of species capable of surviving the wear and tear of high-use areas is essential. The perceived value of the plants to the urban landscape will be lost if inappropriate species are continually replaced due to damage from recreational activities. An example of this can be seen in a study to increase the amenity value of National Park in New Zealand through the selection and placement of ornamental plants.

5.2 Street scape design

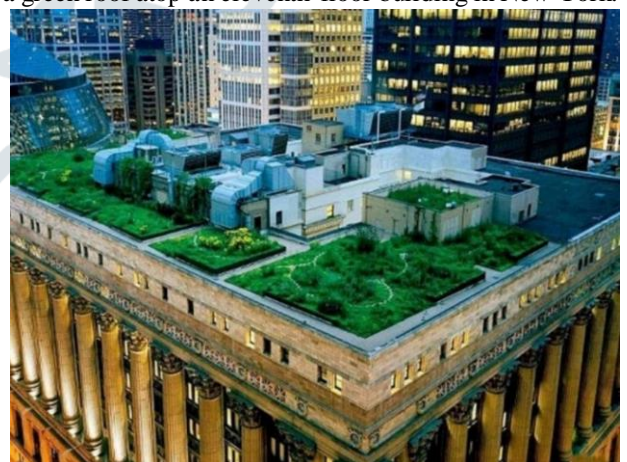
Helping towards this end, a guide on tree selection and placement has been released by the Australian Capital Territory Government. The "right tree, right place" concept is simple, but an understanding of the complexities of the urban environment and the life cycle and growth habit of the tree are often not well understood by arboriculture or the general public. Selecting the right tree involves more than simply choosing a tree from a nursery. An appropriate process involves balancing the tree attributes with the characteristics of the site to achieve the desired outcome. This requires a level of understanding of both arboriculture and urban design practice. A dynamic and supportive process involving both urban designers and arborists can help achieve the selection of appropriate trees and lead to better urban outcomes.

Plant Type Selection Criteria in Road Planting				
Functional Criteria (C1)	Ecological Criteria (C2)	Economic Criteria (C3)	Structural Criteria (C4)	Visual Criteria (C5)
C11. Masking C12. Redirecting C13. Noise blocking C14. Providing pedestrian and vehicle safety C15. Road definition C16. Creating a signal effect C17. Increase urban green space C18. Air cleaning C19. Wind control C110. Shadowing C111. Providing a living space for wildlife	C21. Soil requirements C22. Climatic requirements C23. Resistance to air pollution C24. Light requirements C25. Wind resistance C26. Resistance to insect pests and diseases C27. Salt resistance C28. Harmony with the city	C31. Cheap cost C32. Less care C33. Indigenous species reflecting urban identity C34. Longevity	C41. Ability to be pruned C42. Fast development C43. Deep rooted C44. No root sprouts C45. Shadow tree C46. Falling flower fruit seed etc. C47. Future size and diameter	C51. Leaf color C52. Flower color C53. Texture C54. Form C55. Dimension C56. Calligraphy C57. Continuity C58. Evergreen C59. Deciduous C510. Road width C511. Planting ranges

Street trees are an essential and functional element of the urban landscape. They are a long-term investment in the city, requiring a substantial amount of resources to maintain, with an average life expectancy of 7 years. The benefits of trees are well established. They provide a sense of place through shady, green streets, and they soften the hard edges of the cityscape, bringing nature to our cities. The street tree is a complex, long-term component of the urban landscape, with net benefits often not seen for several decades.

5.3 Rooftop gardens and green spaces

It went on to state that users of the City Hall garden appreciated the architectural effect of the native plants and the sense of national identity they promoted, although many felt they would have preferred more color and variety of plants. It then compared this to the private resident's garden. Many respondents felt it provided a good view and nice place to sit, however, some expressed concerns about the possible damage to the garage roof and there were complaints about the aesthetics of the garden compared to the building. An interesting point was that although the resident's garden had a positive impact on the people using and viewing it, he had never planned what the garden would be used for and it was eventually dismantled when he moved home. This study illustrates how plant selection and the environment in which they will be grown can influence the opinion of the garden and its potential to be a functional living space. Although the cost of planting and the potential long-term effects are a concern for those desiring a rooftop garden, there are ways in which people can utilize plants to provide similar satisfying outcomes spent by others with higher weight tolerances. An example is the use of groundcover plants and shrubs that will blend into a natural landscape in a simple environment such as this study of a green roof atop an eleventh-floor building in New York. Often the soil and access to the roof are only sufficient for construction of gardens requiring a relatively low weight tolerance. This can limit the selection of plants, excluding trees and large shrubs. It is believed that the selection of the right plant can have a significant impact on the enjoyment and functionality of the garden space. This fact is highlighted by a comparative study of two rooftop gardens in Chicago, Illinois. The garden atop the 22-story City Hall building, an experiment sponsored by the mayor's office to design a low maintenance, self-sufficient garden, using native plants and reduced water consumption. The other was a more conventional garden constructed by a private resident atop the garage of their home. The research conducted an interview with garden users and sampled the opinions of others who viewed the gardens from the buildings. It concluded that plant design can be an indicator of garden maintenance and influence how it is perceived by others.



Rooftop gardens have become increasingly popular in metropolitan areas around the world. Due to limited availability of space at ground level for garden and greenery development, rooftop gardens can play a vital role in adding greenery to otherwise dull and lifeless buildings. Realization of the potential benefits of rooftop gardens has seen them pop up in various locations over cities. However, no matter how large or small the area in question, a poorly executed rooftop garden can be a costly mistake.

VI. Conclusion

In conclusion, the selection and placement of ornamental plants play a crucial role in enhancing the aesthetics, environmental quality, and livability of urban spaces. Through this research, it has been highlighted that careful consideration of factors such as species diversity, compatibility, and seasonal variations can lead to more effective and sustainable urban planting designs. However, challenges such as the urban heat island effect and limited space must be addressed to maximize the benefits of ornamental plants in urban areas. Future research and innovation, including the integration of vertical gardens and living walls, offer exciting opportunities to further optimize plant selection and placement in urban design. By recognizing the importance of ornamental plants and implementing thoughtful planting strategies, urban planners and designers can create more vibrant, resilient, and sustainable cities for future generations.

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