

BRISBANE: “BEAUTIFUL ONE DAY, PERFECT THE NEXT”- IS THERE ROOM FOR IMPROVEMENT?

- Urban tree policy and management challenges for Brisbane

LYNDAL PLANT

INTRODUCTION:

The glorious weather of the sunshine state is one of the reasons why more than 16,000 people are currently moving to Brisbane every year, creating a need for at least 50,000 more dwellings by 2026 than allowed for in the current City Plan. However, there have been far too many sunny days in Brisbane over the last 12 months, and South East Queensland is now in the grip of the worst drought in 100 years, and what scientists are now acknowledging is an accelerating climate change.

A new plan to manage Brisbane’s growth is now being prepared. Brisbane residents have already emphasized that maintaining the charm and unique character of their neighbourhoods as well as protecting Brisbane’s natural environment, including bushland and open space is critical. Most recently, residents have indicated a preference for providing more dwellings around existing major centres and transport corridors to preserve the fringing bushland areas from further subdivision. Residents also value Council facilities like parks, bikeways and walkways and have conditioned their support for increased dwelling density on the provision of more open space, better facilities and Council’s protection of existing trees, even on private property. In a separate survey, residents rated improvements such as tree shaded walkways, attractive streetscapes and more trees in new developments as an important part of Council’s role towards a vision for Brisbane 2026.

Whilst Brisbane can currently boast an average of 45.5% tree cover across the entire 1220 square kilometer area, further analysis of 2005 satellite imagery and tree cover statistics reveals that maintaining areas of open space on public land alone will not retain the current levels of tree cover in residential areas that provide significant environmental benefits and the leafy, green, subtropical character of Brisbane. This paper presents the 2005 tree cover results and describes the urban tree policy and management challenges and directions for Brisbane associated with planning for population growth, sustainable water use and further climate change.

SUBURBAN TREE COVER.....AN ESSENTIAL PART OF BRISBANE’S OPEN SPACE.

Modern satellite imagery offers high resolution data that can be used to distinguish tree cover from other vegetative cover using a vegetation density index. By overlaying city and suburban boundaries, tree cover for each of Brisbane’s 187 suburbs has now been measured in 2003 and 2005. Comparisons between years, however, are inappropriate because of the variances in vegetation density which result which from vegetation health and time of day. In 2005 tree cover across all suburbs averaged 45.5%, however Brisbane’s residential suburbs (ie. those suburbs with 50% or more of their land area with a residential area designation in City Plan) averaged 27% tree cover. 36 suburbs had less than 20% tree cover and 6 suburbs had less than 10% (Figure 1.).

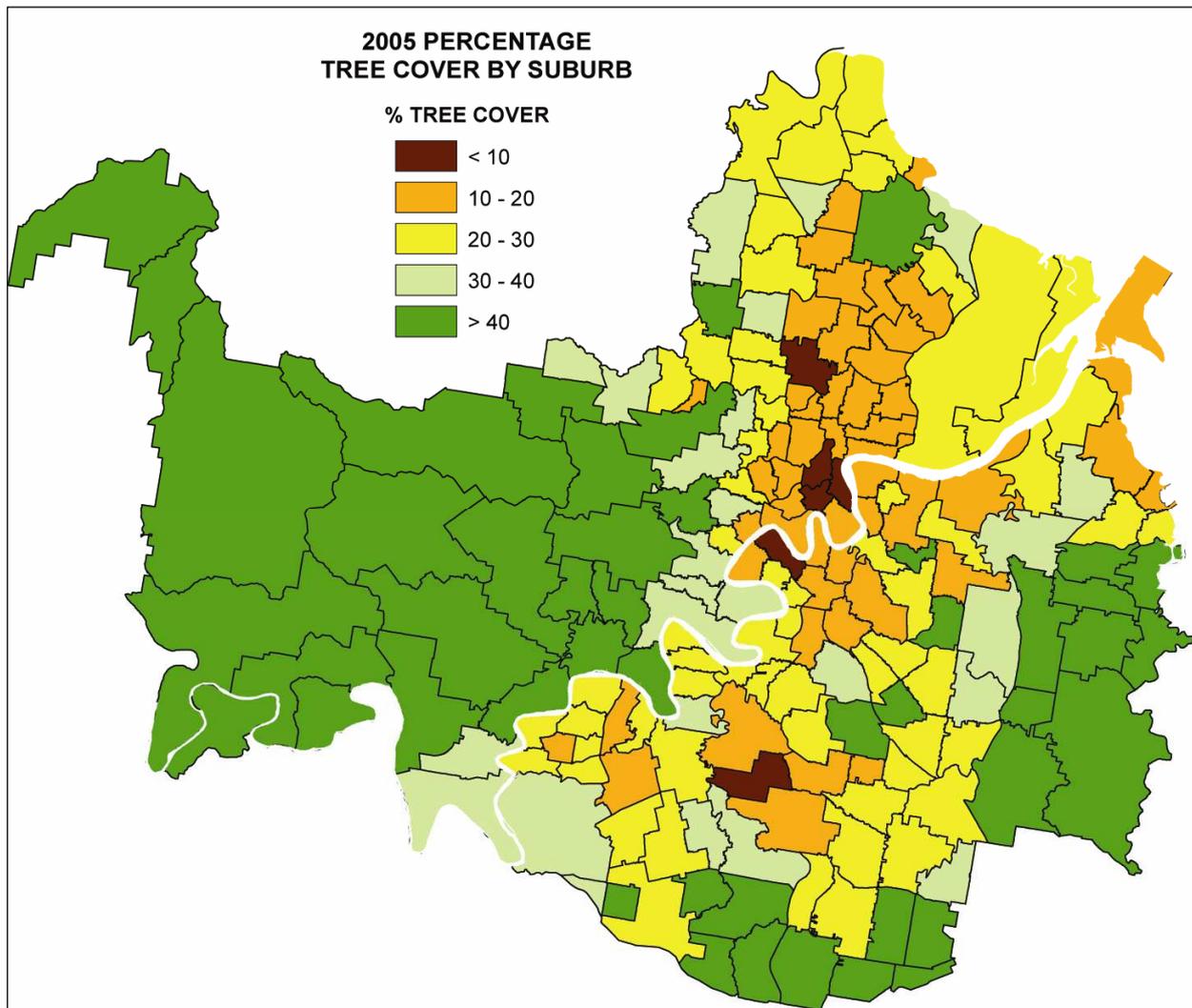


Figure 1. 2005 tree cover across 187 Brisbane suburbs.

Whilst there is no known comparative data for other Australian cities, this figure is similar to suburban Chicago (McPherson, et al 1994) but short of the 35% cover recommended by American Forests CityGreen program (American Forests) for the south-western U.S climate zone. In the sub-tropical climate of Brisbane, where shade in summer is critical to the outdoor lifestyle and building energy conservation, a target of 35% may be too conservative.

As little as 30% of Brisbane's residential tree cover is growing on public land, on streets and in parks. Most (70%) is growing in private "backyards". Retaining private tree cover and making new spaces for trees within areas targeted for growth in the new plan for Brisbane is therefore essential.

A review of proposed medium and high density building types in Brisbane's urban renewal allotment configurations (Mulholland GHD and BCC) identified that there are opportunities to integrate large scale trees with such built forms. Among the key factors in achieving integration of these iconic subtropical landscape elements is:-

- basement car parking must be designed around the need for adequate space, at and below ground level, and
- that the design of the tree spaces be integrated with other desired outcomes like passive ventilation, high quality common open space areas and public/ private realm connections.

There are also exciting opportunities to increase tree cover on public land which offer a new vision for public open space beyond public parkland. Almost one fifth of residential public land tree cover is growing in road reserves (Figure 2), yet other surveys show that the current street tree stocking level is 74.8 % and includes an estimated 527,800 street trees.

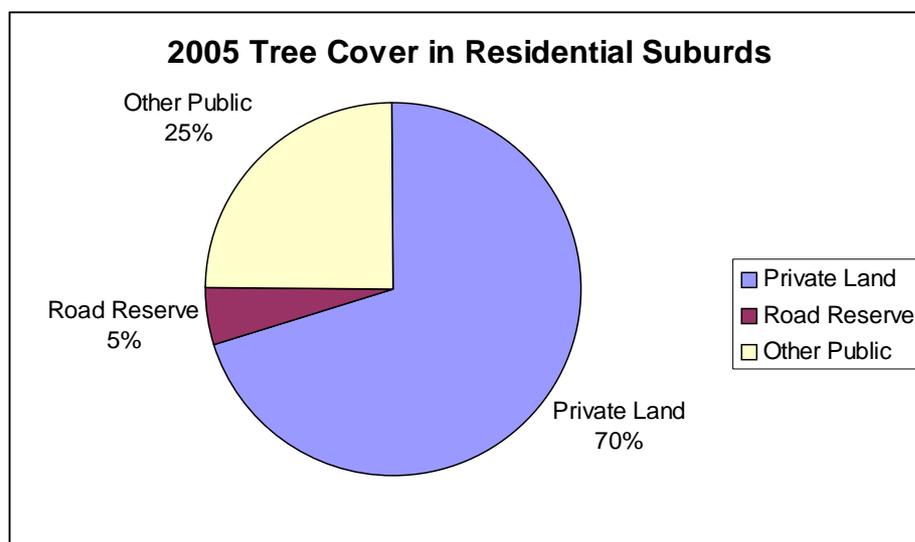


Figure 2. Distribution of 2005 residential tree cover

This leaves space for at least 140,000 more trees along the 4,500 km of roadways in Brisbane. At the current rate of planting 9,000 new street trees per year, but removing more than 13,000 per year, the stocking level can only drop further. However, the Lord Mayor's policies for tree-lined boulevards along major roads, delivery of new and upgraded pathways to support increases in walking and cycling, and Neighbourhood Action Plans as one of the delivery mechanisms for the new CityShape, offer opportunities to improve street, park and private tree cover for multiple benefits to the city and suburbs.

THE CHALLENGES OF DROUGHT AND CLIMATE CHANGE?

Sources and supply of drinking water for Brisbane are now regarded as a seriously precious and undervalued resource. Planting and establishing more trees on public and private land in order to achieve optimal levels of tree cover can no longer rely on drinking water. Since October 2005, street tree planting has continued at the same levels undertaken pre water restrictions, however all new street trees are established using recycled water. The increased cost of using water trucks filled from recycled sources than the previous potable sources, will see the street tree planting target for 06-07 drop slightly to 9,000 new trees, including 5,000 planted as part of 6 Community Street Tree Planting Projects. Most park tree plantings, however, are on hold until rain comes, because those sites are not easily accessed by recycled water trucks, and such interim alternate water sources are not sustainable for off road plantings.

A strategy is currently being prepared to achieve both a reduction in the water demands of all parks, streetscapes and other Council landscaping and at least an 80% conversion to non-potable water sources to meet those new demand levels. Already, many innovative techniques for saving and sourcing water are being explored including sewer mining, using fire hydrant testing water, harvesting and storing stormwater runoff and tapping into old stormwater pipes filled with groundwater.

The fundamentals of site-species matching, good site preparation, good quality nursery stock, good planting technique and proper establishment will also be critical to the success of ongoing planting. Council's Green Choice Gardening program is helping educate home gardeners about these fundamentals. Eighteen Green Choice Gardening events are held annually across Brisbane where residents are invited to fun, family-orientated activities in parks, which focus on sustainable living, including waterwise gardening, soil conditioning, composting, weed identification and control. Free packs of native plants are supplied, along with tips from experts, and information on local parks, bikeways, garden and habitat restoration groups, and water conserving products for the home. Residents have appreciated the opportunity to receive good independent advice about gardening in the drought, and most have recorded that they intend to use at least one tip from their visit to the event to start their journey towards sustainable gardening.

Rather than simply responding to the effects of climate change like drought, more frequent and more damaging storms and higher temperatures, there is ample evidence that optimal urban tree cover can enhance the water cycle, improve air quality and reduce peak summer energy demands.

THE VALUES OF BRISBANE'S URBAN TREE COVER

Since 2000 Brisbane City Council's Landscape Amenity Unit has invested in studies which measure Brisbane's urban tree cover and quantify as many of its significant benefits as possible. Unlike previous studies which focused on the values of larger fringing bushland components, studies such as Yamamoto (2000), and Wilraith (2001) focused on the vegetation of the inner suburbs where most people live, and mirrored the successful approach taken by the USDA Forest Service and American Forests-City Green program. These "home grown" studies have highlighted the environmental, social and economic values of suburban tree cover, well beyond aesthetics. For example:-

- in 2000, Brisbane's residential tree cover was estimated to be absorbing the equivalent amount of CO₂ emitted by 30,000 cars per year, and cooling surface temperatures in the relatively mild month of October 1999 by up to 5 degrees Celsius.
- When applying the effects of tree shade on the eastern and western sides of a single storey 3 star energy rating home to the Building Energy Rating System model, Wilraith found that energy savings of up to 50% per annum could be achieved.
- A Survey by the Real Estate Institute of Queensland in 2004 found that the value of homes in leafy streets were up to 30% higher in the same suburb.

Further research to identify stormwater management benefits and air pollution mitigation effects of Brisbane's trees, similar to those wonderful CityGreen analyses now completed in almost every major city in the U.S, remains a high priority for the future. Quantifying other health and lifestyle benefits of urban trees, relevant to Brisbane's journey towards denser living and the need for greater participation in active transport modes is also important.

THE POLICY/MANAGEMENT HEALTH CHECK AGAINST THE MODEL (CLARK ET AL) FOR LONG TERM URBAN FOREST SUSTAINABILITY

To further assess the current "health" of Brisbane's urban tree policy/management approach, ratings for each of the 3 components (vegetation resource, community framework and resource management) and 20 criteria of a proposed model of urban forest sustainability documented by Clark et al 1997 were compared to those of 25 U.S cities surveyed in 1998.

Whilst Brisbane's total score (49.5 out of possible 80; or 62%) across all criteria was slightly higher than the average of all 25 U.S cities, and was the same as the average of scores across the 9 criteria of the resource management component, there were some interesting differences in the vegetation resource and community framework component scores which highlighted areas for improvement. Brisbane rated much higher (66% compared to U.S cities average of 53%) in the sustainability of the vegetation resource because of our fairly high city-wide level of tree canopy cover and good levels of protection and management of remaining native forest areas. Of some concern is the trend towards a high proportion (35%) of mature and overmature trees and low proportion of recently planted (10%) street trees in Brisbane's total estimated street tree population of 527,000. This is reflective of the relatively low levels of new street tree planting. In November 2005, a phone survey of a sample of Brisbane's community also found that only 51% were satisfied with Council's tree planting programs in their suburb.

Brisbane rated lower (57%) than the U.S cities average of 64% in the community framework component which includes 7 criteria which reflect the model's premise that "creation and preservation of urban forests requires active planning and management by diverse group of owners, managers and stakeholders, and a shared vision and agreement on goals, objectives and management approaches". Areas for improvement for Brisbane include:-

- the need for better co-operation and partnerships amongst other Council programs
- encouraging even greater levels of understanding and participation by local communities in their urban tree goals and outcomes.

CONCLUSIONS/ PRIORITIES/ NEW DIRECTIONS

Analyses of recent tree cover data, other street tree surveys and a quick "health" check against the Clark et al model of urban forest sustainability, has revealed that in the current context of planning for future growth and ongoing climate change effects in Brisbane, the most important areas for improvement in urban tree policy and management are:-

- finding cost effective sources of non-potable water to enhance and sustain the ongoing tree planting required on public and private property to extend suburban tree cover from the current average 27% to an optimal 35%
- continuing the measurement and analyses of urban tree cover and undertaking further research and promotion of the values of Brisbane's urban tree cover to help:
 - develop local neighbourhood level urban tree management plans
 - demonstrate links with other Council and State Government programs, and
 - engage with residents and potential corporate and community partners

Knowing much more about our urban tree resource from the many different sources of information which are now gathered in Brisbane, provides the opportunity to not only make informed decisions, but to share such information with other Council programs, our politicians and the community. These more detailed analyses, as outlined above, already offer the opportunity to set unique public and private tree cover targets and priorities for each Brisbane suburb.

Some of the most exciting opportunities for improvement are in linking with the reviews of land use in Neighbourhood Plans to build local Shadeways Plans and linking with major transport projects to deliver subtropical boulevard outcomes.

Local Shadeways plans are seen as partnerships between Council program areas, developers, business, and community to celebrate their existing trees and achieve their targets. The goal is to enhance and sustain each suburb's outdoor environment in

a way which gives back a generous dividend of multiple social, economic and environmental benefits to that local community and collectively benefits the whole city. A logical extension of the existing Community Street Tree Planting Program, local Shadeways Programs could target shade hungry bikeways and bus stops, shopping centre carparks, popular pedestrian routes and parkland linkages, and propose feature trees for pockets of public/private land.

Other cities like Sacramento, Chicago and Munich are well advanced in their local urban forest plans. Munich has a plan to increase their urban tree cover from 18% to 22% by spending an extra \$US3.8m per year to improve their urban climate and “link environmental planning and urban forestry with general land-use and structure planning” (Pauliet & Duhme 2000). Following the successful partnership between The Sacramento Tree Foundation (STF) and their local electricity authority, which provided free trees for private property owners to reduce their summer cooling costs by 20-40%, STF have recently announced a Greenprint for the region. This Greenprint is a shared vision amongst 24 government agencies and sets a target to double their current average tree canopy cover across the region to 35%.

Closer to home Brisbane’s Suburban Centre Improvement Projects in 34 local business centres across the city since 1996, are a successful public/private partnership model which has proven that streetscape improvements can revitalize business centres.

It is ironic that Brisbane’s current urban tree management challenges are climate based. As the capital of the sunshine state, where it is beautiful one day, perfect the next, drought is demanding a search for alternate, sustainable water sources and more attention to the fundamentals of good tree planting and establishment. Population movement to this wonderful climate is requiring a new city shape to fit more dwellings into existing developed areas, around retail/business centres and along transport corridors. There is both a community mandate and enough new information to build innovative plans to enhance and protect urban tree cover and it’s multiple benefits, on public and private land. Achieving each unique neighbourhood tree cover target will require new partnerships between Council programs and with business and local residents.

REFERENCES:

American Forests – CityGreen: Setting Urban Tree Canopy Goals:
www.americanforests.org/resources/urbanforests/treedeficit.php

Clark, J and Matheny, N 1998. A Model of Urban Forest Sustainability: Application to Cities in the United States, *Journal of Arboriculture*, 24 (2) 112-120

Matheny and Clark, 1997, A model of urban forest sustainability. *Journal of Arboriculture*, 23 (1) 17-30.

McPherson, G 1998. Structure and Sustainability of Sacramento’s Urban Forest, *Journal of Arboriculture*, 24 (4) 174-190.

Pauliet, S and Duhme, F 2000. GIS Assessment of Munich’s Urban Forest structure for urban planning. *Journal of Arboriculture*. 26(3), 133-141.

Willraith, H 2002. Modelling the energy conservation effects of tree shade using BERS. Report to BCC.

Wolf, K 2005. Designing Cities for Trees. Brisbane Centre for Subtropical Design presentation. www.subtropicaldesign.bee.qut.edu.au/documents/Kathleen_Wolf_Presentation.pdf

Yamamoto, T 1999. Urban Ecosystem Analysis; Measuring Values of urban trees in terms of Carbon storage and sequestration, energy conservation for Buildings and Urban Heat Island Mitigation using GIS in Brisbane City. University of Queensland, Master’s Thesis.