SUBMISSION TO GREENER PLACES

February 2018

Contents

EXECUTIVE SUMMARY

Total Environment Centre supports the underlying approach to the development of green infrastructure (GI) as envisioned in introductory sections of the draft Green Places Policy and its five objectives. However, there is no concrete 'road map' articulated within the draft Policy to assure protection and conservation of existing green open space and trees will be delivered or how sufficient legal enforcement for new green infrastructure will be provided.

Our major findings are:

1. The vague definition of GI together with the concept of 'multifunctionality' has led to a 'disconnect' between GI policy and practice overseas and needs to be considered in order to assess implementation.
2. The many benefits of GI are listed in the draft Policy but there has been no attempt to assess these quantitatively or qualitatively. This is important in setting evidence-based targets, raising the barrier for development proposals and for determining funding needs.
3. The draft Policy does not recognise the importance of existing urban trees, especially mature ones. Such trees are of great value, truly multifunctional across social, economic and environmental values. They should be assessed using the i-Tree tool.
4. A major barrier to the successful implementation of the Policy is existing legislation that does not favour the retention/protection of existing green open spaces and/or trees or of future assets under GI. This is exacerbated by the move towards more code-based and exempt forms of development.
5. The draft Policy defines 'high quality' open space as being "multi-functional spaces designed to produce concurrent ecological, social, environmental and economic benefits". It should be recognised that it is not possible for all GI to be multifunctional and that some green open spaces may be highly valued for their passive recreation and environmental conservation benefits.
6. A major deficiency of the document is that it lacks details regarding outcomes, implementation, statutory tools and funding.
7. Although NSW has a target for housing supply and job creation, the Green Grid would be delivered "incrementally over decades." No targets have been set for canopy coverage or environmental services performed.
8. The draft Policy recommends a package of reforms for strategies, policies, plans and guidelines. However these are not sufficiently legally enforceable or comprehensive.
9. Considering the many benefits of GI in relation to mental and physical health benefits, energy savings and other environmental services, we are of the view that funding should be considered as an investment rather than a cost.
10. While promising to investigate new or enhanced funding schemes, the draft Policy appears to rely on existing grants, developer contributions and various state government programs. In our opinion, there is a lack of clarity about the amounts required and the policy is insufficient to consolidate the Green Grid or implement the Greener Places policy.

INTRODUCTION

The Total Environment Centre (TEC) appreciates the opportunity to comment on the NSW Government's Draft Greener Places policy (GANSW 2017).

We support the underlying approach to the development of green infrastructure as envisioned in introductory sections of the draft Policy, and find these to be commendable. In particular:

"*Green infrastructure should be developed as a network rather than separate elements.*" (p. 10)

"*Green Infrastructure is essential and needs to be considered as an asset in its own right.*" (p. 10)

"*By moving beyond a siloed approach, towards connecting agencies and physical networks of open space, the people of NSW will benefit.*" (p. 11)

"*Green Infrastructure is an essential asset, and should be as integral to NSW as its roads, rail lines and storm water pipes. With proven value, it is an infrastructure asset that requires the same kind of investment and innovation we afford more familiar types of built infrastructure.*" (p. 14)

The TEC also agrees with and supports the five objectives of the draft Policy that are listed on p. 20:

1. To protect, conserve and enhance NSW's network of green and open natural and cultural spaces
2. To secure a network of high quality, high performing and well designed green space, establishing a crucial component of urban infrastructure to address the environmental challenges of the twenty-first century
3. To promote healthy living, encouraging physical activity, social cohesion, and enhancing wellbeing by providing liveable places for the NSW community
4. To create a more strategic approach to planning for Green Infrastructure, encouraging early and integrated investment through statutory planning
5. To deliver better tools for the delivery of Green Infrastructure across NSW.

However, we note that the three draft manuals/toolkits that support the draft Policy have not been completed at this stage. This is disappointing as these should form an integral part of the draft Policy and would provide essential operational information required to implement the Policy, that is, to create and/or enhance recreational uses, biodiversity health and climate resilience.

Furthermore, the draft policy document lacks details regarding the outcomes, implementation, statutory context and funding and it is unclear how it will drive the creation and/or enhancement of green infrastructure through legislation or incentives, how success will be measured, how much it will cost and where the funding will come from.

It is all well and good to have lofty ideals, but unless and until genuine progress can be measured and monitored and adequate funding is made available, these will not translate into any tangible additions to our existing green open spaces.

Byrne & Sipa (2010) caution that: "Urban consolidation in Australia...has a poor track record when it comes to the provision of parks and open space."

In 2011, Evans noted that, for Sydney: "Per capita provision of local open space is already below desirable norms in both inner and middle ring suburbs with demand pressures intensifying the carrying capacity of existing open space rather than increasing supply." Today we have even less open space.

Implementation of the policy as written will run the risk of subjecting our existing parks to unsustainable levels of use and human impacts, without creating any new high quality green open spaces or corridors.

For easy reference, this submission is structured using the same section headings as found in the draft Policy.

SECTION 1.1 – WHAT IS GREEN INFRASTRUCTURE?

The draft Greener Places policy document is written as if NSW was the first place in the world to introduce the concept of Green Infrastructure (GI). There is in fact a wealth of information available that has analysed case studies to determine the opportunities and barriers associated with its implementation and creation. In particular, literature reviews undertaken by Davern et al. (2017) and The Nature Conservancy & C40 Cities (2016), Byrne & Sipe (2010) and Davies et al. (2017) should have been taken into account in preparing the draft Policy.

For example, the over-simplified definition of GI has proven problematic in other parts of the world. The term GI encompasses areas ranging from large heterogeneous parks with remnant vegetation, to riparian corridors, private gardens, green walls and rooftop gardens. The draft Policy appears to assume that all GI is capable of performing the full range of environmental services. This is far from true and is explored further in Section 1.3 below.

While GI is part of a 'progressive' planning approach thought to facilitate synergies between economic growth, environmental conservation and social development (Lennon 2014), the lack of comprehension is seen by some as a barrier to implementation (Matthews, Lo & Byrne 2015; Matthews & Byrne 2015; Salomaa et al. 2016; Wright 2011).

This ambiguous definition has led to a 'disconnect' between draft policy aims and on-the-ground implementation of GI. Wright (2011) found that this had "contributed to confusion and discomfort with the 'lack of understanding' among planning practitioners in England who argue that green infrastructure could be a 'corruptible concept'". Roe & Mell (2013) found that, when planning policy introduced GI into the legislative framework, the result was "institutional schizophrenia" resulting in a fragmented approach to the delivery of GI, affecting stakeholder collaboration and confidence.

In the case of planners, reasons for resistance may include:

- inexperience with GI, including planting choice;
- resistance to institutional innovation;
- inability to assess risk of root damage, falling tree limbs or requirements to support roof gardens;
- Inadequate government commitments to budget for GI delivery and maintenance; and
- Wariness of public involvement.

Such barrier need to be anticipated for successful implementation.

We note that the draft Policy has included 'residential gardens' as a recognised type of green infrastructure. While we agree that it should be included, it is also apparent that the draft Policy will have no effect on the retention or enhancement of private open spaces, including trees. There is also evidence to suggest that this is where green open space is most at risk of disappearing. A recent presentation by the City of Stirling describes the challenges of reaching a target of 18% canopy cover in the City by 2030:

https://www.stirling.wa.gov.au/Recreation/Parks-and-reserves/Parks%20and%20reserves%20forms%20and%20information/Urban%20forest%20overview%20-%20for%20public%20distribution.pdf

They found that 75% of the vegetation was being lost on private land with 64% being from residential properties alone. By undertaking aerial surveys annually, they were able to estimate that 1 million m^2 of vegetation cover was lost over a 5-year period. Even though the City planted 10,000 trees per year on public land, this could not replace the canopy being lost on private land. The only way to control vegetation clearing on private land is to strengthen local planning controls to discourage clearing and to require minimum areas of landscaping and appropriate tree plantings in residential areas. There is general agreement that Tree Preservation Orders have been watered down substantially in NSW as part of the 'standard template' LEPs introduced in 2012.

Moreover, the draft Policy needs to address the cumulative impacts of the loss of private open space together with increasing densification that will exert even more pressure on our existing public green open spaces.

Recommendations to stem the loss of GI on private property are discussed in Section 3.1.

RECOMMENDATIONS

Redefine GI in order to overcome, to the greatest extent possible, the apparent mismatch between policy and practice.

Recognise that the greatest canopy losses are likely to be occurring on private land and that this needs to be addressed in the Policy or its aims and objectives will not be met. Despite significant planting in the public domain, there may be an incremental loss in the urban canopy cover in the short and long-term.

SECTION 1.3 – THE BENEFITS OF GREEN INFRASTRUCTURE

The positive environmental, economic and social benefits of GI have been substantiated in a wide variety of studies and published papers.The benefits are listed on p. 18 of the draft Policy but these are not assessed quantitatively or qualitatively. Davern et al. (2017) caution that: "The mere presence of POS [public open space] does not guarantee its benefit for people or biodiversity".

Assessment of benefits is important because these can be used to inform evidence-based targets and to determine future funding requirements (see Section 3.1 below).

For example, the following benefits have been measured in monetary terms:

- Reduction in healthcare costs and mortality rates related to improved air quality, mental and physical health and physical activity (The Nature Conservancy & C40 Cities 2016; Lederbogen et al. 2011; Richardson et al. 2013; Moore undated);
- Reductions in pollutants, stormwater processing and carbon sequestration (Endreny et al. 2017);
- Boostinproperty values due to presence of trees(Plant et al. 2016; Pandit et al. 2013);
- Reduction in energy costs related to shading (The Nature Conservancy & C40 Cities 2016; Endreny et al. 2017);
- Reduction in productivity due to heat stress (Zander et al. 2015);
- Savings in waterdue to presence of trees (Moore undated); and
- Savings in carbon emissions due to the presence of trees (Moore undated).

However, other benefits are more qualitative in nature. Davern et al. (2017) found that those parks that are large, accessible, attractive, treed and heterogeneous, encourage more physical activity.

Some benefits such as aesthetic values, perception of safety and sense of wellbeing and/or community, are more subjective and may vary according to individual age, culture, background or other factors.

As discussed in Section 1.2, it is also important to note that not all GI is capable of performing all environmental services. In support of this, Davern et al. (2017) caution that the "quality and benefits derived from public open space depend on what the space is trying to achieve" and stress that different green open spaces have different purposes.

For example, green rooftops and walls may reduce air pollution and have cooling properties, but provide limited habitat for insects and birds and cannot be used for sporting activities, provide shade or mitigate flooding. They are not a replacement for ground-level green space.

Similarly, newly planted seedlings cannot perform the same environmental services as mature trees in terms of shade provided, filtering of pollutants, carbon sequestration or stormwater management. Mature trees provide 75% more environmental benefits than smaller trees (City of Melbourne 2014). Shade cast by large trees may cover 100 m^2 compared to 3 m^2 around small trees. Large mature native trees have higher value for biodiversity conservation than smaller younger trees (in Davies et al. 2017). Although younger trees were once thought to grow faster and therefore to store more carbon, recent research has shown that the opposite is true and it is the older larger trees that grow more rapidly and absorb more carbon dioxide (Stephenson et al. 2014).

It is important to take different benefits into account during spatial planning but also when offsetting.Opportunities to locate like-for-like offsets for say, endangered ecological communities or mature trees, are extremely restricted in urban environments.   Offsets determined through variation rules or cash payments are not guaranteed to result in the creation of GI where it is most needed.

Like-for-like offsetting will not be achieved by replacing mature trees with seedlings or with a green wall, but instead should aim at the minimum to replace equivalent environmental services as quickly as possible. Appropriate offsets would need to be in place as soon as possible.

In the case of Sydney's Westconnex, it was originally promised that tree loss would be replaced with plantings up to 3 m tall at a ratio of 2:1. However the RMS recently redefined replacement trees as seedlings measuring upwards of 110 mm. This cannot be justified as an appropriate offset, even assuming the seedlings survive to maturity in an increasingly hostile environment.

If offsetting results in the net loss of existing environmental services, then this will necessarily conflict with the stated aims of the policy. It takes 20+ years to replace even the fastest growing eucalypt species, and much longer to replace environmental services provided by 50-100 year old trees that are cut down. In the meantime, our cities are likely to become less resilient to climate extremes. Time is of the essence as we are feeling the effects of global warming even now.

RECOMMENDATIONS

Prepare a series of supporting documents to clearly quantify and qualify the environmental, social and economic benefits attributed to the wide variety of GI types with reference to recent literature reviews conducted in Australia and internationally (i.e. see Table 2 in Davern et al. (2012) and Figure 4 in Moore (undated)). These can be then be used to inform evidence-based targets and to determine future funding requirements.

Develop clear offsetting guidelines that describe environmental services performed by different types of GI and indicate equivalent options for like-for-like compensation. It should be noted that it is not appropriate to offset ground-level GI with green roofs or walls. Similarly it is not acceptable to offset mature trees with immature trees or seedlings.

Recognise that all existing urban trees, especially mature trees, as valuable assets that are already providing a variety of environmental services.

Assign a monetary value to all urban trees using thei-Tree tool such that their removal incurs a substantial cost on the developer. This should cover the environmental, social and economic costs of tree removal plus the cost of 2 advanced replacement trees and their 'no-loss' maintenance.

SECTION 1.4 – WHAT WILL THE DRAFT POLICY DO?

As stated previously, we are of the view that the draft Policy objectives are laudable. However we note that although Objectives 1 and 2 are referred to in Section 2.2 Outcomes, there is no concrete 'road map' articulated within the Sydney Green Grid strategy or the Policy to demonstrate how protection and conservation of existing green open space will be delivered.

Mapping provided in the Sydney Green Grid and Draft District Plans is very broad and not useful in a practical sense. It appears that much of the detailed mapping and prioritising will be undertaken by Councils. However, by the time Councils acquire the funding and resources to carry out this onerous task, the Draft District Plans will be well and truly finalised and development will continue unabated.

There is no doubt that our existing green spaces are more valuable than any future, as yet unplanned and unplanted, open spaces. This is because they are established and have stood the test of time; are highly valued by visitors and residents; can be very large and heterogeneous; may provide a diversity of habitats for threatened fauna; contain mature trees and provide a range of

environmental services. Future GI will require adequate space, regular maintenance and suitable growing conditions in an increasing hostile urban environment.

We have learned from recent experiences that none of our existing green open spaces (including the Green Grid) are safe from development. This includes biodiversity hotspots (i.e. Sydney Park, Moore Park), endangered ecological communities (i.e. Wolli Creek) and highly valued and much used parks (i.e. Royal Botanical Gardens) (see below). At the same time the list of green spaces under threat of development is growing. On our SOS Green Spaces map, the TEC identifies almost 80 green spaces in Sydney that are under threat of destruction:

http://www.tec.org.au/sos_green_spaces

The draft Policy as it is written provides no guarantee that it will act to rectify the current situation. Without appropriate legislation, implementation plans, targets, performance indicators and adequate funding, the Policy is likely to achieve very little.

RECOMMENDATIONS

Ensure that the Policy objective to protect, conserve and enhance NSW's existing network of green spaces, follows through to the outcomes. Neither the draft Policy nor the Sydney Green Grid strategy describe the measures that should be undertaken to protect our existing green open space.

SECTION 1.5 – LEGISLATIVE CONTEXT

In our view, the draft Greener Places policy does not have sufficient 'teeth' and will be overridden by existing planning and environmental legislation that does not favour the retention or protection of existing green open space or trees. Although it promises to 'include' GI in Regional Plans, District Plans and Land Use and Infrastructure Plans and Priority Precincts, the actual wording will be critical. If there is a requirement to simply 'consider' GI, then we can expect little change from the status quo. There must be real disincentives to clear (e.g. monetary, legislative) and/or strong incentives to plant trees (e.g. legislating Green Area Ratios and adequate setbacks for larger developments, requiring appropriate plantings for new homes) in order for the policy to be effective.   Incentives should not include additional FSR or building height as this is likely to further erode the benefits of GI.

Davies et al. (2017) noted that there is a "disconnect between local plans, policies and guidelines and development conditions and their enforcement". They further state that this problem is "exacerbated by changes in the planning and approval system towards more code-based development and exempt forms of development, in which environmental and landscaping controls are given little or no attention."

The planning and environmental laws listed below exacerbate the loss of existing trees and green open space in urban areas, often without any prior assessment. While some of the following descriptions refer specifically to biodiversity/ecological values, it should be stressed that these areas may form part of our existing GI or, with careful planning, could be retained as GI within new developments.

SEPP (State and Regional Development) 2011

This SEPP identifies State Significant Development (SSD) and State Significant Infrastructure (SSI). These are large-scale and/or complex developments that have the potential to remove vast quantities of green open space and trees.

Examples of Critical SSI declared projects that resulted in the removal of significant areas of green open space and trees include:

- Westconnex resulted in the removal of 6000 m² and up to 800 trees in Sydney Park and 1.14 ha of a Critically Endangered Ecological Community at Wolli Creek.
- The South East Light Rail resulted in the removal or pruning of approximately 1277 mature trees, including 871 of significance. This included the removal of a stately avenue of some 80 Moreton Bay figs up to 160 years old growing along Anzac Parade.

The recently announced Sydney Modern museum is an example of SSD. The construction of the gallery extension will remove 140 trees (98 of which are moderate to high value) and green open space that acts as a corridor. Although offsets would include replanting 265 trees, these will not replace the environmental services currently being provided in this area of the gardens (as it will be permanently lost).

SEPP (Urban Renewal) 2010

The Urban Renewal Strategy aims to rezone areas along major urban transport corridors to facilitate medium and high rise development. Urban renewal projects have the potential to remove large amounts of green space and trees over one or more suburbs.

Open space is often delivered as part of a range of trade-offs (i.e. via Section 94 contributions orVoluntary Planning Agreements), in return for additional FSR or building height.

SEPP (Exempt and Complying Development Codes) 2008

A number of building codes have been introduced in NSW in order to fast-track exempt and complying development. These allow the clearing of trees and vegetation without approval under the following circumstances:

- In the case of residential development, allows clearing of all trees within 5 m of new residential buildings; and
- In the case of commercial/industrial buildings, allows clearing of up to 1 ha of vegetation.

Code-based development and watered down Tree Preservation Orders have resulted in more vegetation clearing on private land.

SEPP (Sydney Region Growth Centres) 2006

This SEPP applies to land release areas, particularly to the south-west and north-east of Sydney. In the case of growth areas, the requirement for environmental assessment is 'switched off' as part of strategic land use planning. Where land is certified, development may proceed without the usual requirement for site-by-site assessment and may result in the loss of important vegetation.

Part 8 of the recently enacted Biodiversity Conservation Act (2016) seeks to implement biocertification so that biodiversity assessment reports will not be required for SSI, Part 4 development requiring assessment and activities under Part 5 of the EPA Act.

SEPP (Vegetation in Non-Rural Areas) 2017

The Vegetation SEPP was recently enacted. Under this SEPP, Council can issue a permit to clear if:

- The activity does not require development consent;
- The clearing is below the Biodiversity Offset Scheme (BOS) threshold (i.e. less than 0.25 ha for lot sizes < 1 ha); and
- The trees are listed on the relevant Council's Development Control Plan (DCP).

Any trees or other vegetation that is not listed on the relevant Council's DCP can be cleared without a permit. It is therefore important that Councils update their DCPs to identify significant trees and other vegetation (see discussion below).

SEPP 65 (Design Quality of Residential Flat Development)

The design quality principles set out in SEPP 65 include "enhancing the development's environmental performance by retaining positive natural features which contribute to the local context, co-ordinating water and soil management, solar access, microclimate, tree canopy, habitat values and preserving green networks." While these are applied to the private domain, there is disagreement about whether they extend to surrounding streets, especially in relation to setbacks:

http://www.smh.com.au/nsw/with-more-sydney-apartments-than-ever-who-is-thinking-of-the-streets-20180105-h0e0va.html

http://www.smh.com.au/nsw/more-design-competitions-and-scrutiny-proposed-to-lift-sydney-building-standards-20180111-h0h43d.html

Local Environment Plans (LEPs)

All NSW Councils have prepared LEPs using a standard template that must be consistent with SEPPs. Optional clause 5.9 allows for the preservation of trees and other vegetation.

However, under mandatory clause 5.9AA, any trees or vegetation that are not identified in Clause 5.9, can be "ringbarked, cut down, lopped, removed, injured or destroyed" without consent.

The identification of significant trees and vegetation is therefore at the discretion of individual Councils.

Development Control Plans (DCPs)

At a local level, DCPs guide or facilitate development and are not legally binding. These may or may not identify trees or other vegetation of environmental/biodiversity significance, promote tree cover and connectivity and/or specify deep soil provision and setbacks. They are highly variable with some councils (e.g. City of Sydney, City of Parramatta, Ku-ring-gai) promoting good ecological outcomes while others (e.g. Blacktown, City of Bankstown-Canterbury) do little to protect or enhance environmental values.

Crown Land Management Act Reforms

The NSW state government is reviewing the administration of Crown land in NSW. Crown reserves are reserved for public purposes including environmental and heritage protection, recreation, sport, open space and community facilities.

Amongst other things, the NSW government is proposing to overhaul the ownership of Crown lands which could result in their widespread sale or commercialisation of reserves and/or their transfer to councils. These could then be sold off or be subject to changed use (e.g. roads, car parks), leading to the loss of significant green open space.

10/50 Vegetation Clearing Code of Practice

The '10/50 rule' was introduced by the Rural Fire Services in 2014 to facilitate clearing for bushfire protection. Although it was aimed at households located with 350 m of bushland, this ill-considered code that relied on outdated mapping, was exploited by residents living in waterside and beachside suburbs in order to improve views and/or increase property prices. As a result, hundreds of significant trees were cleared without approval.

Greater Sydney Commission Act 2015

The role of the Greater Sydney Commission (GSC) is to make Regional and District Plans and to transition planning of the Greater Sydney Region by integrating social, economic and environmental considerations with regard to the principles of ESD. One of its roles is to deliver the Sydney Green Grid (GANSW 2017).

The Sydney Green Grid is a key strategy in the metropolitan and draft district plans that aims to:

- Conserve, improve and expand Sydney's strategic network of open spaces;
- Reinforce a sense of place within Sydney's subregions; and
- Safeguard and plan the green infrastructure in Sydney in parallel with the strategic planning of the city's other infrastructure.

Like the draft Greener Places policy, the Sydney Green Grid documentation does not outline targets, key performance indicators and/or direct actions that would act to increase canopy cover or improve connectivity (GSC Planning Priority E17, GSC 2017a). It does not provide detailed mapping or describe how changes in vegetation cover would be measured or monitored. Finally, funding for this ambitious strategy appears to be lacking (GSC Information Note 9, GSC 2017b). These issues have been summarised in the TEC submission dated 28 March 2017.

While the draft Green Places Policy wording encourages a balance between environmental, economic and social benefits, it is apparent that the legislation favours economic outcomes. Without significant changes to EPIs, the Green Places Policy is unlikely to be effective.

RECOMMENDATIONS

Ensure that plans, policies and guidelines pertaining to the protection and enhancement of GI carry over to development conditions and are enforced.

Ensure that decision makers give effective consideration to environmental, economic and social costs of green space and tree removal by seeking to avoid impacts from development proposals.

See Section 3.1 Statutory Measures for more recommendations

SECTION 2.1 – PRINCIPLES OF GREEN INFRASTRUCTURE

The draft Policy lists four key principles to help deliver Green Infrastructure: integration, connectivity, multifunctionality and participation. It is our view that these are overly broad, highly simplified and do not reflect best practice findings based on extensive literature reviews.

For example, Davern et al. (2017) have formulated evidence-based principles that should be applied in best practice urban greening planning and management. These incorporate the draft Policy principles but take them to the next level. They include:

1. Promote and protect community and environmental health (*multifunctionality*).
2. Identify community needs (*participation*).
3. Understand the network of green spaces (*connectivity*).
4. Heterogeneity as a target (*multifunctionality, participation*).
5. Consider biodiversity outcomes (*multifunctionality*).
6. Maximising the quality of public open space (*multifunctionality, participation*).
7. Plan for maintenance and irrigation (*participation*).
8. Type and scale of green space (*all principles*).

Importantly the authors recognise that "one type of green open space cannot meet all possible health and biodiversity benefits and different designs across multiple geographies will produce the greatest social impact."

Similarly, Davies et al. (2017) concentrated on 7 'themes' to translate their extensive literature review into strategic outcomes to make cities more liveable and sustainable:

1. Retain and enhance habitats to support biodiversity and healthy cities (*all principles*).
2. Reform strategic planning to embed urban ecology (*integration*).
3. Connect biodiversity across cities through green and blue networks (*connectivity*).
4. Design and deliver a green and blue city (*connectivity*).
5. Create new habitats to support biodiversity and human health and wellbeing (*all principles*).
6. Develop and implement ongoing engagement programs to increase education and involvement across the sectors (*participation*).
7. Align urban ecology policies between levels of government (*integration, participation*).

Although the authors focussed on urban ecology, GI can be substituted for 'ecology', 'habitat' and 'biodiversity'. In fact, GI that is larger, more heterogeneous and has higher ecological value, is more likely to be resilient and multifunctional (see below).

Other authors have conducted workshops and reviews to develop best practice principles and guidelines for urban consolidation and high density developments (City of Charles Sturt 2012; Brown et al. 2013; Byrne & Sipe 2010).

Comments below apply to the each of the principles.

Integration

To date, those SSI and SSD projects that potentially result in the most vegetation and tree clearing, do not appear to have considered the principle of integration with any seriousness (see Section 1.5 above). The complete lack of integration between green and grey infrastructure is especially prevalent along transport corridors (e.g. Westconnex, Sydney Light Rail).There is nothing in the draft Policy that would convince us that that grey-green GI will be better integrated in the future. We do not consider that replanting after construction constitutes 'integration'.

This is also the area where there is likely to be the greatest 'disconnect' between policy and practice and where resistance by planners and engineers due to inexperience is likely to be greatest (Wright 2011; Roe & Mell 2012; Matthews & Byrne 2016; Matthews et al. 2015).

202020 Vision (2017a) has just launched a report that attempts to bridge the gap between green space practitioners and engineers.

RECOMMENDATIONS

With reference the published literature, address the 'disconnect' between policy and practice relating to integration of large complex infrastructure projects.

Connectivity

Despite the emphasis on improving connectivity throughout the draft Policy, Sydney's open space network has previously been described as "a jigsaw of green with many missing pieces" (in Evans & Freestone 2011) and this is an accurate description even today. Without strategic mapping to identify and prioritise potential linkages in the landscape and the will to act, we cannot hope to fill in the missing pieces any time soon.

Just as the draft Policy fails to delineate different types of GI, it also does not differentiate amongst varying corridor types. Corridors shown in photographs on p. 35 consist mainly of hard surfaces with some associated planting to provide amenity and aesthetic appeal. These clearly do not perform the same environmental services as extensive vegetated corridors located along riparian corridors. Similarly the Cooks River corridor can be clearly differentiated from the narrow, fragmented and largely replanted Glebe Foreshore Walk in both carrying capacity and environmental services performed.

Like larger parks, wider corridors provide more environmental services than narrow ones. They are more resilient to surrounding impacts because they are less subject to edge effects including weed invasion, windthrow and dieback. They tend to be more heterogeneous and are therefore capable of supporting biodiversity and withstanding higher levels of human activity and impacts.

RECOMMENDATION

Prepare detailed spatial data to clearly identify gaps in the existing network of green open space and to prioritise important future linkages and/or stepping stones for future acquisition or rehabilitation.

Multifunctionality

Potentially, the principle of multifunctionality is the most problematic. There are concerns about what GI can actually deliver (Sussams et al. 2015; Salomaa et al. 2016; Roe & Mell 2012). While the concept of multifunctionality strengthens political appeal of GI, Sussams et al. (2015) question its

ability to be effectively multifunctional, with particular emphasis on climate change adaptation. Roe and Mell (2012) detected a "mismatch" between policy aims and the on-the-ground practicalities of creating multifunctional GI in England.

Similarly, due to the conceptual ambiguity surrounding GI and the complex role of ecosystem services, there is doubt about its ability to contribute to biodiversity conservation (Salomaa et al. 2016). This may be because, as Lennon (2015) hypothesises, GI represents a planning approach where "habitat conservation initiatives are primarily designed and justified relative to the ecosystems services they are seen to provide to society."

Importantly, current land use zoning standards limit the classification of land to either environment or recreation, thus acting as a barrier to multifunctionality (Evans & Freestone 2011).

Based on these findings, it may be more cost effective and productive to design GI that:

- Is proven to be multifunctional;
- Follows ecological principles; and/or
- Comprises a network of areas performing a diversity of environmental services.

Trees are truly multifunctional

The environmental benefits of trees have been well-documented (The Nature Conservancy and C40 Cities 2016; Davies et al. 2017; Brown et al. 2013; Davern et al. 2017; 202020 Vision 2014, 2017b; Byrne & Sipe 2010). These include, but are not limited to:

- Reduction of air pollution;
- Reduction of stormwater volume;
- Mitigation of wind and noise;
- Provision of habitat;
- Reduction of UV exposure;
- Enhanced sense of place and identity;
- Improved mental and physical wellbeing;
- Encouragement of outdoor activities;
- Reduced demand for energy;
- Increased property values;
- Carbon sequestration; and
- Mitigation of Urban Heat Island effect.

In addition, Davern et al. (2017) found that trees encourage walking, promote social cohesion and can form an important part of cultural landscapes. Mature trees provide more environmental services than smaller younger trees (see Section 1.3).

The Nature Conservancy & C40 Cities (2016) undertook an extensive literature review that focussed on two health benefits associated with trees – pollution reduction and heat abatement - to estimate the scope of current and future street trees to make urban air healthier. Their study considered 245 cities housing 91 million people.

While existing street trees are already providing significant benefits, a maximum annual investment of $3.2 billion (i.e. less than $4/resident) would reduce air pollution related mortality by 2.7-8.7% and reduce heat-related deaths by 2.4-5.6%. Brown et al. (2013) estimated that heat-related deaths in Australia alone could reach 2500/year by 2020.

The authors found that tree planting was not only the most cost-effective strategy (except for cool roof technologies), but it was the only method available to address both pollution reduction and cooling.

Importantly, the benefits of trees can be conveniently measured and monitored and can therefore be used to inform evidence-based targets and to determine future funding requirements (see Section 3.1).

Follow core ecological principles

Davies et al. (2017) describe ecological features that support high biodiversity values. Two of the most important ecological characteristics – large size and connectivity – are associated with greater heterogeneity and smaller edge-to-area ratios (i.e. less edge effects) and support higher species diversity. Large and/or well connected areas have better ecological function and perform numerous environmental services. They are also more resilient to natural or human-induced impacts.

It is interesting to note that, not only have humans traditionally settled in places with high biodiversity, but many of our retained open spaces that support high biodiversity also encourage physical health and wellbeing. These include: large size, connectivity, presence of trees, vegetation complexity and heterogeneity. These areas are able to withstand higher levels of human usage and visitation than smaller habitat patches. They are therefore more likely to meet the principles of multifunctionalty and participation.

In support of this, Davern et al. (2017) concluded that "having access to fewer larger high quality open spaces may be more beneficial than access to a larger number of smaller poorer quality open spaces". The draft Greener Places Policy makes no such distinction.

A network of open spaces

There is agreement amongst many researchers that a 'one size fits all' approach to GI will be doomed to failure and this applies particularly to multifunctionality.

Davern et al. (2017) found that:

"One type of green space cannot meet all possible health and biodiversity benefits and different designs across multiple geographies will produce the greatest positive impact." and

"When planning for green spaces, managers and planners often consider the design requirements for human health, biodiversity and ecosystem services in isolation from each other. However, to build an equitable, liveable, healthy and resilient city, planners need to plan green spaces to achieve multiple benefits...."

High quality green space

Although the draft Policy refers to high quality open space throughout, it is apparent from the Glossary (p. 56) that 'high quality' green spaces are defined as "multi-functional spaces designed to

produce concurrent ecological, social, environmental and economic benefits." We are of the opinion that this is a very restricted definition that does not recognise a wide variety of existing open spaces (e.g. those that provide one or few services, open space used for passive recreation, remnant native vegetation). Further it assumes that multifunctionality is an achievable goal when clearly there are barriers to its implementation and effectiveness. Finally, it assumes that every area of green space has the capacity to deliver the full range of ecological, social, environmental and economic benefits. This is clearly not possible.

Using needs-based analysis, Davern et al. (2017) define high quality parks as including grassed areas, amenities, dog-related facilities, off-leash areas, gardens, walking paths, water features and wildlife. Furthermore, they found that heterogeneity and lush attractive vegetation attracted more users.

RECOMMENDATIONS

Review the published literature to determine those factors that enhance/diminish multifunctionality. It needs to ask the question: Is multifunctionality achievable?

Prioritise efforts to protect and create GI that is proven to be multifunctional or to develop a network of GI that holistically performs a variety of ecological, social, environmental and economic benefits.

Focus efforts and funding on protecting or creating large and/or interconnected networks of green open space, rather than on numerous poor quality spaces.

Redefine high quality green space taking into account needs-based analysis, recognising that not all GI is 'multifunctional' and that some GI is primarily valued for passive recreation.

Participation

The principle of participation appears to confound two separate ideas: collaboration and participation. While some actions involve collaboration across government agencies and consultation between government, community and stakeholders, others relate to improving park accessibility to everyone (participation).

Collaboration

Collaboration can be achieved by building partnerships across government, the private sector and the community (Department of Transport, Planning and Local Infrastructure 2013) which may involve workshops (Brown et al. 2013) or other suitable forums.The City of Stirling ran 4 community and one industry workshop involving 225 participants and generating 1000 solutions to reduce tree loss and increase planting:

https://www.stirling.wa.gov.au/Recreation/Parks-and-reserves/Pages/Urban-Forest-Strategy.aspx?utm_source=conventional-marketing&utm_medium=vanity-url&utm_campaign=urban_forest

Stakeholder workshops organised by the National Green Infrastructure Network (NGIN) to develop an evidence-based case for the conservation, management and enhancement of urban ecology involved 123 participants, 67 organisations, 20 LGAs, 10 State government departments, 3 city councillors and 3 top tier developers (NGIN 2017).

Challenges may involve resolving the conflicting goals of different agencies (e.g. utilities vs parks, stormwater vs electricity). The Nature Conservancy (2016) suggested solutions to break down the 'silo' effect associated with urban forest management by:

- Integrating public works, environmental protection, parks and recreation, energy and other council inputs to ensure greening policies are effectively and efficiently implemented;
- Using comprehensive sustainability plans to strengthen connections between greener cities and public health;
- Developing Heat Action Plans that link increasing vegetation cover and cool surfaces to mitigate health impacts related to excessive heat; and
- Developing an integrated planning process that supports green infrastructure solutions in addition to traditional grey infrastructure to improve water quality and support other environmental attributes.

There are many other notable examples in the literature to demonstrate how 'silos' can be overcome.

The Victorian Growing Green Guide 2014 (Frances et al. 2013) demonstrates the role of government in leading by example in its commitment to the greening of public buildings. It was written for councils, stakeholders in the building industry, State government departments and other interested parties.

The SA Million Trees Program showed strong top-down and bottom-up leadership from the SA government to increase vegetation cover within Adelaide's open space network by10%.

Creating Liveable Open Space Case Studies (Victoria Department of Transport, Planning & Local Infrastructure 2013) demonstrates the importance of building partnerships across government, the private sector and the community to deliver innovative approaches for delivering new open space assets.

Finally, the success of City of Sydney in pursuing its vision for a green, global and connected city is due to its multidisciplinary approach that aims to engage the whole organisation, the development sector and the community.

Community participation

Participation as it relates to park usage is influenced by many factors, although the draft Policy primarily emphasises accessibility. In fact, size appears to be more important than accessibility in encouraging physical activity (Davern et al. 2017) and people will travel further to visit parks that are aesthetically pleasing, have large areas of vegetation and offer a wide variety of activities and published literature

Evans & Freestone (2011) consider that detailed spatial knowledge and mapping are essential to undertake open space planning, particularly with regard to equitable distribution of open space across the region. This type of data is not currently available for most of NSW.

Byrne and Sipe (2010) examined factors affecting the use of open space in high density neighbourhoods in Brisbane. They found that it was important to consider the age, income,

race/ethnicity, household composition and family status of surrounding apartment dwellers. The factors most likely to influence open space use by residents were size, safety, cultural services, aesthetics (including heterogeneity) and accessibility. They concluded that: "A 'one-size fits all' approach to green space design will be prone to failure."

Davern et al. (2017) found that large size, accessibility, quality and heterogeneity of green open space were most important in promoting exercise and health benefits. However, larger green spaces appeared to be the most important factor influencing physical health, biodiversity and urban cooling outcomes.   These findings support the views of other experts (cited in Davern et al. 2017).

Research conducted by the same authors indicates that a diverse 'portfolio of places' is required to satisfy the specific needs of current and predicted future communities to achieve best practice green space planning.

Participation also typically refers to community consultation.Davern et al. (2017) recommend that community consultation occurs at various stages of the planning process, including initial needs-based assessment and throughout the planning and implementation stages. They note that it is also important to take into account the views of non-users as certain benefits of green open space may be important to them even though they do not visit parks.

Underutilisation

There is also a worrying trend to refer to existing areas of open space as 'underutilised'. This is a value judgement and is not based on measurable benefits obtained from green open space, but on the perception that it does not attract enough users to justify its current use/retention.

'Underutilisation' is the justification for building the proposed Sydney Modern museum within the Royal Botanic Gardens. This completely ignores the benefits of passive recreation focussed around vistas, colourful gardens and greenery enjoyed by many city office workers on a daily basis. It also provides distant views for pedestrians and joggers and a large permeable expanse of grass, shade and foraging habitats for birds and bats. All of these benefits will be lost because due to an ill-informed value judgement. 'Underutilisation' should never be used as an excuse to alienate green open space.

RECOMMENDATIONS

Separate 'participation' into two principles – collaboration and participation – each with its own associated actions.

Taking into account the methodology used in published literature, conduct needs-based analyses to determine the specific needs of current and predicted future communities in NSW. The full range of characteristics that enhance participation should be examined, not just 'accessibility'.

Remove the 'term' underutilisation from all policies and plans. It expresses a value judgement that is not evidence-based and does not take into account less tangible but equally important environmental benefits derived from passive recreation, such as a sense of wellbeing, connection with nature and/or a feeling of isolation. It completely ignores the environmental services and ecological values that may be present.

Conduct community consultation throughout the planning process, including the views of non-users.

SECTION 2.2 OUTCOMES

The biggest challenge to be faced in implementing the Greener Places policy will be setting targets and key performance indicators, selecting appropriate metrics and monitoring outcomes. The most important question to be asked is: Where are we now and where do we want to be with respect to GI in 2020? In 2036? In 2050?

Urban planning strategies in NSW have focussed on housing supply and employment targets. Within the first few pages of *A Plan for Growing Sydney* (NSW Government 2014), we learn that there are targets to supply 664,000 houses and 689,000 jobs in Sydney over the next 20 years. Similarly, the Draft Eastern City District Plan (GSC 2017) tells us that we can expect the number of houses to increase from 466,500 to 624,000 over the next 20 years. Job projection targets for 2016-2066 are tallied for each of the 7 strategic centres within the Eastern City District.

In contrast, the vision for the Sydney Green Grid "will be delivered incrementally over decades, as opportunities arise and detailed plans for connections are refined." The proposed metric is the "proportional increase in Greater Sydney covered by urban tree canopy".   Metrics proposed for two issues closely related to GI – energy efficiency and resilience – are similarly vague.

Although the Planning Minister announced at the launch of the draft Policy that the aim is to increase Sydney's canopy from 16% to 40% by 2030 by planting 5 million trees, this commitment is not restated or referred to anywhere in the Policy. No further details have been provided. Where would 384,615 trees be planted every year? Will these be seedlings or advanced trees? How many will survive to maturity? Which parts of Sydney would be prioritised?

While the draft Greener Places policy is supposed to "build on the Green Grid" and to "strengthen existing Green Infrastructure components", it is non-committal when it comes to targets and key performance indicators. Incremental increase in canopy cover is not an 'outcome' but a process by which an outcome will be reached.

While the Green Grid and the Greener Places policy provide a framework for conserving and enhancing green open space, there appears to be no coherent or coordinated mechanism to achieve a metropolitan green space network in practice. Urban planning needs to be guided by overarching objectives that value GI to the same extent as jobs and housing targets (Davies et al. 2017).

Targets for green cover should be set for each of Sydney's districts when plans are finalised.

We ask the questions: What is going to change under this new Policy? How much 'greener' are our cities going to be?

Mapping

In order to plan outcomes, it is essential to know where we are at now. Evans & Freestone (2011) note that: "No comprehensive spatial-statistical analysis exists to document in detail the distribution, provision and accessibility of local or regional open space across the Sydney region." Davies et al. (2017) agree that habitats and habitat corridors need to be mapped at the "local and metropolitan scales and strategies implemented to support their long-term viability".

However, in 2014 the Institute for Sustainable Futures undertook an Australia-wide benchmarking study covering 139 LGAs as part of the 202020 Vision working towards a 20% increase in green space

(Jacobs et al. 2014; 202020 Vision 2014). The authors used the i-Tree tool to assess 4 different types of cover: trees, shrubs, grass and bare ground (i.e. potential planting sites). The study covered 39 LGAs in Sydney representing 58% of the population of Greater Sydney and showed a wide range of canopy cover values, from 12.1% in Botany to 59% in Pittwater.

As Davies et al. (2017) point out, this type of benchmarking study is valuable because it can "identify where vegetation is needed (either to augment core areas or for linking corridors) or being lost (thus requiring policy reform) and to quantify gains (and enable the identification of the actions and policies that are working)." It is also a monitoring tool that can be used to help to quantify the outcomes of Urban Forest Strategies, assess the impacts of clearing and quantify cumulative changes in vegetation structure.

In a recent report *Where should all the trees go?*, 202020 Vision (2017b) updated the results of the benchmarking study to measure the overall vulnerability of LGAs based on heat mapping and socio-demographic data to identify the top 50 greening opportunities in Australia.

Targets and Key Performance Indicators

Canopy (and vegetation) cover is one of the simplest most useful indicators of GI, although by no means the only one. Trees have the advantage of being truly multifunctional and are positively associated with participation (especially physical activity), connectivity and resilience.They perform a wide range of environmental services (Section 2.1).

The economic value of trees can be measured in cost savings (i.e. health, lost productivity), energy savings (e.g. reduction in electricity use) and/or pollution control (e.g. reduction in emissions). For example Emmanuel &Loconsole (2015) estimated that a 20% increase in green cover could reduce surface temperatures in Glasgow by 2° C in 2050 and then investigated options to increase green infrastructure towards that end.

However, it is probably more common and practical to monitor canopy cover as an indicator of changes in tree cover. Tools such as i-Tree have been adapted to Australian conditions and have been widely used to measure coverage and to monitor losses, gains and connectivity gaps. For example:

202020 Vision, a collaboration of over 400 organisations/individuals, aims to increasetree canopy coverage in Australian urban environments by 20% by 2020.

The City of Melbourne (2014) has estimated the amenity value of its urban forest at $700 million. Its Urban Forest Strategy aims to increase the tree canopy from 22% to 40% by 2040. It also has set targets for increasing forest diversity, improving vegetation health, soil moisture and biodiversity values.

The City of Sydney Urban Forest Strategy (2013) aims to increase the tree canopy from 15.5% to 23.25% by 2030 and then to 27.13% by 2050. The City of Sydney Urban Ecology Strategic Action Plan contains targets to increase indigenous vegetation and fauna species.

Adelaide and Brisbane have opted for planting targets of 3 million trees and 2 million trees, respectively.

This does not preclude the use of other indicators/targets in the future. However, the measurement and monitoring of vegetation cover can begin immediately as we are already partly there in having benchmarked much of the state. It is also possible to immediately start planting to target identified hot spots (202020 Vision 2017b). Time is of the essence. We cannot afford to stand around for 'decades' waiting for 'opportunities' (Will these be what is left behind by developers?) to record dubious 'incremental increases'. Instead, the NSW Government, through its Green Places Policy must drive the protection, enhancement and consolidation of our green open space network.

Monitoring

In order to chart the course between where we are now and where we want to be in 20 years' time, it is essential to monitor progress. The GSC recommends annual reporting of the performance of the District Plans, supposedly including the "proportional increase" in green open space. It will be difficult or impossible to chart progress without baseline data and identified targets. At the rate that vegetation is being removed in our urban environments, it is questionable if annual monitoring will be frequent enough to arrest the decline and learn from our mistakes.

Davies et al. (2017) state that: "Performance-based tools can be used to set quantifiable monitoring and evaluation frameworks". They suggest an evaluation matrix for medium- to long-term monitoring of vegetation (as an index of biodiversity) from individual lots through to LGAs and regional areas/districts (Table 4.6). This could conveniently be applied to all green open space.

The same authors also noted a 'disconnect' between the development application state and what happens on the ground after consent and recommend that "monitoring and evaluation programs should be linked to consent conditions". Moreover the effectiveness of DCP controls is often not measured or reported which is compounded "by the discretionary nature of DCPs in the planning system".

It is apparent that we are not only unsure of where we are and where we are going, but also how we will get there.

Timing

Timing is of the utmost importance and the time to start planting is now. There is already a considerable time lag built into the system due to:

- the removal of more trees than are being replaced (i.e. we are losing green space at an ever increasing rate);
- the replacement of established mature trees with immature trees that will take a minimum of 20+ years (for the fastest growing species) to perform similar environmental services;
- an ever increasing population and unprecedented development;
- the time it will take to overcome political, institutional, planning and statutory barriers;
- the time and resources that it will take for local councils to update their LEPs and DCPs; and
- the time it will take to raise adequate funding.

In the meantime, development will continue unabated and even accelerate. A recent study commissioned by the Federal Government (Kendal et al. 2017) that examined 1.5 million trees in 29 council areas has found that 24% of public trees were at high risk from increased temperatures if emissions continued to rise to 2070. In Sydney, 50% of street trees are at risk under a 'business as

usual' scenario. Increasing urban heat and continuing emissions may mean that new species will have to be introduced, existing trees will have to be given special care and some trees may disappear. Young trees will require more maintenance and irrigation in order to reach maturity in a more hostile urban environment.

RECOMMENDATIONS

Set targets for green cover as part of the finalisation of District Plans.

Immediately commission detailed mapping of all urban areas at the local and metropolitan scales and identify priority areas for connectivity.

Immediately commission vegetation benchmark studies for all remaining LGAs in NSW. These will provide baseline data to mark where we are now.

SECTION 3.2 – STATUTORY MEASURES

For the Greener Places policy to be truly effective, it will be necessary to change the 'business as usual' practices and traditions evident in government, planning practices and the development sector. Davies et al. (2017) recommend that to do this, it will be necessary to "address causes, barriers and other obstacles from multiple perspectives...through multiple actors...and at multiple scales". A positive step forward is to amend statutory measures.

Currently, developers are setting the agenda when it comes to the retention and creation of GI. We support Davies et al. (2017) in recommending that:

"Strategic reform should be vertically integrated, and state and local governments and the community – not the development sector – should set priorities."

As written, the draft Policy promises a package of reforms to existing strategies, policies, plans and best practice guidelines. However most of these are not legally enforceable and therefore have no statutory effect. Another issue discussed earlier is that decision-makers do not appear to give equal consideration to environmental benefits and consequently decisions are skewed towards economic outcomes at the expense of environmental and social benefits. The intent should be to avoid impacts.

A key action stated in District Plans is the development of 'green cover design principles' to incorporate vegetated, permeable and reflective surfaces into urban development. However it is uncertain how these would be enforced. Design 'guidelines' have no statutory effect.

The GANSW also advocates more design competitions and review panels, public meetings and workshops in order to improve streetscapes. While these might improve some iconic developments, they will have no statutory effect in the majority of cases.

Although toolkits/manuals promise to provide advice about preparation of planning proposals and LEPs to give effect to regional and district plans, council interpretation of the vague mapping provided in those plans, will be critical. Green space outcomes, including Green Grid planning priorities will be at the discretion of individual councils. Tree Preservation Orders have been

watered down substantially in the 'standard template' LEPs introduced in 2012; there is an opportunity to strengthen these during the next round of amendments.

The proposal to develop model DCPs is commendable. However, it is essential that these describe all significant trees and vegetation to be retained within individual council boundaries, as any vegetation that is not specified can be removed without approval.   It should be noted that DCPs are guidelines only and are not enforceable.

There is a real risk that the Greener Places policy will be useless unless the implementation of GI is embedded within EPIs. As SEPPs override local planning controls and therefore override local council controls, the creation and/or amendment of SEPPs should be the preferred means of ensuring the delivery of GI outcomes. There are several opportunities to do this with planning reforms:

- Amend SEPP 65 (Design Quality of Residential Flat Development) to extend the principles of apartment planning to increase the attractiveness and amenity of the public domain (i.e. streetscape);
- Develop a separate 'streetscape' SEPP that stipulates minimum standards for setbacks that provide deeper soils suitable for plantings, including trees;
- Amend the Native Vegetation SEPP to identify 'no go' areas (e.g. endangered communities) and to reduce the amount of clearing that can be undertaken without approval. Where clearing cannot be avoided and offsetting is the only option available, clear guidelines should be put in place to describe and compare environmental benefits associated with all types of GI (i.e. green roofs/walls should not offset the loss of ground level open space).
- Amend SEPP 19 (Bushland in Urban Areas) to incorporate urban ecology.The Draft Environment SEPP is currently on exhibition. It seeks to consolidate seven SEPPs for the protection and management of the natural environment, including urban bushland. Davies et al. (2017) view this as an opportunity to broaden the scope of the SEPP to include open space areas and list 10 recommendations towards this end.
- Codify landscape controls to set minimum areas or percentages of site that must be dedicated to landscaping (i.e. green area ratios). These may include additional conditions to provide deep soil zones suitable for canopy trees or to integrate green walls and/or roofs (Davies et al. 2017).
- Amend planning controls to mandate the planting of trees post-development or renovation. In the case of the City of Stirling, a planning scheme amendment requires that, where no trees existed prior to development, one (advanced) tree be planted per 500 m^2, that the tree be given 9 m^2 space to grow and that applicant pays the cost of providing a new street tree where none exists.
- Prepare landscape plans to specify minimum landscape areas, configuration of landscaping areas, types of vegetation or species and/or the provision of habitat. Prepared by a 'suitably qualified' person, these could improve open space outcomes from development application through to the construction and approval phases (Davies et al. 2017).
- Adopt and/or modify planning controls similar to those suggested by Davies et al. (Table 7.1, 2017) to advance urban ecology outcomes. These include specifications for lot coverage, new tree plantings and replacement, deep soil area, setbacks and green roofs.
- Introduce a mechanism that captures the true cost of tree canopy removal and impose this cost on tree removal (Brown et al. 2013). For example, the City of Melbourne (undated) has

used i-Tree to place a monetary value on street trees such that their removal incurs the cost of that tree plus 2 replacement trees. The most expensive tree in Melbourne, a 130 year old Morton Bay Fig is valued at $1.7 million.

- Review the '10/50 rule', based on the most accurate and recent mapping, and ensure that it clearly delineates only those areas at risk of bushfire and is not open to misinterpretation.
- Amend the NSW Local Government Act 1993 and the NSW Crown Land Management Act 2016 to include a provision stating that any decision to sell, lease or otherwise dispose of public green open space must be done by a 'disallowable instrument'.

It is important that any SEPPs relating to the creation of GI take into account factors such as placement, species and spacing in order to be most effective.

For example, current urban planning practices in NSW encourage the development of priority precincts and urban renewal areas and other high-density residential along major transport corridors, including busy roads. This exposes residents to potentially high pollution levels. While Planning Priority E17 (GSC 2017a) stresses the importance of planting trees to reduce pollution levels, these are being removed in many locations to make way for road and rail construction. Planning Priority E17 also notes that, although roadsides have limited opportunities for tree planting, the addition of green ground cover including garden beds and hedges "can help to improve air quality". In fact, low dense plantings are unlikely to significantly alleviate pollution (i.e. too low, little circulation) or to provide any shade.

The Nature Conservancy & C40 Cities (2016) outlines tree planting guidelines to optimise air quality and cooling benefits. In the case of pollution mitigation, they caution that trees planted inappropriately can trap pollution and increase human exposure to particulate matter. They recommend planting major roads with a single row of a species with high removal capacity (i.e. large leaf area and/or large surface area) using appropriate spacing to allow air to circulate around them.

While the majority of mitigation benefits are felt within 300 m of tree plantings, the effects of cooling are strongest within 30 m of street trees. The best shade trees are those that have a high leaf area index.

RECOMMENDATIONS

Provide advice to councils regarding strengthening protection for trees and other important vegetation as part of LEP amendments to give effect to District Plans.

Ensure that any model DCPs developed prioritise the identification and protection of significant trees and vegetation. The TEC would welcome the opportunity to contribute to the development of model DCPs.

Develop new EPIs or amend existing EPIs (i.e. SEPPs) to reduce the amount of clearing that can be undertaken without approval and to embed GI outcomes.

Ensure that plans and design guidelines relating to landscaping or tree planting provide details about placement, spacing, preferred species, setbacks, etc. in order to optimise environmental services provided.

SECTION 3.4 – ENACTING PRINCIPLES

The draft Greener Places principles will not be enacted unless and until challenges and barriers to their implementation are overcome. Challenges and barriers are evident at many different levels and have been reported extensively in the literature:

- Lack of a strong vertical policy framework between different levels of governments (Davies et al. 2017);
- Lack of a strong vertical and horizontal policy framework within the NSW state government (Davies et al. 2017; Evans & Freestone 2011);
- At the local level, there is limited coordination across LGAs, particularly with regard to policies, LEPs and DCPs (Davies et al. 2017; Evans & Freestone 2011);
- Absence of strong regulatory and non-regulatory framework to support the implementation of GI (Davies et al. 2017);
- Conflicting goals of different agencies (The Nature Conservancy 2016; 202020 Vision 2017a);
- Zoning standards limit the classification of open space to environment or recreation, acting as a barrier to multifunctionality (Evans & Freestone 2011);
- Other barriers to implementation of multifunctionality (Sussams et al. 2015; Salomaa et al. 2016; Roe & Mell 2012);
- Barriers between planning and implementation (Sandstrom et al. 2006, in Davies et al. 2017;Matthews, Lo & Byrne 2015; Matthews & Byrne 2016; Salomaa et al. 2016; Wright 2011; Lennon 2014; Sussams et al. 2015);
- Barriers to tree planting and retention (Brown et al. 2013; The Nature Conservancy 2016); and
- Challenges to achieving urban ecological outcomes (Davies et al. 2017; Salomaa et al. 2016; GSC Environment Panel 2016).

Davies et al. (2017) recommend that: "Government and industry must apply innovative and multidisciplinary approaches to promote urban ecology in their operational planning and maintenance practices." The TEC is of the view that the same is true for GI.

There are also many examples in the literature of case studies demonstrating where innovative and multidisciplinary approaches to implementing GI have been successful (Davies et al. 2017; The Nature Conservancy & C40 Cities 2016; Victoria Department of Transport, Planning & Local Infrastructure 2013; Byrne & Sipe 2010).

RECOMMENDATIONS

Undertake a review of Australian and international best practice studies and innovative case studies to identify the many barriers and challenges to the implementation of GI policy and to develop mechanisms to overcome these.

SECTION 3.5 FUNDING

As highlighted by Evans & Freestone (2011), the biggest challenge to policy implementation for metropolitan green space is funding, together with equitable distribution and sustainable resourcing.

Considering the many benefits of GI in relation to mental and physical health benefits, energy savings and other environmental services, The Nature Conservancy & C40 Cities (2016) recommend that funding be thought of as an investment rather than a cost outlay. A related report (The Nature Conservancy 2016) outlines the common finance mechanisms that might be used to fund urban forestry but also proposes an innovative approach linking funding for trees and parks to health benefits. The authors then investigate a number of private- and public-sector models that examine the practicalities of this approach.

NGIN (2017) investigated funding options for the maintenance and management of urban ecology in Sydney, Wollongong and Newcastle as part of a workshop involving stakeholders representing public, private, not-for-profit and peak industry bodies. Funding solutions are summarised in Box 2 (p. 82) of that report, but one in particular would demonstrate that the NSW government's intent is to treat GI as an "essential asset" that requires the "same kind of investment and innovation we afford more familiar types of built infrastructure":

"In government, recognise urban ecosystem elements as essential infrastructure so that funding comes out of the capital works budget rather than operational budget".

However it is apparent from Information Note 9 (GSC 2017b) and Section 3.5 of the draft Policy, that the acquisition, enhancement, revegetation and/or rehabilitation of green open spaces will continue to be funded by existing grants, developer contributions and various state government programs. Although the draft Policy promises to investigate 'new or enhanced' funding streams, there is no firm commitment for substantial future funding.[1] We consider this to be a major weakness as the acquisition of land and future maintenance regimes are likely to require huge investments.

Evans & Freestone (2011) noted that funding for green space "proceeds largely on a case-by-case basis on a priority basis rather than through a systematic acquisition program." The ultimate success of the Green Grid will depend on a systematic acquisition program and a steady funding stream. It is of considerable concern that the GSC does not appear to have any role in coordinating disparate projects or driving future initiatives.

It is clear that current funding as outlined in Note 9(GSC 2017b) is insufficient to consolidate the Green Grid or to implement the Greener Places policy. Grants distributed by the Metropolitan Greenspace Program and the Environmental Trust programs only amount to several millions of dollars in total.

Many of the other funding sources are linked to particular areas (e.g. Parramatta Road), walking or cycling initiatives or to development contributions collected by councils (GSC 2017b). Section 94 development contributions can be used to fund a variety of public amenities, including parks, road works, town centre improvements, community centres and other services. Voluntary Planning

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[1] We note the OSL Strategic Business Plan has a welcome focus on the green grid, but amounts are similarly vague.

Agreements (VPAs) similarly can be used to fund a variety of public amenities including affordable housing and transport. Use of these funds to acquire or enhance green open space is therefore at the discretion of individual councils who have many competing priorities.

Although Special Infrastructure Contributions (SICs) can help to fund regional open space and to offset biodiversity impacts, this will be at the discretion of the DPE and will compete for funding with other regional infrastructure such as roads and transport.

As stated in the introduction, without new parks, we run the risk of subjecting our existing parks to unsustainable levels of use and human impacts. Planning Priority E17 (GSC 2017a) confirms that this may be the intent:

"There will be relatively few opportunities to increase the quantity of public open space, and therefore greater emphasis will be needed on improving the quality and distribution of open space, including sporting facilities."

To compensate for this, it is proposed to build more sporting facilities, convert existing open space into sportsground and share existing open space amongst different users. This would appear to conflict with the objectives of the draft Greener Places Policy.

It is apparent that councils will be supplied with toolkits but will bear the brunt of providing human and monetary resources into planning for and providing open space at the local level. This is in addition to supplying adequate housing (including affordable housing) and jobs, amending local plans, accommodating planned precincts, etc. It is highly likely that the green space planning will not be able to compete with development interests.

The cost of GI maintenance should not be underestimated. In our increasingly warming cities, it will be necessary to water and otherwise maintain plantings to counteract increasingly hostile urban environments and the heat island effect. This will have the added advantage of increasing biodiversity (through better plant growth) and attracting more visitors (high quality)

RECOMMENDATIONS

Consider funding for the Green Grid and the Greener Places Policy to be investments in health, productivity and energy savings rather than costs.

Investigate new and enhanced funding streams with reference to the case studies and innovative solutions presented in the published literature.

Consider linking GI to health outcomes in order to tap into new funding streams.

Consider a systematic acquisition program for green open space rather than basing funding priorities on a site-by-site basis. Land acquisition is essential as our parks will not cope with increasing population pressures.

Plan to increase future funding for tree and park maintenance. It is apparent from the published literature that more maintenance/irrigation will be required to establish vegetation in increasingly hostile urban environments.

SUMMARY OF RECOMMENDATIONS

1. Redefine GI in order to overcome, to the greatest extent possible, the apparent mismatch between policy and practice.

2. Recognise that the greatest canopy losses are likely to be occurring on private land and that this needs to be addressed in the Policy or its aims and objectives will not be met. Despite significant planting in the public domain, there may be an incremental loss in the urban canopy cover in the short and long-term.

3. Prepare a series of supporting documents to clearly quantify and qualify the environmental, social and economic benefits attributed to the wide variety of GI types with reference to recent literature reviews conducted in Australia and internationally (i.e. see Table 2 in Davern et al. (2012) and Figure 4 in Moore (undated)). These can be then be used to inform evidence-based targets and to determine future funding requirements.

4. Develop clear offsetting guidelines that describe environmental services performed by different types of GI and indicate equivalent options for like-for-like compensation. It should be noted that it is not appropriate to offset ground-level GI with green roofs or walls. Similarly it is not acceptable to offset mature trees with immature trees or seedlings.

5. Recognise that all existing urban trees, especially mature trees, as valuable assets that are already providing a variety of environmental services.

6. Assign a monetary value to all urban trees using the i-Tree tool such that their removal incurs a substantial cost on the developer. This should cover the cost of tree removal plus the cost of 2 advanced replacement tree and their 'no-loss' maintenance.

7. Ensure that the Policy objective to protect, conserve and enhance NSW's existing network of green spaces, follows through to the outcomes. Neither the Policy nor the Sydney Green Grid strategy describe the measures that should be undertaken to protect our existing green open space.

8. Ensure that plans, policies and guidelines pertaining to the protection and enhancement of GI carry over to development conditions and are enforced.

9. Ensure that decision makers give effective consideration to environmental, economic and social costs of green space and tree removal by seeking to avoid impacts from development proposals.

10. With reference the published literature, address the 'disconnect' between policy and practice relating to integration of large complex infrastructure projects.

11. Prepare detailed spatial data to clearly identify gaps in the existing network of green open space and to prioritise important future linkages and/or stepping stones for future acquisition or rehabilitation.

12. Review the published literature to determine those factors that enhance/diminish multifunctionality. It needs to ask the question: Is multifunctionality achievable?

13. Prioritise efforts to protect and create GI that is proven to be multifunctional or to develop a network of GI that holistically performs a variety of ecological, social, environmental and economic benefits.

14. Focus efforts and funding on protecting or creating large and/or interconnected networks of green open space, rather than on numerous poor quality spaces.

15. Redefine high quality green space taking into account needs-based analysis, recognising that not all GI is 'multifunctional' and that some GI is primarily valued for passive recreation.

16. Separate 'participation' into two principles – collaboration and participation – each with its own associated actions.
17. Taking into account the methodology used in published literature, conduct needs-based analyses to determine the specific needs of current and predicted future communities in NSW. The full range of characteristics that enhance participation should be examined, not just 'accessibility'.
18. Remove the 'term' underutilisation from all policies and plans. It expresses a value judgement that is not evidence-based does not take into account less tangible but equally important environmental benefits derived from passive recreation, such as a sense of wellbeing, connection with nature and/or a feeling of isolation. It completely ignores the environmental services and ecological values that may be present.
19. Conduct community consultation throughout the planning process, including the views of non-users.
20. Set targets for green cover as part of the finalisation of District Plans.
21. Immediately commission detailed mapping of all urban areas at the local and metropolitan scales and identify priority areas for connectivity.
22. Immediately commission vegetation benchmark studies for all remaining LGAs in NSW. These will provide baseline data to mark where we are now.
23. Provide advice to councils regarding strengthening protection for trees and other important vegetation as part of LEP amendments to give effect to District Plans.
24. Ensure that any model DCPs developed prioritise the identification and protection of significant trees and vegetation. The TEC would welcome the opportunity to contribute to the development of model DCPs.
25. Develop new EPIs or amend existing EPIs (i.e. SEPPs) to reduce the amount of clearing that can be undertaken without approval and to embed GI outcomes.
26. Ensure that plans and design guidelines relating to landscaping or tree planting provide details about placement, spacing, preferred species, setbacks, etc. in order to optimise environmental services provided.
27. Undertake a review of Australian and international best practice studies and innovative case studies to identify the many barriers and challenges to the implementation of GI policy and to develop mechanisms to overcome these.
28. Consider funding for the Green Grid and the Greener Places Policy to be investments in health, productivity and energy savings rather than costs.
29. Investigate new and enhanced funding streams with reference to the case studies and innovative solutions presented in the published literature.
30. Consider linking GI to health outcomes in order to tap into new funding streams.
31. Consider a systematic acquisition program for green open space rather than basing funding priorities on a site-by-site basis. Land acquisition is essential as our parks will not cope with increasing population pressures.
32. Plan to increase future funding for tree and park maintenance. It is apparent from the published literature that more maintenance/irrigation will be required to establish vegetation in increasingly hostile urban environments.

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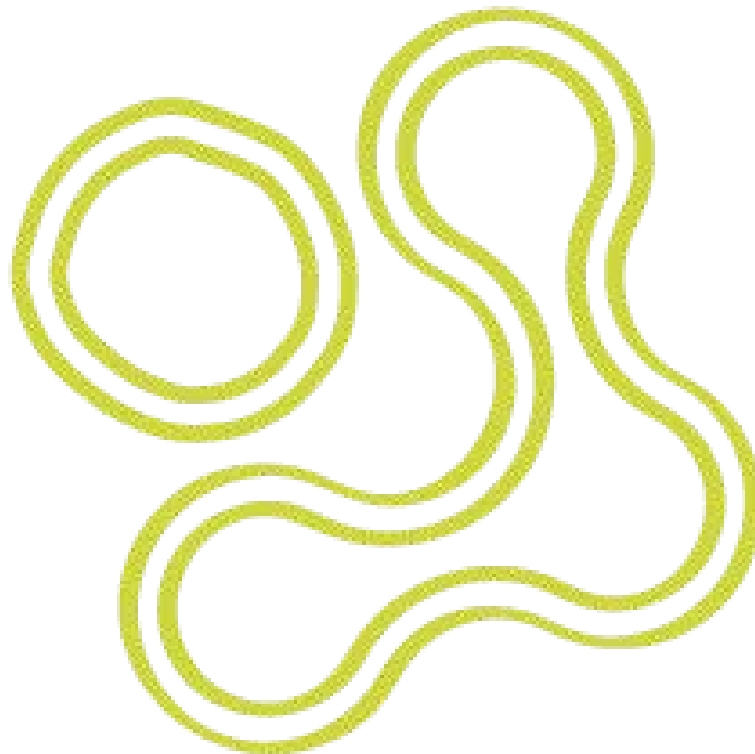202020 Vision (2014). Where are all the trees?

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