From Planning to Wildlife Gardening

Evolving Approaches to Fostering Urban Biodiversity

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The ways urban communities can foster native plants and animals as part of the biodiversity of their neighbourhoods, and the social implications, are being reconceived. Traditionally, nature conservation efforts have focused on protecting threatened species and habitat on public land and educating residents about the need for conservation, with minimal recognition of how households can play active roles on their own land. We see how community champions and personal relationships have influenced how nature is valued and conserved in Knox City (a municipality in Melbourne Australia). We place this story within a historical perspective of nature conservation in cities internationally, and trace the links between planning and conservation in Melbourne. Turning to the present we describe research on an innovative collaboration between a community group and council (Knox Gardens for Wildlife) that engages residents to garden to conserve native biodiversity (wildlife gardening), complementing Knox Council's biodiversity conservation activities. We find that the program provides biodiversity and social benefits to the community, including contributions to participants' wellbeing and connections with nature and community. Underpinning factors include a face-to-face garden assessment, physical hubs for advice and support, visible involvement of volunteers and Council, and the endorsement of each garden's potential conservation contribution. We propose how similar partnerships can reframe the role of urban citizens and households in fostering municipal biodiversity, and suggest future lines of enquiry.

Keywords — *urban nature conservation; urban biodiversity; environmental planning; wildlife gardening.*

Introduction

Cities are often located in areas rich in biodiversity (Secretariat of the CBD 2012). Urban processes like fragmentation of land, alteration of water bodies, and elevation of nutrients disrupt pre-settlement ecosystems and cause the withdrawal or demise of a number of native species and communities (Farinha-Marques et al. 2011, Kowarik 2011). Yet urban green spaces can and do support species of conservation concern (Aronson et al. 2017). City governments are called upon to play a key role in conserving native species as part of their municipal biodiversity (Puppim de Oliveira et al. 2011, Secretariat of CBD 2012).

There has been less attention on the role of households (Reid et al. 2010), community groups, and networks, including those with government representatives (Ernstson et al. 2010), to facilitate or drive biodiversity stewardship. Here we illustrate how households, community groups, and local government can work together to foster biodiversity across public and private land in their municipalities. We begin with a brief history of urban nature conservation, followed by the history of environmental planning in Melbourne, noting the limitations of planning for conserving native biodiversity. In a case study of Knox City, we see the historic influence of environmental champions on valuing and conserving local nature. Reviewing research findings on a current Knox community group-council partnership that engages householders in biodiversity stewardship, we conclude with the opportunities these collaborations offer for fostering urban biodiversity.

Nature Conservation And Cities

From the early 1970s, environmental organisations internationally (government and nongovernment) grew exponentially. This has been attributed to mounting, actionable scientific data on environmental degradation, and the rise of the United Nations framework (Meyer et al. 1997). Following the formation of the United Nations Environment Program in 1972, the first World Conservation Strategy was produced (IUCN 1980). It highlighted that for human development to occur sustainably, the ecological systems and diversity that underpin it need to be maintained - locally and globally. The first United Nations Conference on Environment and Development was held in 1992 in Rio de Janeiro. At this conference a Convention on Biological Diversity (CBD) (United Nations 1992a), the Rio Declaration, a non-binding statement of principles for environmental policy (United Nations 1992b), and Agenda 21 (United Nations Department of Public Information 1993), an international action plan for sustainable development, were signed. These documents set out principles that underpin many countries' frameworks for conserving biodiversity, including that: biodiversity conservation is a global responsibility, environmental quality is required for human wellbeing, and environmental issues are best handled with the participation of concerned citizens in their localities.

Traditional nature conservation activities attempt to protect representative 'wild' landscapes (defined by 'ecological integrity and historical fidelity') from human influence (Higgs 2012, Corlett 2016). Given that cities are characterised by human aggregation and landscape fragmentation (Lambin et al. 2001), different approaches to conservation emerged. Effort was placed on improving or preserving habitat patches and corridors (habitat linkages that support species movement between patches) found within the landscape (Forman 1995). Rather than whole landscapes, particular native species or communities, each with distinctive habitat needs, are targeted (Lindenmayer and Fischer 2006).

One of the first international urban nature conservation conferences, 'Man and Nature in the Metropolitan Environment: A Challenge in Creative Conservation' was held in 1987 (Adams and Leedy 1987). Its themes included: urban planning to benefit wildlife and people, public education and extension, landscape design for wildlife habitat, and establishing wildlife sanctuaries on public and private land. Foremost among the approaches was designing urban open space to incorporate habitat reserves, buffers, and corridors, with ancillary use for recreation and environmental education (Adams 2005). Examples include the development of a Metropolitan Open Space System in Durban South Africa, a park connector network in Singapore, and the Metropolitan Green Spaces program in Portland USA (Adams 2005). The potential for urban backyards to provide wildlife habitat was recognised in two programs.

In 2008 the CBD formally recognised the importance of cities in conserving biodiversity (Puppim de Oliveira et al. 2011). How this could be done was outlined in a subsequent action/policy document (Secretariat of the CBD 2012). This includes recommendations to plant native plants in gardens, (including vertical and rooftop gardens) because "even small urban gardens [are important] in providing habitat for native pollinators such as bees" (Secretariat of the CBD 2012: 25). Local innovations and conservation approaches are strongly encouraged. Local authorities are asked to develop institutional mechanisms to support local groups, and to "create rules and organizational capacity to make collaboration effective" (Secretariat of the CBD 2012: 45).

Nonetheless, many land types in cities, including residential properties, remain undervalued as conservation spaces. There is poor engagement and networking of diverse land managers from statutory entities to homeowners in conservation actions (Ernstson et al. 2010). Instead, emphasis is placed on conservation education and improving residents' 'connection to nature' (Dearborn and Kark 2010, Shwartz et al. 2014). The opportunities to involve urban households in fostering

native wildlife on their properties to complement management of reserves and corridors on public land has received relatively little attention, particularly in the form of collaborative public-private conservation partnerships (Mumaw and Bekessy 2017).

Planning And Nature Conservation: Melbourne, Victoria, Australia

Coinciding with events internationally, nature conservation began to be incorporated into the planning system of the Australian state of Victoria in the early-1970s (Manton, 1993). All land, public and private, within the state is subject to this system (Rowley, 2017). First established under the *Town and Country Planning Act 1944*, the Victorian planning system provides controls that restrict how land is to be used, developed and subdivided (Eccles and Bryant, 2011; Rowley, 2017). Importantly, the system has evolved over time (Eccles and Bryant, 2011).

From 1961 until 1987, the Victorian planning system was prescribed under the *Town and Country Planning Act 1961*. It comprised three tiers: the state tier, a state policy body preparing statements to guide planning schemes; the regional tier, involving regional planning authorities administering regional planning schemes consistent with relevant statements; and the local tier, involving councils administering local planning schemes consistent with relevant statements (Eccles and Bryant, 2011). In Melbourne, land was subject to the Melbourne Metropolitan Planning Scheme (MMPS), a regional planning scheme administered by the Melbourne and Metropolitan Board of Works (MMBW), a regional planning authority, and local planning schemes administered by councils. Importantly, the MMPS was the primary scheme; all local planning schemes were to be reconciled with the MMPS and then revoked (TCPB, 1968). The planning schemes of this period primarily used zones to restrict how land was to be used, developed and subdivided (Eccles and Bryant, 2011).

During this period, nature conservation was first incorporated into the Victorian planning system. In 1972, the Victorian parliament passed the *Town and Country Planning (Amendment) Act 1972*. Section 32(a) of the act gave planning authorities, either regional or local, the power to implement into their planning schemes controls "for the conservation and enhancement of areas and objects as being of natural beauty or interest". In 1974, the MMBW introduced two zones for nature conservation into the MMPS: the Conservation Zone and the Landscape Interest Zone (McLoughlin, 1992). Both of these zones restricted land uses and minimum allotment subdivision sizes to protect the land from urbanisation. These zones, as well as other non-urban zones, were used to establish non-urban areas, known as 'green wedges', across Melbourne. These still exist today.

Since 1987, the Victorian planning system has been prescribed under the *Planning and Environment Act 1987*. The system comprises the state and local tiers. The regional tier was abolished and regional planning schemes were incorporated into local planning schemes (Eccles and Bryant, 2011). Between 1987 and 1996, planning schemes continued to primarily use zones as control mechanisms (Eccles and Bryant, 2011). In 1996, the Victorian parliament passed the *Planning and Environment (Planning Schemes) Act 1996*. This act standardised local planning schemes by establishing the Victorian Planning Provisions (VPPs), a source document that specifies the form of local planning schemes and an expanded list of planning controls available for use. Since this time, planning schemes use zones, overlays and provisions as land use and development controls (Eccles and Bryant, 2011).

Importantly, the VPPs introduced a suite of new controls for nature conservation including overlays and provisions (Eccles and Bryant, 2011). In 1989 Victoria had introduced native vegetation retention controls; a Native Vegetation Framework was incorporated into the VPPs in 2004 (Costello 2012). This framework mapped and classed various native ecological vegetation systems (EVCs) by threatened status. The removal of native vegetation was restricted, requiring a sequential three-step process of: avoid losses, minimise unavoidable losses, and offset any permitted losses by increasing the extent and quality of native vegetation either on the property or offsite (Costello 2012). Today there exists an Environmental Significance Overlay, Vegetation Protection Overlay and Significant Landscape Overlay (DELWP, 2017). All of these restrict the removal of vegetation. There also exists the Rural Conservation Zone for private land and Public Conservation and Resource Zone for public land (DELWP, 2017).

The history of the Victorian planning system and the way in which it has incorporated nature conservation raises an important issue. In effect, the history has shown that planning controls can be used to protect or offset existing native vegetation and bushland assets. They may require planting of indigenous or native species and/or removal of environmental weeds in new developments. But they have limited capacity to compel land managers to foster or enhance biodiversity.

Caring for Nature in Knox: A History of Community Champions

Knox City is located in Melbourne. It was formed in November 1963 (Knox City Council 2017a). The area was largely rural and the local foothills and forests were viewed as a resource for infrastructure development and building timber. There was no management of the forest resource and as a result what were claimed to be "the tallest trees in the world" were removed (Jones 1983: 78). Indeed, the Knox Coat of Arms (Fig. 1) contains a woodcutter, representing the importance of tree felling for supporting development and growth (Knox City Council 2017b).

In the 1960s and 70s there was a growing movement to appreciate and use Australian native plants for horticultural purposes, exemplified by the development of Australian native plant societies (Australian Plants Society Victoria, 2018).

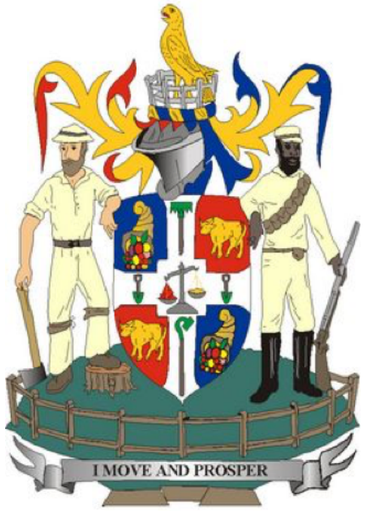

Figure 1. City of Knox coat of arms

One Knox landscape architect recounted (I Bell 2015, personal communication 20 November):

> *We had some very strong political leadership at the time…challenging our thinking on a whole range of levels… our landscape, and our whole appreciation of what is Australia… that led to …the emergence of the landscape architecture profession. The emergence of some specific [Australian native plant] nurseries [in Knox]… and they were selling to your Coles, and your K Marts …The challenge was that - and I actually worked for one of those nurseries …we had these massive glasshouses that were propagating these [Western Australian] plants- they were from everywhere else [but locally].*

There were individuals who appreciated the character of indigenous bushland and species, and championed them. Alistair Knox, a notable Victorian architect and pioneer of building in harmony with the environment, attempted in the

early 1970s to get Knox City (Council) to use indigenous species for all roadside and general planting (Knox Environment Society 2015).

In the 1980s the conservation of local bushland was taken up and promoted by key Knox staff and community members. Amongst them was a landscape architect employed by Council, one of the first to be employed in local government in Victoria. As part of his role, Richard (Dick) Dare worked with the planning department on case-by-case development applications to protect areas of bushland where the opportunity arose (I Bell 2017, personal communication, 6 September). Council did not consider it necessary to resource the management of these reserves and they were left untended for up to a decade. At this stage there was very little understanding of biodiversity management in local government (I Bell 2017, personal communication, 6 September).

In 1982 a "small group of like-minded people interested in their local environment and community" and with a desire to protect local native vegetation, founded the Knox Environment Society, or KES (Knox Environment Society 2015). Founders included Andrew Paget, an Australian indigenous plant specialist then a student at Monash University promoting use of indigenous species and ecosystem restoration (Youl 2006). KES objectives were to: foster an interest in the Knox environment, provide opportunities for local environmentalists to meet and exchange ideas, and undertake projects in support of conservation and natural history (Knox Environment Society n.d.). In 1985 KES established an indigenous plant nursery, one of the first in Australia, to support revegetation projects (Knox Environment Society 2017). Members began to map native vegetation in some of the Knox bushland reserves and to develop management plans, although Council was not resourced to manage the reserves and was not receptive to adopting these plans (D Wallace 2017, personal communication, 8 September). KES lobbied sympathetic Council officers for support, and an informal and long lasting partnership developed (D Wallace 2017, personal communication, 8 September).

KES representatives and the officers identified key creek habitat corridors for indigenous plantings, and priority reserves for removal and control of blackberry and major woody weeds. Weed management techniques were developed by trial and error, with resultant improvements in the native vegetation. As a result, in the early 1990s a report was put to Council noting that there was biologically significant vegetation in some of the bushland reserves and recommending allocation of resources to sustain it (I Bell 2017, personal communication, 6 September). Concurrently, KES continued to lobby Knox Councillors about the importance of the local bushland.

In 1993, in the global pro-environmental period of the Rio conference, the Victorian government provided grants to local government to develop conservation plans. KES lobbied Council to apply for a grant (D Wallace 2017, personal communication, 8 September), and Council used the grant to employ a Conservation Officer. In addition to conservation planning, the officer supported development of 'Friends of' groups to care for local reserves. The first such group was formed in 1994. These groups remain advocates and custodians of their reserves today. In 1995 Council's first Environmental Advisory Committee was established. Two KES members were accepted onto the Committee, which advocated for resourcing the development of Bushland Management Plans. Permit conditions to require planting of native plants in new developments were introduced, believed to be the first of their kind in Australia (D Dare 2018, personal communication, 19 January). In the late 1990s Council created a conservation and environment team to support local biodiversity as well as to develop strategy around water, waste and energy efficiency.

In 2004 a seminal report on Sites of Biological Significance in Knox (Lorimer 2004) was produced for Council. It identified and mapped the majority of sites within Knox with remnant vegetation. Importantly, sites were found on public and private land, making Council more aware of the importance of private land for conservation. The report coincided with the Victorian State government incorporating the Native Vegetation Framework into the VPPs. One year later, in 2005, two KES members proposed to a Council officer (Nadine Gaskell) the development of a program to support and celebrate indigenous plants on private land. Through a serendipitous meeting of the minds between these individuals, the Knox Gardens for Wildlife (G4W) program was born. In 2013 Council implemented the Environmental Significance Overlay in its local Planning Scheme, protecting not only remnant trees and vegetation but also ecological processes. The overlay heightened the importance of the Sites of Biological Significance with Council's statutory and strategic planners as well as Councillors: "even planners thought differently about native vegetation after this planning overlay was introduced" (N Vickridge 2017, personal communication, 6 September). The protection applied to over 11,000 households. Some strategic planners were surprised by the limited objection in the community consultation process (N Vickridge 2017, personal communication, 6 September).

The history of biodiversity conservation in Knox and its movement from focusing on public land in the 1980s to incorporating private land in the 2000s has one common thread - individual champions. We began with the story of a landscape architect employed at Council with an interest in the natural environment, working to protect bushland through developer contributions to public open space. We continued with stories of the informal partnership between KES advocates and Council officers to identify and protect bushland reserves. The G4W program in 2005 heralded a new approach of partnering between Council, a community group and householders, working collaboratively to support conservation on both private and public land.

The Knox Gardens for Wildlife program (G4W)

Knox Gardens for Wildlife (G4W) (Knox City Council 2016) involves and supports residents to wildlife garden on their properties to help conserve the indigenous species and habitat of the municipality. Promoted wildlife gardening activities include removing environmental weeds (Smith et al. 2006), adding habitat structure and features like shelter or nesting sites and planting indigenous flora (Goddard et al. 2010), and nurturing indigenous regrowth (Doody et al. 2009).

G4W members (households, businesses) join G4W by signing up online or by post. Members (now numbering over 700) receive an on-site garden visit by garden assessors who explain the program's purpose, identify environmental weeds and indigenous biota in the garden, and describe specific opportunities for wildlife gardening. Garden assessors are either Knox City staff or G4W volunteers (often G4W members).

G4W's impact on community capacity for biodiversity conservation

Between 2013 and 2017 qualitative research was undertaken on G4W. It examined how the program engages and supports residents to garden as part of a municipal conservation collaboration, how a land stewardship ethic and practice develops, and the effects involvement has on participants' subjective wellbeing and connections with nature, place, and community. Primary data were gathered through interviews with thirty-two individuals involved with G4W, including members, garden assessors, founders, and KES and Knox City officers. This was supplemented with demographic data from G4W members, observations of their gardens, an unpublished Knox City survey of members, and an open-ended questionnaire of garden assessors.

The research found that urban residents with diverse gardening styles and demographic backgrounds begin caring for indigenous species and habitat in their gardens because of their participation in G4W (Mumaw and Bekessy 2017). Factors critical to recruit members and maintain their involvement in wildlife gardening include: a face-to-face garden assessment, endorsement of the conservation contribution wildlife gardening makes to the municipality, visible involvement of community volunteers and council, and community hubs from which to get advice and support (Mumaw and Bekessy 2017). A stewardship ethic and practice develops over time, through a complex interplay between wildlife gardening, improving competency and confidence, increasing stewardship knowledge, growing stewardship beliefs and values, and deepening attachments to place and community (Mumaw 2017).

Program participation strengthens wellbeing and social connections amongst program members and volunteers. Feelings of wellbeing come from experiencing nature, sharing learning, developing skills, and making a meaningful contribution to community and nature (Mumaw et al. 2017). A number of interviewees expressed feelings of hope for the future because of their involvement (Mumaw et al. 2017):

"I just get a buzz out of going down to the indig nursery… you think like, gosh Knox is actually great, you know, it makes you feel good about your neighbourhood and the people around and it's not all bad and the world's not bad. There's people that are doing the positive things".

The KES-Council collaboration and the social dimensions of the program are critical to actioning biodiversity stewardship. More households and businesses are involved in wildlife gardening. Some G4W members volunteer with KES and join in habitat improvement of local reserves. Some introduce wildlife gardening activities to their children's schools (Mumaw et al. in review). The work of Council staff and longstanding volunteers is extended with the involvement of families, young children and new immigrants. The stewardship is done at home, linking a place of deep attachment and identity formation (Holland 2006) with caring for local nature as a community contribution (Mumaw 2017).

There is increased ecological capital for conservation through identification and mapping of native species and remnant vegetation on private land; donation of conservation-significant land to Council by some G4W members; and location, storage and propagation of indigenous plant material by KES. From a social capital perspective, not only does the program increase residents' skills and knowledge about fostering biodiversity, it strengthens their connections to nature and place, and links them to others helping to conserve local biodiversity (Mumaw et al., in review). G4W participants, KES, and Knox City communicate about the program and local environmental issues. There is growing appreciation of each other's different contributions to conservation. A Council officer remarked, "The messages coming from KES are probably stronger than the messages that come from us, because they're coming from a community group as opposed to an authoritative government figure."

A collaborative partnership between KES and Council program leaders emerged from learning by doing. The founders developed trust, shared understanding, a commitment to continue, and connected local community knowledge with scientific/management expertise. These are qualities recommended for successful tackling of complex natural resource management challenges (Bouwen and Taillieu 2004, Ansell and Gash 2008) and specifically for maintaining and improving urban green infrastructure (Andersson et al. 2014, Munoz-Erickson et al. 2016).

The Future: Collaboration For Biodiversity Stewardship?

The challenges we face in conserving biodiversity in cities are many. Conservation methodologies are unclear, and meaningful progress measures difficult to establish (Game et al. 2014). What biodiversity to attempt to conserve and why requires ethical, cultural and political considerations (Maris and Béchet 2010, Damiens et al. 2017). As circumstances change, so too will conservation targets and strategies; planning and legislation are valuable tools but not enough to secure species and ecosystem persistence.

Participation of organisations, individuals and groups as collaborators in the conservation process helps to develop relationships, skills, and shared values around what might be achieved and how (Bouwen and Taillieu 2004, Andersson et al. 2014). There are increasing examples in which ecosystems and species populations have been maintained or restored through collaboration between individuals, organisations, formal and informal networks, and leaders who build trust and connect people (Olsson et al. 2006, Schultz et al. 2015). These groups seek and use diverse bodies of knowledge, involve stakeholders in defining problems and choosing solutions, and learn from reflecting on their work (Armitage et al. 2015). This helps provide the capacity to respond to uncertain and changing conditions (Schultz et al., 2015).

Knox G4W displays many of these collaborative features. Building on research on G4W, Gardens for Wildlife Victoria was initiated in 2016. This is an informal network of representatives from community environmental groups, municipal councils, and state environmental agencies. The network promotes community group-local government partnerships as hubs to co-design and develop wildlife gardening programs that meet local social and ecological needs and aspirations (Gardens for Wildlife Victoria 2017). Collaboration, connections and wellbeing are fostered alongside environmental objectives. In the first year, three new partnership programs commenced in different municipalities of Melbourne, and at least six more are in development. While each program is reflective of its local context, their development and that of G4W are strikingly similar in the importance of community champions and a supportive network.

This conference explores the making and remaking of cities through human endeavour. Sometimes the changes are purposeful, sometimes the inadvertent consequences of socio-political or individual behaviour directed elsewhere. Institutional mechanisms to protect or restore biodiversity, like planning regulations and professional staff, are insufficient and indeed, may be perceived as "an alien idea descending from some remote expert, backed by state bureaucracy and, if necessary, coercive force" (Adams and Mulligan 2003). While the G4W program shows promise in engaging urban communities in biodiversity stewardship, there is still much to learn. Amongst the many questions are: What are effective models of collaboration that include state, local agencies, community groups, and community members in caring for nature? What and how can institutional innovations support community-led conservation? What factors help get people involved? How do we involve residents in apartments or high-density housing? How can we scale up successful programs? How can we monitor and communicate the social and ecological impacts? With biodiversity continuing to decline in cities, we need to reverse the cautionary observation of Adams and Mulligan (2003) that "conservation is not, by and large, something people do, but something that is done for them".

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