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Transforming urban gardeners into land stewards

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ABSTRACT

This qualitative study explores how urban gardeners were supported to become land stewards through a wildlife gardening program in Melbourne Australia, and how this process occurred. From interviews of 16 program members in their gardens, the effects of program participation on reported gardening purpose and practice, and attachments to place, nature, and community, were investigated. Using inductive analysis, a stewardship development model was posited and compared to PEB change models. A first phase introduces participants to the purpose, activities, and support for land stewardship, and their potential role. A development phase follows where connections to place deepen; stewardship knowledge, competencies and activities strengthen; and commitment to stewardship increases through learning by doing, supported by rewarding results, validation, community involvement, and accessible resources. Private land stewardship values and practice can develop from wildlife gardening, a means to foster urban biodiversity while strengthening connections between residents and nature, place, and community.

1. Introduction

Much of the modern sustainability agenda involves promoting pro-environmental behaviours (PEBs) to city dwellers, comprising over 70% of the population in many countries outside of Asia and Africa (United Nations Department of Economic and Social Affairs Population Division, 2014). PEBs are behaviours that minimise harm to the "availability of materials or energy" from the environment or "the structure or dynamics of ecosystems" (Steg & Vlek, 2009, p. 309). They include actions to conserve biodiversity, a primary goal of the international Convention on Biological Diversity. Understanding how to effectively engage and sustain urban residents in conserving biodiversity is both an ongoing challenge and a research priority (Shwartz, Turbé, Julliard, Simon, & Prévot, 2014).

Diverse theories have been proposed for the development of pro-environmental behaviours (refer to Chawla & Derr, 2012; Darnton, 2008; and Schultz & Kaiser, 2012 for reviews). The most common theories focus on behaviour of individuals, identifying factors believed to affect one's ability or intention to behave. These factors include attitudes, social norms, and perceived control (Ajzen, 1991); knowledge, action competence, personal investment, and expectance of rewards (Hungerford & Volk, 1990); and emotional investment (Kollmuss & Agyeman, 2002). There remains a dearth of research about how the practicing of nature conservation develops from these antecedents (Restall & Conrad, 2015). Chawla and Derr (2012: 549–550), reviewing research on the development of conservation behaviours in youth, noted that it "has been dominated by a focus on knowledge, values and attitudes at the expense of behaviour", and called for more qualitative studies to provide insight into processes of learning and how people themselves interpret experiences.

There is agreement that change approaches should be tailored to a particular behaviour, including its desired persistence (Geller, 1995), adaptability (Vare & Scott, 2007), context (Schultz & Kaiser, 2012), and distinctive characteristics (Darnton, 2008). Larson, Stedman, Cooper, and Decker (2015) stress the distinctiveness and importance of land stewardship, a category of PEBs they defined as protecting or improving habitat to conserve biodiversity. These are "place-based behaviours, which play a critical role in local environmental quality, yet are rarely considered in PEB research" (Larson et al., 2015, p. 114). There is no one definition of land stewardship, but land stewardship activities described in the literature include preserving and protecting remnant vegetation (Gosling & Williams, 2010) and improving wildlife habitat, principally through revegetation (Carr, 2002; Huddart-Kennedy, Beckley, McFarlane, & Nadeau, 2009; Larson et al., 2015). Alternative definitions, not discussed here, include managing and protecting land for cultural or agricultural purposes (Raymond, Bieling, Fagerholm, Martin-Lopez, & Plieninger, 2016). What distinguishes land

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stewardship from other PEBs is its focus on nurturing flora and fauna in specific geographic places. To achieve conservation goals, land stewardship needs to continue over time and to adapt to changing environmental circumstances and species/locale targets (Wiens & Hobbs, 2015).

Appeals to conserve nature include doing so for its intrinsic values, its instrumental values (what useful services it provides for people), and more recently its social or 'relational' values, such as to live a meaningful life, preserve cultural value, or strengthen social ties (Chan et al., 2016, p. 1462). Caring for other species and particular places are acts laden with relational values. Chan et al. (2016) recommend fostering PEBs by understanding the relational values people have with nature and building on them.

This work seeks to understand how land stewardship can be fostered in urban residents by building on a relationship many diverse residents have with nature – gardening. Here land stewardship is defined as:

> Caring for the ability of the land in a geographically situated place to support nominated species or communities of flora and/or fauna to persist across the surrounding landscape, as a matter of personal responsibility, for future generations.

This definition derives from concepts articulated by Aldo Leopold in his seminal essay The Land Ethic (Leopold, 1949, pp. 201–226): that an ethic guides an individual's actions to cooperate for the good of the community (p 203); that "the land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land" (p 204); and that a land ethic "reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land" (p 221). Importantly, this definition encompasses purpose as well as behaviours, and concepts of nurturing, species conservation, place, landscape, personal responsibility, persistence of action, and supporting the common good across generations. Promotion of land stewardship as defined here has been studied in rural and urban settings.

1.1. Promotion of rural land stewardship

In Western agricultural settings, stewardship on one's own land (private land stewardship) has been promoted from at least the 1940s as a valuable contribution to conservation (Leopold, 1949). Leopold accepted that one could manage a rural land holding for stewardship simultaneously with other purposes like agriculture, caring for the land sensitively while supporting the continued existence of native species "and, at least in spots, their continued existence in a natural state" (Leopold, 1949, p. 204). The focus of private land stewardship remains at the landscape scale and for the common good. Larson et al. (2015) found that a high proportion of rural New York landowners reported participating in private land stewardship (72% doing it often or very often compared with 13% on public land).

There is little published about how rural land stewardship develops. Pannell et al. (2006) highlighted the importance of awareness and learning by doing in rural landholders' adoption of conservation practices. Race, Curtis, and Sample (2012), in a qualitative study of Australian rural landholders, found that personal advice and recognition of their efforts from environmental program staff and peers strengthened motivation for private land stewardship. The role of place attachment is unclear. Selinske, Coetzee, Purnell, Knight, and Lombard (2015) found that place attachment motivated rural South Africans landholders to enrol in a private land stewardship program. However, Gosling and Williams (2010) found that place attachment (using a postal survey questionnaire) was not associated with rural Australian landholders' reported conservation of native vegetation and suggested that further analysis, including a more nuanced observation of behaviours, is needed to understand mediating factors.

1.2. Promotion of urban land stewardship

In contrast with rural land stewardship, the promotion of urban land stewardship is a more recent phenomenon and has focused almost exclusively on volunteering to improve habitat on public land (Dearborn & Kark, 2010; Schwartz, 2006). Much of the research on promoting urban land stewardship comes from close-ended questionnaire studies on the motivations and rewards for volunteering in organised stewardship programs on public land. In these studies, helping the environment, particularly one that they use personally, was the most important motivation; others included learning about nature and expressing personal values (Asah & Blahna, 2012; Bruyere & Rappe, 2007). When open-ended questions were used the results were 'markedly different', with the most frequent responses being to experience positive emotions, contribute to community, and socialise (Asah, Lenentine, & Blahna, 2014, p. 111). Receiving personal and social benefits increased the frequency and duration of volunteering (Asah & Blahna, 2012; Ryan, Kaplan, & Grese, 2001). Urban conservation volunteers have also been reported to develop a strong interest in protecting local natural areas and a strong attachment to their volunteer sites (Ryan & Grese, 2005, pp. 173–188).

Very little is written about engaging city dwellers in private land stewardship. Larson et al. (2015:121) suggested that urban landowners are unlikely to exhibit the high levels of private land stewardship seen in rural locations because of the "unique environmental place meanings and sense of place that often emerges in rural settings" or lack of opportunity. Huddart-Kennedy et al. (2009), while also finding higher rural than urban participation rates in private land stewardship in Canada, found that city-raised Canadians living rurally participated at similar rates to those raised rurally. Neither of these studies investigated how land stewardship develops.

The premise here is that caring for one's land in the city should have the same potential to evoke land stewardship as caring for one's land in the country, as "in the case of gardening and farming especially, [there is] the rewarding and productive engagement with other life forms and the opportunities to exercise virtues of nurture and care" (Holland, 2006, p. 133). The work reported here was a component of a revelatory case study (Yin, 2009) exploring how a purposively chosen wildlife gardening program affected participants' self-reported gardening behaviour, feelings of well-being, and connections to nature and place. This sub-study explored how program participants reported the development of land stewardship purposes, materials and activities for their gardening, the impacts on their connections with place and community, and the role of the program in this process.

2. Methods

A qualitative, interview-based methodology was employed because it is 'attuned' to surfacing interconnections between factors and "the unfolding of events over time" (Bryman, 2012, p. 408), required to explore participant's views of their changing behaviours, purposes, and feelings from participation in the program. van Heezik, Dickinson and Freeman (2012) found that open questions provided a deeper, finer-grained understanding of changes in householders' gardening attitudes and behaviours than closed question surveys used in the same study. Inductive analysis of members' interviews was used to develop a model for stewardship

development rather than testing or building on existing frameworks (Bryman, 2016, pp. 23–24, 379). This model was then compared to existing PEB change frameworks. Methods are described in detail below. This study received ethics approval from a sub-committee of RMIT University's Human Research Ethics Committee. Pseudonymic initials are used for interviewees to preserve anonymity.

2.1. Case study program

The chosen case study program, Knox Gardens for Wildlife (G4W) (Knox City Council, 2016), is located in eastern greater Melbourne, Australia, with the aim of conserving the area's indigenous species by aligning private and public land management across the municipality. G4W promotes removing environmental weeds, planting and protecting indigenous vegetation and vegetative structure, and providing habitat for indigenous wildlife as private land managers' conservation contribution (Knox City Council & Knox Environment Society, 2008). 'Indigenous wildlife gardening' is used to refer to these activities. G4W was purposively chosen for its purpose, partnership structure, success (founded in 2006, with a membership in 2017 of over 700 households), and variety of program features. It is a collaboration between an urban council Knox City (Council), and community group Knox Environment Society (KES). KES promotes the Knox environment and runs an indigenous plant nursery that is a key feature of G4W.

Any Knox resident or business can sign up to be a G4W member. Members receive an on-site garden assessment by assessors who explain the program's purpose, identify environmental weeds and indigenous biota in the garden, and advise on specific opportunities for helping to conserve indigenous species. Members then receive an illustrated assessment report, Knox indigenous wildlife gardening booklet, and 20 free vouchers for indigenous plants at the KES nursery. They also receive newsletters and invitations to program events like open-garden days and occasional get-togethers. Members with properties of sufficient size and proximity to a biologically significant site can apply for a grant for their gardening activities. A Facebook page and website provide online information and advice.

2.2. Member sampling strategy

A diverse sample of G4W members was sought for interview to explore the impact of program participation on members with a wide variety of personal and property features. Thirteen garden assessors (council staff and program volunteers), who between them had visited over 200 members' gardens, were asked to identify a range of personal, property, and program-related aspects of membership diversity in a group interview. The assessors then independently suggested potential interviewees they felt displayed a variety of these characteristics. All 32 recommended interviewees were invited to participate; 10 responded and were interviewed. Subsequently the program coordinator invited 106 members on the membership database from across joining years and postcodes; six responded and were interviewed. While the percentage agreeing to participate indicates selection bias for quick response and willingness to be interviewed, the sample was deemed suitable because 1) the research was exploratory, identifying concepts for further testing rather than establishing a theory or generalizable findings; 2) the sample included G4W members with diverse backgrounds as desired (refer 3.1); and 3) data saturation was reached after 16 interviews. Data saturation, "the point in data collection and analysis when new information produces little or no change to the codebook" (Guest, Bunce, & Johnson, 2006, p. 65), is used to help determine the adequacy of a sample in qualitative studies using non-probabilistic sampling (Bryman, 2016, p. 417; Guest et al., 2006). In an experiment on data saturation in an interview study, Guest et al. (2006) found that saturation occurred after the first 12 of 60 in-depth interviews, at which point 97% of high-prevalence themes and 88% of all themes identified in the study were recorded (some of which were variants of high-prevalence themes). They concluded that twelve interviews can suffice to identify common perceptions and experiences of participants when the sample is purposive and homogeneous (as in this study where the sample was of invited participants in a specific wildlife gardening program).

2.3. Data acquisition

Data was acquired from interviewees and about their gardens through: 1) a demographic questionnaire; 2) semi-structured interviews at interviewees' homes that included a walking tour of their gardens; 3) observations of the garden at interview; and 4) web and document review to obtain lot size and proximity to parks and reserves. Interviews explored members' gardening experiences and interaction with the program over time, and the effect of participation on their gardening behaviour and reported connections with nature, place and community. A prompt sheet was used as a guide during the interviews. Interviews varied from 45 min to 2 h, were digitally recorded, and transcribed verbatim.

2.4. Analysis

Transcripts were coded line by line using QSR NVIVO software for Mac (v10.1). Codes were not pre-established but derived from interviewees' responses. Enough text was coded to provide a context for each code; if interviewees covered a number of topics in a single response these were all separately coded with different contextual segments as appropriate. Codes and transcripts were iteratively reviewed as part of a fluid, inductive analytical process (Thornberg & Charmaz, 2011, pp. 41–51) in which emergent ideas and relationships from initial coding were used to develop subsequent analytical categories and nodes. Codes were grouped inter alia into descriptive nodes relating to attitudes, feelings and meanings; impacts of G4W program features; gardening activities, purpose, motivations, rewards and challenges; and connections with nature, place and community. Particular attention was paid to how and why these elements changed from the time prior to an interviewee joining the program until the interview.

To understand the development of land stewardship, interviewees' descriptions of the materials, purpose, meanings and connections associated with their gardening were considered: how they aligned with those of land stewardship and how they evolved. Other qualitative studies have used purpose, meanings, and activities to evaluate the development of pro-environmental behaviour by individuals, although in the context of waste and energy reduction (Hargreaves, 2011) and climate change campaigning (Hards, 2011). From the interview data, an initial model of a process for the development of land stewardship was prepared, including the role of program elements. Manuscripts and coded material were then re-examined on a participant-by-participant basis to refine the model.

3. Findings and discussion

3.1. Diversity of interviewees and their gardens

Interviewees differed by gender, qualifications, place of birth, employment, age, and length of G4W membership; their properties varied in location and lot size, and how long interviewees had lived

Table 1
Attributes of interviewees and their properties.

Gender	**Age (yrs)**[a]
Male: 9 Female: 7	<25: 1 35-44: 4 45-54: 3 55-64: 4 65-74: 2 75+: 1
Qualifications Up to High School: 8 Certification: 1 Tertiary/plus: 7	**Employment** Full time: 8 Part time: 3 Retired: 5
Born and raised Australia: 12 Europe: 3 SE Asia: 1	**Property size (sqm) (in 7 postcodes)** <1000: 6 1000-1999: 4 2000-2999: 3 3000-3999: 2 23,000: 1
Years at property 1 yr: 1 2-5 yrs: 6 8 yrs: 2 18-21 yrs: 3 25-26 yrs: 2 40 yrs: 2	**Years in G4W at property** <0.5 yr: 2 .5–1.5 yrs: 3 2.5–3.5 yrs: 5 4.5–5.5 yrs: 2 5.5–6.5 yrs: 3 7.5–8.5 yrs: 1

[a] Only 15 of 16 interviewees' age ranges are shown because one interviewee did not provide their age.

at them (Table 1). Interviewees' gardening experience and style prior to joining G4W also differed, ranging from inexperienced (2 interviewees), backyard (4), and traditional (3) to native gardeners (7) who had used Australian native (not usually indigenous to Knox) plants for their origin or to attract wildlife. Table 2 provides further description of gardening categories.

3.2. Practising indigenous wildlife gardening

All interviewees, irrespective of their gardening background, demographic or property characteristics, or reasons for joining the program, had planted indigenous species and all but one (who had not had an assessment) had removed environmental weeds since joining the program. None of the interviewees knew about indigenous wildlife gardening or how it could be practiced before joining G4W. The G4W program played a key role in engaging members in these activities (Mumaw & Bekessy, 2017). Here, a mechanism for the process is presented (Fig. 1). This process description serves as a foundation for addressing how urban private land stewardship develops in program participants, given that land stewardship extends beyond practicing stewardship behaviours (wildlife gardening) to adopting stewardship values and purposes.

Interviewees joined the program primarily to improve their gardening knowledge and gardens; the majority were not actively seeking information about the program or wildlife gardening

Table 2
Interviewees: Background characteristics, stewardship purpose, extent of stewardship activities, and reported connections for Knox & stewardship.

Background characteristics						Stewardship purpose elements							Activities[a]	Connections
Ref No.	Prior gardening experience[b]	Neighbourhood character	Given grant	Time in G4W	Lot size sqm	Care for wildlife	Care for indigenous flora	Care for Knox landscape	Help Council /Knox	A personal responsibility	For the future	Number Elements Expressed	Intensity of stewardship activities	Deep feelings for Knox & stewardship
I1	Backyard	Suburban		1.5 mo	1000-1999							0/6	LOW	
I2	Inexpcd	Suburban		3 yr	1000-1999							0/6	LOW	
I3	Traditional	Suburban		1 yr	500-799	✓						1/6	MED	
I4	Traditional	Suburban		4 mo	5000+	✓						1/6	MED	
I5	Backyard	Suburban		5 yr	500-799	✓	✓					2/6	MED	
I6	Backyard	Suburban		6 yr	500-799	✓	✓					2/6	MED	
I7	Traditional	Suburban		6 yr 3 mo	1000-1999		✓			✓		2/6	MED	
I8	Backyard	Hilly, treed	✓[c]	5 yr	3000-3999	✓			✓			2/6	HIGH	
I9	Native	Hilly, treed	✓	2 yr 8 mo	3000-3999	✓	✓	✓		✓		4/6	HIGH	✓
I10	Native	Hilly, treed		1 yr	1000-1999		✓	✓		✓	✓	4/6	HIGH	✓
I11	Native	Hilly, treed	✓	3 yr	2000-2999	✓	✓	✓		✓		4/6	HIGH	✓
I12	Native	Hilly, treed	✓	6 yr	2000-2999	✓	✓	✓	✓	✓		5/6	HIGH	✓
I13	Native	Suburban		2 yr 10 mo	800-999	✓	✓	✓	✓	✓	✓	6/6	HIGH	✓
I14	Native	Suburban		3 yr	300-499	✓	✓	✓	✓	✓	✓	6/6	HIGH	✓
I15	Inexpcd	Hilly, treed	✓	9 mo	2000-2999	✓	✓	✓	✓	✓	✓	6/6	HIGH	✓
I16	Native	Suburban		8 yr	800-999	✓	✓	✓	✓	✓	✓	6/6	HIGH	✓

[a] Intensity of activities based on interviewee description, author's observation of gardens, and photos or videos of activities if offered by interviewee.
[b] Backyard = Informal garden maintenance usually including mowing lawns and maintaining garden beds; Inexpcd = Establishing/maintaining one's first home garden; Traditional = Use of exotic flora in semi-formal garden designs; Native = Use of Australian native plants (not usually indigenous to Knox) for their origin or to support or attract native wildlife.
[c] ✓ = Reported presence of element by interviewee.

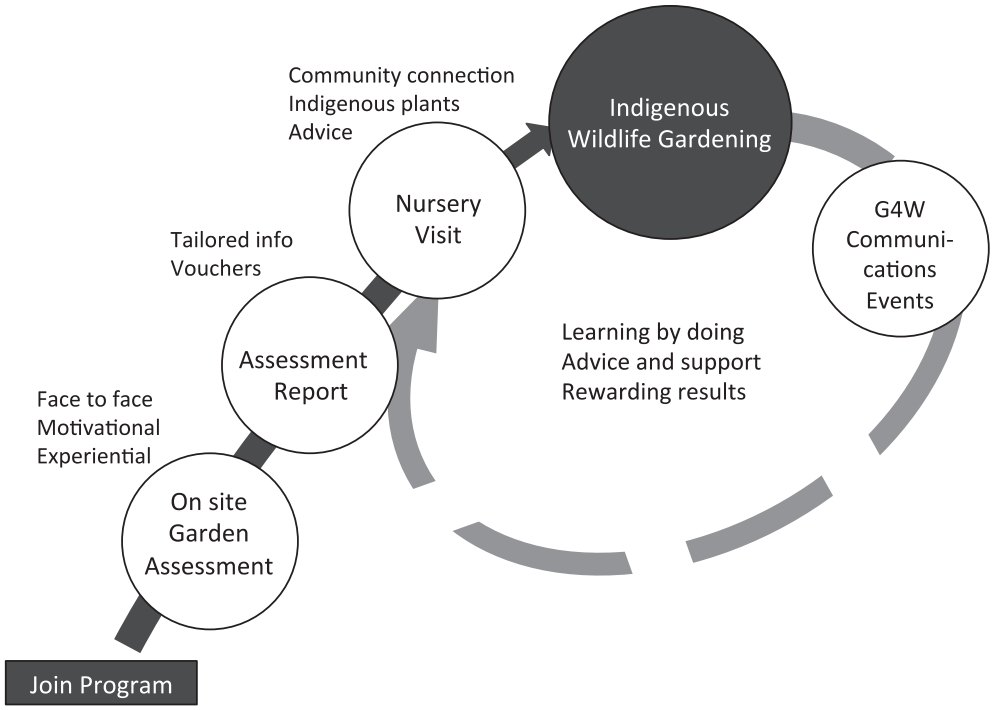


Fig. 1. G4W program elements (in circles) and their role in initiating (solid arrow) and supporting (dashed arrow) indigenous wildlife gardening.

(Mumaw & Bekessy, 2017). Key factors that stimulated interviewees to commence wildlife gardening, depicted by the solid arrow in Fig. 1, were an on-site garden assessment, assessment report, and nursery visit. The garden assessment was experiential and motivational; highlighting what contribution interviewees' gardening could make to conserving indigenous species. Interviewees valued the personal guidance and encouragement of assessors. As I7 noted "It was much better having someone come out and talk to you … [they] pointed out a lot of things that I could do that would make a difference". The assessment report, a written record of what was discussed, was used by many interviewees as reference material. Free plant vouchers provided with the report spurred a visit to the nursery and discovery of its use as a hub of advice and support. I6 recalled

> *It took us a long time to go and use those vouchers … that got us in there, so that was probably the most beneficial thing … [knowing] it was as accessible to talk to people to get the right information.*

Commencing indigenous wildlife gardening was a pivotal point.

> *Initially it was … not having the knowledge of how to change the landscape to support the wildlife for one. Okay now that we know how to do that, what's the cost involved? And the amount of energy it takes to move something living on a hill … It's very very difficult physically. Sometimes mentally. I15*

What helped interviewees to persist? The dashed line in Fig. 1 represents the continuation of wildlife gardening behaviours. Six key themes, described in the ensuing paragraphs, emerged for why interviewees persisted with wildlife gardening: finishing a job you start, pacing oneself, learning by doing, access to advice and support, receiving rewarding results, and helping Knox and its environment. In many cases these were inter-related.

First, 'finishing the job' was spoken of by several interviewees, like I8, *"Now, if I'm going to plant a plant, it'll be one … which is indigenous to the City of Knox … because I think, 'What's the point? If I've started I might as well continue'"*. Second, pacing oneself and tackling tasks progressively were described as key strategies for persisting. I9 noted *"We had to shut things out mentally, like we just couldn't look sort of from here down because it was too much and we had to just focus on one area*". These strategies were learned from personal experience or advised by G4W personnel. As interviewees persisted, they took more difficult decisions like removing weed trees valued for shade or privacy.

Third, gaining knowledge and skills through their gardening not only enhanced participants' competencies in indigenous wildlife gardening, but also provided motivation and confidence to continue. For example I8, who spoke of persisting to finish the job, also continued because *"I'm starting to learn more about the plants over the years, so I'm having more of an input … I can make it the way … I wanted it to be"*. This aligns with the importance of action competence noted by Hungerford and Volk (1990) and learning by doing as the process by which rural landholders adopt conservation practices that help them to achieve personal goals (Pannell et al., 2006).

Fourth, accessible G4W advice, communications, and events supported interviewees to continue. Face-to-face support was particularly valued, as recounted by I7 *"So they came out and assessed again and so that got me going again a bit. So that personal, somebody coming out to talk to you makes a difference*". Fifth, rewarding results also sustained or increased interviewee's efforts, as has been previously reported for PEBs generally (Schultz & Kaiser, 2012). Rewards included having gardening success, as explained by I3 *"Some of the plants have started to grow and flower … that is good, you feel that's an achievement*", and gaining knowledge and skills, as related by I5, *"The program's just given me a focus on learning and watching, and like every day there's something new to learn"*. The pleasure of hearing and seeing wildlife was a key reward and motivation, as described by I14, *"seeing the small insect eating birds and magpies and owls. We get owls here, so that's always good to come out and bang there's a tawny frogmouth"*.

Sixth, helping the environment was also a key motivator and reward as I5 explained, *"It's helping to protect the environment, and it's just improving the environment. And even though it might be little things in little ways, it's something positive in the outcomes"*, particularly doing something for wildlife, as I6 described, *"you've done something yourself, and that you are creating a garden that matches your environment, and that you can get wildlife into it. Particularly when we see the birds. I think that's the best thing"*.

Importantly, working hard to improve one's land strengthened interviewees' feelings for their gardens and their work, as I8 noted *"Let's put it this way, if there was a fire … and it whipped through and killed all my plants I would be devastated"*.

3.3. Development of land stewardship

In practising indigenous wildlife gardening, all interviewees had carried out land stewardship activities. However, they did not all describe their gardening purpose using land stewardship qualities in terms of caring for Knox' landscape to conserve indigenous species, contributing to the common good, taking personal responsibility, or doing it for the future. There was variety and nuance in articulation and strength amongst and within interviewees' descriptions of their gardening purpose. The persistence and extent of their land stewardship activities also varied. Age, gender, schooling, employment, size of property, employment status, years at the property, and years in the program did not appear to be related to the development or expression of land stewardship characteristics. Table 2 provides a summary of features of land stewardship associated with each interviewee, who are ordered by extent of their stewardship activities. A key point to note is that those interviewees (I9-I16) who expressed more dimensions of stewardship purpose were more actively involved in stewardship activities and articulated strong feelings for Knox as a landscape and community, and for their stewardship work.

Fig. 2 sets out a model for the development of urban private land stewardship. It has two phases, a first phase comprising initiation to land stewardship, and a development phase comprising the intensification and further development of land stewardship. The model bears similarities to Fig. 1, but differs in two ways. One, it is concerned with development of stewardship feelings, purpose, and meanings in addition to stewardship behaviour (wildlife gardening). Second, it focuses not on G4W program elements specifically, but rather what generic factors help to initiate and support development of stewardship purpose and practice.

In the initiation phase the beginner is introduced to the purpose, activities, and materials of the practice, along with where to get ongoing support. A critical step is opening participants' eyes to their potential to contribute to improving the landscape and conserving species in their own garden. Kempton and Holland (2003: 331–335) found three key factors for the development of sustained practice of PEBs of various kinds: salience ("waking up" to the issues), identification "as an actor in the world of environmental action", and practical knowledge. With respect to salience, I16 related:

> *When I joined … Gardens for Wildlife … I actually went and bought some prickly plants, and when I had a look, I actually had them in the understory … I realised then that I had absorbed it out of the Bird Observer's leaflet [I had received earlier], … but in the busy life that you lead with your children, and going to work, and that, I'd forgotten … I hadn't been able to indulge myself in those messages until I actually got into the Gardens for Wildlife.*

Commencement of indigenous wildlife gardening is the juncture between the initiation and development phases of land stewardship. The circular arrows in Fig. 2 represent that land

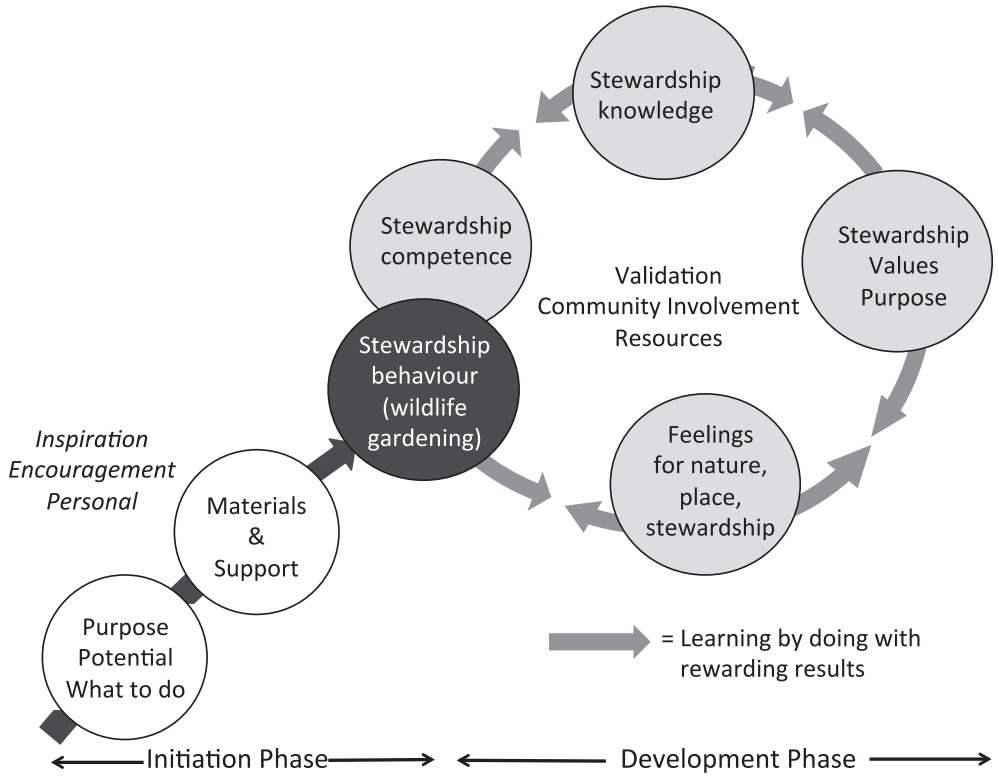


Fig. 2. A model for the development of urban private land stewardship.

stewardship develops through a complex interplay between performance of stewardship activities; gaining stewardship competence, confidence, and knowledge; acquiring stewardship values and purpose; and deepening attachments to place, including the local landscape, nature, and community agencies and members sharing the stewardship practice.

3.3.1. Gaining stewardship knowledge and competence by doing

The engine of change in the stewardship development cycle is learning by doing, accompanied by rewarding results, represented by the circular arrows in Fig. 2. While action skills and perceived competency have long been identified as contributory factors for development of PEBs in individuals (e.g. Ajzen, 1991; Hungerford & Volk, 1990), the means to acquire these skills and confidence, particularly through performing the behaviour as a form of 'learning-by-doing', is generally not explicitly addressed in PEB models (an exception is Chawla's (2009) framework for environmental action). Continuing stewardship action provided learning in the rich sense of growing and developing, expressed by interviewees with higher levels of stewardship involvement and purpose like I11, "*And we feel now more competent in this field than we did before. And our success rate seems to be improving. Yeah. So it's a very positive feeling to be acquiring a skill almost*".

Interviewees who were less involved in stewardship activities expressed fewer stewardship purposes, tended to live in suburban landscapes with less vegetative structure, and reported less wildlife variety than other interviewees. They were less convinced about the ecological value of indigenous wildlife gardening in their gardens, like I7:

> *I didn't really equate having to have particular plants with having wildlife and I still perhaps don't. I kind of think, if there's somewhere safe for them to go and there's the plants that they will eat if it's not their native ones, then you'll have more wildlife than if you had paddock grass.*

I2 is an interesting case. In three years he had only planted three indigenous plants brought to him by an assessor. Although he had decided that anything in the garden that "*dies will not be replaced unless it is a native*", he had not planted anything because "*the rotation of plants is much slower than I anticipated*". He had started a vegetable garden, and explained how his feelings for nature were strengthening through this gardening. He left the impression that when he did find room in his garden for indigenous plants, he might very well strengthen his stewardship purposes and practice together in the manner described by other interviewees.

3.3.2. Gaining stewardship values for indigenous plants

All interviewees, irrespective of the extent of their stewardship activities or purpose, had adopted G4W's values for plants in their gardens and gardening. When they joined the program, no interviewees knew about the indigenous species of Knox and many, if not all, of its environmental weeds. Strikingly, by the time of the interview they all used adjectives like "right", "wanted", "good" or "needed" to refer to indigenous species and "wrong", "a baddie", or a "spreader" for noxious weeds in their gardens. Species not designated by the program to be invasive weeds were "acceptable", particularly native species from other parts of Australia. I6 explained "*If they're natives I'm not as worried as long as there's a lot of indigenous as well … it annoys me knowing that I've got some that shouldn't be there*" while I4 said "*I admit I'm cheating; I'm putting a few that aren't necessarily indigenous to this area, but they're native*". These considerations sat beside other needs and connections interviewees had for their gardens:

> *There's sort of lots of influences on the garden … this came from my Mum who I love, this came from my Sister and the indigenous part has another connection again and I think that's more of a connection to the actual land, you know, that they are the ones that actually belong here. I'm not willing to give up all the rest of it but I do feel that there needs to be that connection with place as well, …I think it's important to make some connection with the land, you can't just take it. I7*

3.3.3. Strengthening land stewardship purpose

Most interviewees had goals of caring for Australian wildlife or indigenous flora. For 8 interviewees (I9-I16), this care extended to the Knox landscape. Notably, they spoke of their homes as an inextricable part of that landscape.

> *I think I've always sort of shied away from changing the environment into something that it doesn't want to be. I much prefer to use the indigenous species and see the natural wildlife returning … When you come home and you're driving towards the hills you see it and that's home. You see the trees and it just sort of makes you feel part of where you live. I12*

Some interviewees described helping Council or the Knox community as a purpose for their indigenous wildlife gardening, a dimension of the 'common good' stewardship purpose. I8 gave this as a primary reason for his work:

> *In the backyard, I believe I've pulled out everything that's non-indigenous to the City of Knox, everything. And every plant that's in there that is planted is indigenous to the City of Knox, and there's probably 1200 of them so far. And I reckon I've got another 500 to put in. So I want it like that because a) I think I owe them that, right, b) I'm not a greenie so I don't care whether the plant comes from the City of Knox or from the middle of Western Australia, I don't care, but if that's what makes them happy and attracts the wildlife I'm happy to do that. I8*

Another attribute of land stewardship is taking personal responsibility for caring for the land, expressed by 9 interviewees, like I15 "*I feel like we take more of a sense of ownership*". Sometimes this was expressed as a form of 'giving back to place', like I13, "*For me it was about … putting some of the structure back in that was being lost … giving back to the place, trying to re-establish that*" or I15, "*By our own little patch of land, we're trying to give back to the area, by just planting indigenous and things like that*". Some interviewees mentioned working for future generations, like I16, "*It was also about my future grandchildren … I realized that on my watch, I planted every weed known to man … I wanted to redress that*".

Purpose, values, and beliefs, in association with practice, are important and dynamic factors in the transformation of interviewees from gardeners to land stewards. G4W land stewards assign stewardship purpose, meanings and potential for their gardens, plant materials, and activities. Similarly, Hargreaves (2011: 94) found that office workers conceived of and reacted to routine office practices differently after involvement in an energy conservation program "as new pro-environmental meanings, skills and stuff were incorporated into normal working life".

3.3.4. Deepening feelings for nature, place, and stewardship

All interviewees expressed growing attachments to nature as a result of their gardening. For example I2, a first-time homeowner and G4W member for 3 years, who had undertaken the least indigenous wildlife gardening (although he had planted a vegetable garden), explained:

It [my gardening] has certainly enhanced it [feelings for nature], amplified it … when I was younger I … did a lot of hiking and walking and so it started out with experiencing like rocks, mountains, the outback … I experienced it as a challenge. It didn't have that attachment feeling to it … It [the garden] is so much more immediate … Here I open the door and I'm just there, you know. I2

Interviewees who were heavily involved in land stewardship activities and described gardening purposes aligned with many facets of land stewardship purpose, expressed intense and intensifying feelings for nature. I15 explained, *"And that grows. It's not just something you go 'yep we're connected. We're now connected with nature' … for me it just keeps growing, that feeling"*.

These interviewees also described deepening attachments for Knox the place as landscape and community. I12 explained, "*I just really love the natural environment. When we go on holidays, this place is so hard to leave because it's so beautiful. We love coming home*". I11 related:

I don't think I'll ever lose that connection to nature, but this is keeping me very much focussed on it. Because I see the growth that's coming in the plants each year and the seasonal changes and that sort of thing, and it just, it becomes part of my life.

They valued Council, KES, and other G4W members as co-contributors caring for indigenous species and the landscape. I13 and a few others described this community involvement as inspiring:

I get joy out of the critical mass that surround it, I think there's about 400 members, you know, hold on this is quite a movement, this is great. Initially when I started I thought, I'm the only one, 'cause you look around- and then there's people everywhere doing it. I13

In her review of place attachment research, Lewicka (2011) concludes that place is an object of strong attachment although the relationships between who gets attached, to what features of place, why and how attachment occurs, and how that attachment might be expressed in behaviours, remain poorly understood. Lewicka (2011: 226) does note that studies show "a positive relationship between strength of place attachment and strength of neighborhood ties". Various studies report that having and making experiences in a place is a key mechanism by which people learn about place (Measham, 2006) and develop emotional connections to its environmental qualities (Carr, 2002; Rogan, O'Connor, & Horwitz, 2005). These findings corroborate this. There was no evidence that the suburban setting diminished interviewees' developing attachment to their land, nature, or fellow participants.

Similarly interviewees displaying high stewardship activity, expressing many aspects of stewardship purpose, and reporting strong feelings for Knox, described strong attachments to their stewardship. Their stories suggested that they did not carry out these activities *because* of strongly held purposes or beliefs but rather, that stewardship behaviour and purpose strengthened together in a mutually reinforcing feedback loop. Caring for the land had become "part of their life", or a "life-long hobby". I13 explained:

So then I was able to see Chocolate Lilies for the first time and notice those other things, like the other smaller or interesting things, and then it just kind of went from there. It becomes part of your blood, I guess, you know, like, what you're used to and what you're comfortable with and it kind of just sits well within the landscape.

3.3.5. Validation, community involvement and resources

In the centre of the stewardship development cycle (Fig. 2) are three components whose presence or absence respectively may promote or hinder the process: validation, community involvement, and resources.

Validation refers to information and feedback that one's efforts are contributing to conservation and habitat quality from parties that are knowledgeable and responsible. In this study, validation came through communications from KES and Council with interviewees about the importance and appreciation of their efforts, especially when given in person. The feedback had weight because Council is the primary public land manager, KES and Council are perceived to have relevant expertise, and both are demonstrably involved and committed to the program.

Knowing that the community is involved – Council, KES, and other G4W members-was important for interviewees. This aligns with findings that people are more apt to take up behaviours if they are presented by individuals they trust and find credible (Moseley & Stoker, 2013), and if the behaviours "are part of, and seen to be part of, a coherent and consistent response" (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007, p. 454), making people feel that their contributions are making a difference (Quimby & Angelique, 2011).

Resources refers to situational or contextual factors that make it easier or harder for individuals to carry out stewardship activities, once they have been introduced to issues and possible actions (Schultz & Kaiser, 2012; Steg & Vlek, 2009). Interviewees described these factors as available time and dollars, accessible and reasonably priced indigenous plants, access to personal advice (at the nursery or Council or from open garden days), and prompts from printed and electronic communications like G4W newsletters, websites and Facebook posts.

3.4. Urban gardening as context for developing land stewardship

Urban gardening provides a different context for the development of land stewardship than on public land or in rural contexts. First, gardens are viewed more strongly as places that "make a house a home" than as places to "learn about nature", or to "care for the planet" (Bhatti & Church, 2004). Other studies have discussed the lack of connection gardeners make between their gardens and the neighbouring environment (Clayton, 2007; Dahmus & Nelson, 2014), questioning whether providing this knowledge would facilitate development of environmentally sustainable gardening behaviours. Similarly, a study of British birdwatchers concluded that the number who consciously gardened to support birds was "surprisingly low" (Cammack, Convery, & Prince, 2011, p. 317) because they did not perceive their gardens as places where they could improve habitat for these birds. Findings about G4W here and previously reported (Mumaw & Bekessy, 2017). point to how personal guidance and encouragement about the value of wildlife gardening for conserving local flora and fauna is an important motivating factor.

Second, while gardening can be seen as a chore and unrewarding work with sometimes disappointing results, a significant number of people make deep connections with nature through their gardens and gardening (Bernardini & Irvine, 2007; Bhatti & Church, 2004). In this study, every interviewee who had had a garden assessment (all but one) related that their gardening strengthened their feelings for nature - nature that was at their back door. This applied whether interviewees had done much or little indigenous wildlife gardening since joining the program.

Third, homes are " places that are the focus of deep attachments and places that are ingredients in our sense of identity" (Holland, 2006, p. 122). When caring for nature is practiced on one's

residential land, it becomes intertwined with the qualities and relationships of home and family. Several participants recalled their indigenous wildlife gardening activities as memorable because they were shared with family, like I13, "*and we have a young son with a little bit of a learning difficulties, and … this is, you know, great for him"* or I16, "*one granddaughter in particular, she's just got such an affinity for it".*

Fourth, homeowners have personal control over and responsibility for their gardens. They make their gardening choices amidst an array of ecological, historical, institutional, cultural and technical constraints and opportunities (Cook, Hall, & Larson, 2012). Being able to choose the pace and extent of their indigenous wildlife gardening activities was important to interviewees, as I5 noted, "*they emphasize … 'we're not here to tell you how to do your garden, or how to set it up' … I'm absolutely rapt in that cause it's an experiment"*. This aligns with reports that developing "internalized motivation" for PEBs is fostered by supporting people's autonomy while making "a strong request for change combined with a rationale for the needed change" (Oskamp, 2002, p. 315).

Last, urban residents must satisfy their various aspirations and land use objectives within the limited confines of an urban property lot, generally in close proximity to neighbours. Most interviewees were keeping some exotic species for aesthetic or other personal reasons or delaying removal of weed species, particularly trees, until alternative measures could be put in place. This approach is also reported in peri-urban and agricultural landscapes where landholders intersperse exotic and indigenous plantings to satisfy aesthetic needs by "planting a species deemed visually amenable, while providing benefits 'for nature' by including species that were good habitat" (Wyborn, Jellinek, & Cooke, 2012, p. 251). The characteristics of interviewees' gardens were influenced by their previous management, soil conditions, and topography as well as the gardening activities of interviewees. Interviewees' choice of indigenous wildlife gardening activities at a variety of paces in diverse gardens produced an equally diverse array of gardens-in-progress. Examples of plantings and habitat features in different properties are shown in Fig. 3.

The conservation outcomes of interviewees' wildlife gardening (apart from environmental weeds removed, indigenous species planted, or habitat features retained or added - Mumaw & Bekessy, 2017) were not able to be measured within the scope of this study. Conservation 'success' in the context of the urban residential setting would be determined by how a garden assisted a species or community of species, each with their distinctive ecological needs, to persist (Goddard, Dougill, & Benton, 2010; Lindenmayer & Fischer, 2006).

3.5. Time and models of behaviour change

The model presented in Fig. 2 describes the development of land stewardship *over time*, as inductively derived from this exploratory case study. It shows that land stewardship develops through a complex interplay between performing stewardship behaviours; improving stewardship competence, confidence, and knowledge; and deepening stewardship purpose, beliefs, and attachments. These are interesting insights in a context where "almost all research in EP [environmental psychology] has relied on static outcomes at one point in time thus missing a critical component of human behavior-maturation" (Winkel, Saegert, & Evans, 2009, p. 324). It is important to understand and distinguish models describing the relationship between factors that occurs *over a period of time*, and those describing the relationship between factors *at a point in time*. For example, the theory of planned behaviour (Ajzen, 1991) and its variants take a 'snapshot in time' of how behaviour or intention to behave (the dependent end variable) is affected by 'precursor' variables including beliefs, attitudes and norms. There are many PEB models in the literature (refer Darnton, 2008 for various examples) depicting the development of PEB as a linear process (Fig. 4) with the behaviour shown as the endpoint. These depictions omit what impact performing the behaviour itself has on 'precursor' variables over subsequent iterations.

In his paper on the theory of planned behaviour, Ajzen (1991: 181) noted that "For ease of presentation, possible feedback effects of behaviour on the antecedent variables are not shown". Yet omitting feedback loops may limit insights and cause practitioners to focus interventions on 'precursor factors'. This study's findings reinforce that consideration should be given to how the PEB development process works over time, including the role of learning from behaviours. Studies investigating sustainability or development of other PEBs over time report a similar interactive process between the growth of knowledge, beliefs and feelings, and action. In a study about climate change behaviours in the U.K., Lorenzoni et al. (2007: 446) wrote that engagement is "a personal state of connection with the issue" in three dimensions: cognitive, affective, and behavioural and develops from complex interrelationships between the three (Lorenzoni et al., 2007; Whitmarsh, Neill, & Lorenzoni, 2012). Another study of U.K. climate change campaigners found that "the relationship between values and action is complex and bi-directional" (Hards, 2011, p. 37). Hards (2011: 37) described three related mechanisms that shape environmental values: practising the behaviour; having reinforcing "sensory, mental and emotional" contextual experiences; and interacting with like-minded people (Hards, 2011, p. 37). Chawla (2009) presented a framework derived from syntheses of behavioural research on how children develop conservation behaviours over time, showing a feedback loop between taking action; developing knowledge, confidence, skills, and motivation for conservation behaviour; and reflection and adaptation. Darnton (2008: 39–56) provided an array of examples of models for a wide range of behaviours, including PEBs. He distinguished between "models of behaviour", designed to explain determinant factors underlying behaviour and tending to be linear, and "theories of change", which show how behaviours change over time and demonstrate that " change is a process, not an event" (Darnton, 2008, p. 1).

3.6. Implications for fostering urban native biodiversity conservation

The G4W case study shows that urban residents can readily be involved in nurturing the ecological quality and indigenous species of the land they live on by introducing them to the potential they have to make a difference and how they can do it, building on relationships they have with nature at home, and providing a supportive framework with credible community partners. To Cameron's question (2003: 173–174): "How possible is it to move people to change the way in which they dwell on Earth in ecologically desirable ways through the vehicle of their own daily experience, their love of place, rather than fear of eco-catastrophe, appeals to the moral rights of other species or to a vision of ecotopia?": these findings support the reply 'very possible'.

If conservation is only promoted to urban residents as protecting remote ecosystems or public reserves and requiring specialist expertise, it comes to be seen as "not, by and large something people do, but something that is done for them or, sometimes, to them and their land" (Adams & Mulligan, 2003, p. 295). This limits development of a powerful mechanism – private land stewardship - for engaging urban communities in caring for the environments they live in. As one of the few mechanisms to improve the habitat quality of the residential land matrix this is a powerful complement

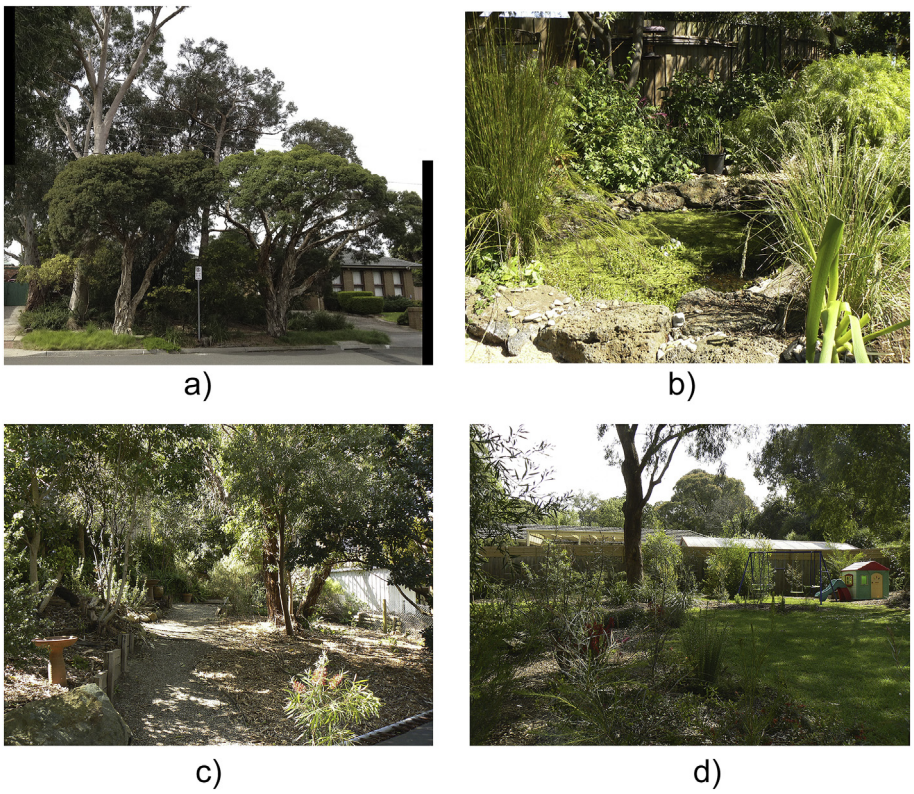
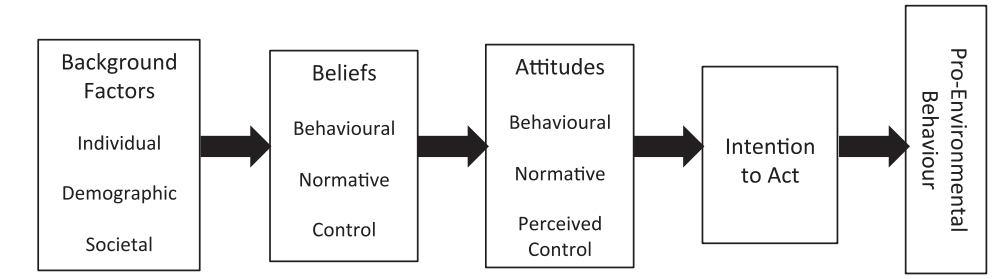
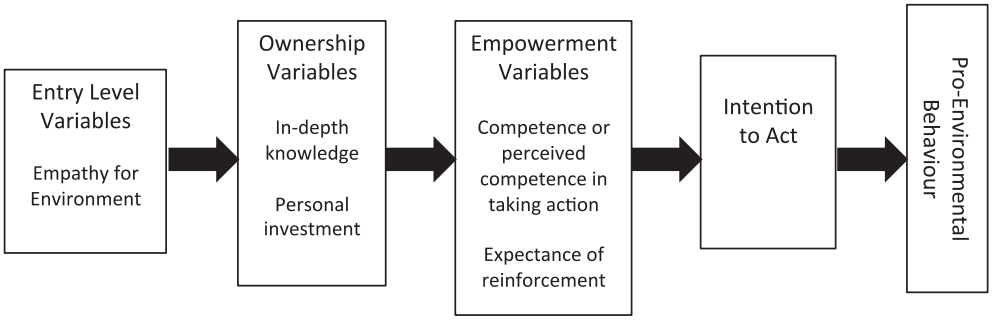


Fig. 3. a. Indigenous planting/structure in suburban front garden, alongside more usual suburban garden frontage. b. Frog pond in suburban back garden. c. Indigenous planting in hilly, treed front garden. d. Indigenous planting in suburban back garden.



A. Theory of Planned Behaviour Model – adapted from de Leeuw et al., 2015: 129



B. Environmental Behaviour Model – adapted from Hungerford & Volk, 1990:260

Fig. 4. PEB models showing linear process with behaviour as endpoint.

to other urban biodiversity conservation activities. Adopting a pragmatic approach that accommodates a mixture of native and non-native species in a garden and multiple land use objectives can help engage more residents, who over time increase their commitment to land stewardship and shape their gardens accordingly. Private land stewardship, with its ethic of taking personal responsibility to care for the land and its species over time for the common good, provides a good foundation for urban

biodiversity conservation with its need to adapt to changing circumstances. The use of a collaborative framework involving local government and community group hubs not only supports participants to continue, but builds shared goals and relationships that can be deployed to conservation at a landscape scale. Connections with place, nature, and community that deepen with interviewees' stewardship ethic and practice suggest that interlinked social and ecological benefits can arise from fostering urban private land stewardship.

Coming from an exploratory qualitative study using a small sample of G4W members, these findings cannot be extrapolated to the G4W membership as a whole, generalised, or directly transferred to other populations. Unfortunately, it was not possible to identify members for interview who were unhappy with the program or wildlife gardening. A previously reported survey of the G4W membership found few criticisms of the program and a substantial uptake of wildlife gardening activities (Mumaw & Bekessy, 2017). The findings reported here should be interpreted as highly nuanced insights into a modelled process for developing land stewardship over time, secured from a group of urban wildlife gardening program members who adopted stewardship behaviours, values and purpose to varying degrees. The study did not incorporate data from G4W members who disagreed with or did no wildlife gardening. Not knowing about environmental weeds was why interviewees had not previously removed them, and not wanting to remove existing vegetation (for shade, aesthetics, or other personal reasons) was why interviewees had not replaced them with indigenous species or removed weed species after joining the program. The study's findings should be tested and enhanced. Methods could include: quantitatively testing some of the posited relationships from the broader program population and other populations; using theoretical sampling to test and refine the model, such as looking for alternative examples or 'failures'; or testing the utility of the model to interpret findings in other land stewardship development programs.

4. Conclusions

This investigation found empirical evidence that urban private land stewardship can be readily fostered through a program that builds on a common urban residential relationship with nature in the distinctive context of home – gardening. A partnership between a community group and local government provides a framework that first introduces residents to the potential of their gardening to contribute to species conservation and where ongoing advice and materials can be obtained. Once residents commence their conservation-oriented gardening activities, a stewardship development process can begin. Stewardship competencies and confidence increase, along with attachment to stewardship practice and belief in its purpose-a non-linear engagement of hearts, heads and hands. Connections to nature, place and community concurrently strengthen. Learning by doing, with rewarding experiences and supported by accessible resources, validation of the contribution by credible parties, and involvement of community members, drives the process. Acknowledging a meaningful role for individuals and their gardens is critical. Engaging urban residents to care for their land as part of a community can help to improve habitat quality of the residential land matrix while building connections with place and the social fabric of a community.

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References

Adams, W. M., & Mulligan, M. (2003). Conclusions. In W. M. Adams, & M. Mulligan (Eds.), *Decolonizing Nature: Strategies for conservation in a post-colonial era* (pp. 290–299). Earthscan Publications Ltd.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behaviour and Human Decision Processes, 50*, 179–211.

Asah, S. T., & Blahna, D. J. (2012). Motivational functionalism and urban conservation stewardship: Implications for volunteer involvement. *Conservation Letters, 5*(6), 470–477.

Asah, S. T., Lenentine, M. M., & Blahna, D. J. (2014). Benefits of urban landscape ecovolunteerism: Mixed methods segmentation analysis and implications for volunteer retention. *Landscape and Urban Planning, 123*, 108–113. http://doi.org/10.1016/j.landurbplan.2013.12.011.

Bernardini, C., & Irvine, K. N. (2007). The "nature" of urban sustainability: Private or public greenspaces?. In A. G. Kungolos, C. A. Brebbia, & E. Beriatos (Eds.), *Sustainable development and planning III* (Vol. II, pp. 661–674) Southampton, UK: WIT Press. Retrieved from http://library.witpress.com/viewpaper.asp?pcode=SDP07-064-2.

Bhatti, M., & Church, A. (2004). Home, the culture of nature and meanings of gardens in late modernity. *Housing Studies, 19*(1), 37–51. http://doi.org/10.1080/0267303042000152168.

Bruyere, B., & Rappe, S. (2007). Identifying the motivations of environmental volunteers. *Journal of Environmental Planning and Management, 50*(4), 503–516. http://doi.org/10.1080/09640560701402034.

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford University Press.

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford: Oxford University Press.

Cammack, P. J., Convery, I., & Prince, H. (2011). Gardens and birdwatching: Recreation, environmental management and human-nature interaction in an everyday location. *Area, 43*(3), 314–319. http://doi.org/10.1111/j.1475-4762.2011.00992.x.

Carr, A. (2002). *Grass roots and green Tape: Principles and practices of environmental stewardship*. Sydney: The Federation Press.

Chan, K. M. A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., … Turner, N. (2016). Why protect nature? Rethinking values and the environment. *Proceedings of the National Academy of Sciences, 113*(6), 1462–1465. http://doi.org/10.1073/pnas.1525002113.

Chawla, L. (2009). Growing up green: Becoming an agent of care for the natural world. *The Journal of Developmental Processes, 4*(1), 6–23.

Chawla, L., & Derr, V. (2012). The development of conservation behaviours in childhood and youth. In S. D. Clayton (Ed.), *The oxford handbook of environmental and conservation psychology* (pp. 527–555). Oxford University Press.

Clayton, S. (2007). Domesticated nature: Motivations for gardening and perceptions of environmental impact. *Journal of Environmental Psychology, 27*(3), 215–224. http://doi.org/10.1016/j.jenvp.2007.06.001.

Cook, E. M., Hall, S. J., & Larson, K. L. (2012). Residential landscapes as social-ecological systems: A synthesis of multi-scalar interactions between people and their home environment. *Urban Ecosystems, 15*(1), 19–52. http://doi.org/10.1007/s11252-011-0197-0.

Dahmus, M. E., & Nelson, K. C. (2014). Yard stories: Examining residents' conceptions of their yards as part of the urban ecosystem in Minnesota. *Urban Ecosystems, 17*, 173–194. Retrieved from http://link.springer.com/10.1007/s11252-013-0306-3.

Darnton, A. (2008). *Reference Report: An overview of behaviour change models and their uses*. http://doi.org/https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/498065/Behaviour_change_reference_report_tcm6-9697.pdf.

Dearborn, D. C., & Kark, S. (2010). Motivations for conserving urban biodiversity. *Conservation Biology, 24*(2), 432–440. http://doi.org/10.1111/j.1523-1739.2009.01328.x.

Geller, E. S. (1995). Actively caring for the environment: An integration of behaviorism and humanism. *Environment and Behavior, 27*(2), 184–195. http://doi.org/10.1177/0013916595272004.

Goddard, M. A., Dougill, A. J., & Benton, T. G. (2010). Scaling up from gardens: Biodiversity conservation in urban environments. *Trends in Ecology & Evolution, 25*(2), 90–98. http://doi.org/10.1016/j.tree.2009.07.016.

Gosling, E., & Williams, K. J. H. (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology, 30*(3), 298–304. http://doi.org/10.1016/j.jenvp.2010.01.005.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough?: an

experiment with data saturation and variability. *Field Methods, 18*(1), 59–82. http://doi.org/10.1177/1525822X05279903.
Hards, S. (2011). Social practice and the evolution of personal environmental values. *Environmental Values, 20*(1), 23–42. http://doi.org/10.3197/096327111X12922350165996.
Hargreaves, T. (2011). Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture, 11*(1), 79–99. http://doi.org/10.1177/1469540510390500.
van Heezik, Y. M., Dickinson, K. J. M., & Freeman, C. (2012). Closing the gap: Communicating to change gardening practices in support of native biodiversity in urban private gardens. *Ecology and Society, 17*(1). art34 http://doi.org/10.5751/ES-04712-170134.
Holland, A. (2006). Must we give up environmental ethics? In H. A. M. J. ten Have (Ed.), *Environmental ethics and international policy* (pp. 117–143). Paris, France: UNESCO.
Huddart-Kennedy, E., Beckley, T. M., McFarlane, B. L., & Nadeau, S. (2009). Rural-urban differences in environmental concern in Canada. *Rural Sociology, 74*(3), 1–21. http://doi.org/10.1526/003601109789037268.
Hungerford, H., & Volk, T. (1990). Changing learner behaviour through environmental education. *The Journal of Environmental Education, 21*(3), 8–21.
Kempton, W., & Holland, D. C. (2003). Identity and sustained environmental practice. In S. Clayton, & S. Opotow (Eds.), *Identity and the Natural Environment: The Psychological Significance of Nature* (pp. 317–341). Cambridge, Massachusetts: The MIT Press.
Knox City Council. (2016). *Gardens for wildlife (G4W)*. Retrieved from http://www.knox.vic.gov.au/g4w.
Knox City Council, & Knox Environment Society. (2008). *Gardens for wildlife*.
Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239–260. http://doi.org/10.1080/13504620220145401.
Larson, L. R., Stedman, R. C., Cooper, C. B., & Decker, D. J. (2015). Understanding the multi-dimensional structure of pro-environmental behavior. *Journal of Environmental Psychology, 43*, 112–124. http://doi.org/10.1016/j.jenvp.2015.06.004.
Leopold, A. (1949). *A sand county almanac*. New York: Oxford University Press.
Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology, 31*(3), 207–230. http://doi.org/10.1016/j.jenvp.2010.10.001.
Lindenmayer, D. B., & Fischer, J. (2006). *Habitat fragmentation and landscape Change: An ecological and conservation synthesis*. Collingwood, VIC, Australia: CSIRO Publishing.
Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change, 17*(3–4), 445–459. http://doi.org/10.1016/j.gloenvcha.2007.01.004.
Measham, T. G. (2006). Learning about environments: The significance of primal landscapes. *Environmental Management, 38*(3), 426–434. http://doi.org/10.1007/s00267-005-0205-3.
Moseley, A., & Stoker, G. (2013). Nudging citizens? Prospects and pitfalls confronting a new heuristic. *Resources, Conservation and Recycling, 79*, 4–10. http://doi.org/10.1016/j.resconrec.2013.04.008.
Mumaw, L., & Bekessy, S. (2017). Wildlife gardening for collaborative public-private biodiversity conservation. *Australasian Journal of Environmental Management*. http://dx.doi.org/10.1080/14486563.2017.1309695.
Oskamp, S. (2002). Summarizing sustainability issues and research approaches. In P. Schmuck, & P. W. Schultz (Eds.), *Psychology of sustainable development* (pp. 301–324). Boston: Kluwer Academic Publishers.
Pannell, D. J., Marshall, G. R., Barr, N., Curtis, A., Vanclay, F., & Wilkinson, R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture, 46*(11), 1407–1424.
Quimby, C. C., & Angelique, H. (2011). Identifying barriers and catalysts to fostering pro-environmental behavior: Opportunities and challenges for community psychology. *American Journal of Community Psychology, 47*(3–4), 388–396. http://doi.org/10.1007/s10464-010-9389-7.
Race, D., Curtis, A., & Sample, R. (2012). Restoring the bush on private land: Perspectives of landholders in Victoria. *Australasian Journal of Environmental Management, 19*(4), 227–240. http://doi.org/10.1080/14486563.2012.719347.
Raymond, C. M., Bieling, C., Fagerholm, N., Martin-Lopez, B., & Plieninger, T. (2016). The farmer as a landscape steward: Comparing local understandings of landscape stewardship, landscape values, and land management actions. *Ambio, 45*(2), 173–184. http://doi.org/10.1007/s13280-015-0694-0.
Restall, B., & Conrad, E. (2015). A literature review of connectedness to nature and its potential for environmental management. *Journal of Environmental Management, 159*, 264–278. http://doi.org/10.1016/j.jenvman.2015.05.022.
Rogan, R., O'Connor, M., & Horwitz, P. (2005). Nowhere to hide: Awareness and perceptions of environmental change, and their influence on relationships with place. *Journal of Environmental Psychology, 25*(2), 147–158. http://doi.org/10.1016/j.jenvp.2005.03.001.
Ryan, R. L., & Grese, R. E. (2005). Urban volunteers and the environment: Forest and prairie restoration. In P. F. Barlett (Ed.), *Urban Place: Reconnecting with the natural world*. The MIT Press.
Ryan, R. L., Kaplan, R., & Grese, R. E. (2001). Predicting volunteer commitment in environmental stewardship programmes. *Journal of Environmental Planning and Management, 44*(5), 629–648.
Schultz, P. W., & Kaiser, F. G. (2012). Promoting pro-environmental behaviour. In S. D. Clayton (Ed.), *The oxford handbook of environmental and conservation psychology* (pp. 556–580). New York: Oxford University Press.
Schwartz, M. W. (2006). How conservation scientists can help develop social capital for biodiversity. *Conservation Biology, 20*(5), 1550–1552. http://doi.org/10.1111/j.1523-1739.2006.00421.x.
Selinske, M. J., Coetzee, J., Purnell, K., Knight, A. T., & Lombard, A. T. (2015). Understanding the motivations, satisfaction, and retention of landowners in private land conservation programs. *Conservation Letters, 8*(4), 282–289. http://doi.org/10.1111/conl.12154.
Shwartz, A., Turbé, A., Julliard, R., Simon, L., & Prévot, A.-C. (2014). Outstanding challenges for urban conservation research and action. *Global Environmental Change, 28*, 39–49. http://doi.org/10.1016/j.gloenvcha.2014.06.002.
Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*(3), 309–317. http://doi.org/10.1016/j.jenvp.2008.10.004.
Thornberg, R., & Charmaz, K. (2011). Grounded theory. In S. D. Lapan, M. T. Quartaroli, & F. J. Riemer (Eds.), *Qualitative Research: An introduction to methods and designs* (pp. 41–67). Hoboken NJ: Wiley.
United Nations Department of Economic and Social Affairs Population Division. (2014). *World Urbanization Prospects: The 2014 Revision*. Highlights (ST/ESA/SER.A/352).
Vare, P., & Scott, W. (2007). Learning for a change: Exploring the relationship between education and sustainable development. *Journal of Education for Sustainable Development, 1*(2), 191–198. http://doi.org/10.1177/097340820700100209.
Whitmarsh, L., Neill, S. O., & Lorenzoni, I. (2012). Conclusion: What have we learnt and where do we go from here? In L. Whitmarsh, I. Lorenzoni, & S. O'Neill (Eds.), *Engaging the public with climate Change: Behaviour change and communication* (pp. 270–282) (Hoboken).
Wiens, J. A., & Hobbs, R. J. (2015). Integrating conservation and restoration in a changing world. *BioScience, 65*(3), 302–312. http://doi.org/10.1093/biosci/biu235.
Winkel, G., Saegert, S., & Evans, G. W. (2009). An ecological perspective on theory, methods, and analysis in environmental psychology: Advances and challenges. *Journal of Environmental Psychology, 29*(3), 318–328. http://doi.org/10.1016/j.jenvp.2009.02.005.
Wyborn, C., Jellinek, S., & Cooke, B. (2012). Negotiating multiple motivations in the science and practice of ecological restoration. *Ecological Management and Restoration, 13*(3), 249–253. http://doi.org/10.1111/j.1442-8903.2012.00667.x.
Yin, R. K. (2009). *Case study Research: Design and methods* (4th ed.). Sage Publications, Inc.