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Transforming urban gardeners into land stewards

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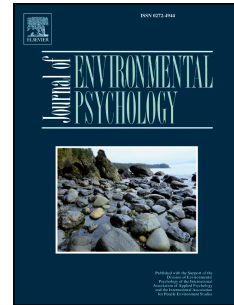
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TITLE: Transforming urban gardeners into land stewards

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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.

Keywords: Urban nature conservation; land stewardship; environmental education; wildlife gardening; environmental stewardship

Highlights

- Urban programs can foster residential land stewardship through learning by doing
- Visible community involvement and endorsement of one's contribution are key
- Stewardship purpose, motivation, ability, and actions strengthen interactively
- Connections to nature, place and community occur as part of the process

26 1. Introduction

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

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

48 There is agreement that change approaches should be tailored to a particular behaviour,
49 including its desired persistence (Geller, 1995), adaptability (Vare & Scott, 2007), context
50 (Schultz & Kaiser, 2012), and distinctive characteristics (Darnton, 2008). Larson, Stedman,

51 Cooper, and Decker (2015) stress the distinctiveness and importance of land stewardship, a
52 category of PEBs they defined as protecting or improving habitat to conserve biodiversity.
53 These are “place-based behaviours, which play a critical role in local environmental quality,
54 yet are rarely considered in PEB research” (Larson et al., 2015:114). There is no one
55 definition of land stewardship, but land stewardship activities described in the literature
56 include preserving and protecting remnant vegetation (Gosling & Williams, 2010) and
57 improving wildlife habitat, principally through revegetation (Carr, 2002; Huddart-Kennedy,
58 Beckley, McFarlane, & Nadeau, 2009; Larson et al., 2015). Alternative definitions, not
59 discussed here, include managing and protecting land for cultural or agricultural purposes
60 (Raymond, Bieling, Fagerholm, Martin-Lopez, & Plieninger, 2016). What distinguishes land
61 stewardship from other PEBs is its focus on nurturing flora and fauna in specific geographic
62 places. To achieve conservation goals, land stewardship needs to continue over time and to
63 adapt to changing environmental circumstances and species/locale targets (Wiens & Hobbs,
64 2015).

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

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

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

77 This definition derives from concepts articulated by Aldo Leopold in his seminal essay *The*
78 *Land Ethic* (Leopold, 1949: 201-226): that an ethic guides an individual's actions to cooperate
79 for the good of the community (p 203); that "the land ethic simply enlarges the boundaries of
80 the community to include soils, waters, plants, and animals, or collectively: the land" (p 204);
81 and that a land ethic "reflects the existence of an ecological conscience, and this in turn
82 reflects a conviction of individual responsibility for the health of the land" (p 221).

83 Importantly, this definition encompasses purpose as well as behaviours, and concepts of
84 nurturing, species conservation, place, landscape, personal responsibility, persistence of
85 action, and supporting the common good across generations. Promotion of land stewardship
86 as defined here has been studied in rural and urban settings.

87

88 *1.1. Promotion of rural land stewardship*

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

98 There is little published about how rural land stewardship develops. Pannell et al. (2006)
99 highlighted the importance of awareness and learning by doing in rural landholders' adoption

100 of conservation practices. Race, Curtis, and Sample (2012), in a qualitative study of
101 Australian rural landholders, found that personal advice and recognition of their efforts from
102 environmental program staff and peers strengthened motivation for private land stewardship.
103 The role of place attachment is unclear. Selinske et al. (2015) found that place attachment
104 motivated rural South Africans landholders to enrol in a private land stewardship program.
105 However, Gosling and Williams (2010) found that place attachment (using a postal survey
106 questionnaire) was not associated with rural Australian landholders' reported conservation of
107 native vegetation and suggested that further analysis, including a more nuanced observation of
108 behaviours, is needed to understand mediating factors.

109

110 *1.2. Promotion of urban land stewardship*

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

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

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

143

144 **2. Methods**

145 A qualitative, interview-based methodology was employed because it is ‘attuned’ to
146 surfacing interconnections between factors and “the unfolding of events over time” (Bryman,
147 2012: 408), required to explore participant’s views of their changing behaviours, purposes,
148 and feelings from participation in the program. Van Heezik, Dickinson, and Freeman (2012)
149 found that open questions provided a deeper, finer-grained understanding of changes in

150 householders' gardening attitudes and behaviours than closed question surveys used in the
151 same study. Inductive analysis of members' interviews was used to develop a model for
152 stewardship development rather than testing or building on existing frameworks (Bryman,
153 2016: 23-24, 379). This model was then compared to existing PEB change frameworks.
154 Methods are described in detail below. This study received ethics approval from a sub-
155 committee of [withheld in review draft for author anonymity]. Pseudonymic initials are used
156 for interviewees to preserve anonymity.

157

158 *2.1. Case study program*

159 The chosen case study program, Knox Gardens for Wildlife (G4W) (Knox City Council,
160 2016), is located in eastern greater Melbourne, Australia, with the aim of conserving the
161 area's indigenous species by aligning private and public land management across the
162 municipality. G4W promotes removing environmental weeds, planting and protecting
163 indigenous vegetation and vegetative structure, and providing habitat for indigenous wildlife
164 as private land managers' conservation contribution (Knox City Council & Knox
165 Environment Society, 2008). 'Indigenous wildlife gardening' is used to refer to these
166 activities. G4W was purposively chosen for its purpose, partnership structure, success
167 (founded in 2006, with a membership in 2017 of over 700 households), and variety of
168 program features. It is a collaboration between an urban council Knox City (Council), and
169 community group Knox Environment Society (KES). KES promotes the Knox environment
170 and runs an indigenous plant nursery that is a key feature of G4W.

171 Any Knox resident or business can sign up to be a G4W member. Members receive an
172 on-site garden assessment by assessors who explain the program's purpose, identify
173 environmental weeds and indigenous biota in the garden, and advise on specific opportunities
174 for helping to conserve indigenous species. Members then receive an illustrated assessment

175 report, Knox indigenous wildlife gardening booklet, and 20 free vouchers for indigenous
176 plants at the KES nursery. They also receive newsletters and invitations to program events
177 like open-garden days and occasional get-togethers. Members with properties of sufficient
178 size and proximity to a biologically significant site can apply for a grant for their gardening
179 activities. A Facebook page and website provide online information and advice.

180

181 *2.2. Member sampling strategy*

182 A diverse sample of G4W members was sought for interview to explore the impact of
183 program participation on members with a wide variety of personal and property features.
184 Thirteen garden assessors (council staff and program volunteers), who between them had
185 visited over 200 members' gardens, were asked to identify a range of personal, property, and
186 program-related aspects of membership diversity in a group interview. The assessors then
187 independently suggested potential interviewees they felt displayed a variety of these
188 characteristics. All 32 recommended interviewees were invited to participate; 10 responded
189 and were interviewed. Subsequently the program coordinator invited 106 members on the
190 membership database from across joining years and postcodes; six responded and were
191 interviewed. While the percentage agreeing to participate indicates selection bias for quick
192 response and willingness to be interviewed, the sample was deemed suitable because 1) the
193 research was exploratory, identifying concepts for further testing rather than establishing a
194 theory or generalizable findings; 2) the sample included G4W members with diverse
195 backgrounds as desired (refer 3.1); and 3) data saturation was reached after 16 interviews.
196 Data saturation, "the point in data collection and analysis when new information produces
197 little or no change to the codebook" (Guest, Bunce, & Johnson, 2006: 65), is used to help
198 determine the adequacy of a sample in qualitative studies using non-probabilistic sampling
199 (Bryman, 2016: 417; Guest et al., 2006). In an experiment on data saturation in an interview

200 study, Guest et al. (2006) found that saturation occurred after the first 12 of 60 in-depth
201 interviews, at which point 97% of high-prevalence themes and 88% of all themes identified in
202 the study were recorded (some of which were variants of high-prevalence themes). They
203 concluded that twelve interviews can suffice to identify common perceptions and experiences
204 of participants when the sample is purposive and homogeneous (as in this study where the
205 sample was of invited participants in a specific wildlife gardening program).

206

207 *2.3. Data acquisition*

208 Data was acquired from interviewees and about their gardens through: 1) a demographic
209 questionnaire; 2) semi-structured interviews at interviewees' homes that included a walking
210 tour of their gardens; 3) observations of the garden at interview; and 4) web and document
211 review to obtain lot size and proximity to parks and reserves. Interviews explored members'
212 gardening experiences and interaction with the program over time, and the effect of
213 participation on their gardening behaviour and reported connections with nature, place and
214 community. A prompt sheet was used as a guide during the interviews. Interviews varied from
215 45 minutes to 2 hours, were digitally recorded, and transcribed verbatim.

216

217 *2.4. Analysis*

218 Transcripts were coded line by line using QSR NVIVO software for Mac (v10.1). Codes
219 were not pre-established but derived from interviewees' responses. Enough text was coded to
220 provide a context for each code; if interviewees covered a number of topics in a single
221 response these were all separately coded with different contextual segments as appropriate.
222 Codes and transcripts were iteratively reviewed as part of a fluid, inductive analytical process
223 (Thornberg & Charmaz, 2011: 41-51) in which emergent ideas and relationships from initial
224 coding were used to develop subsequent analytical categories and nodes. Codes were grouped

225 inter alia into descriptive nodes relating to attitudes, feelings and meanings; impacts of G4W
226 program features; gardening activities, purpose, motivations, rewards and challenges; and
227 connections with nature, place and community. Particular attention was paid to how and why
228 these elements changed from the time prior to an interviewee joining the program until the
229 interview.

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

239

240 **3. Findings and Discussion**

241

242 *3.1. Diversity of interviewees and their gardens*

243 Interviewees differed by gender, qualifications, place of birth, employment, age, and
244 length of G4W membership; their properties varied in location and lot size, and how long
245 interviewees had lived at them (Table 1). Interviewees' gardening experience and style prior
246 to joining G4W also differed, ranging from inexperienced (2 interviewees), backyard (4), and
247 traditional (3) to native gardeners (7) who had used Australian native (not usually indigenous
248 to Knox) plants for their origin or to attract wildlife. Table 2 provides further description of
249 gardening categories.

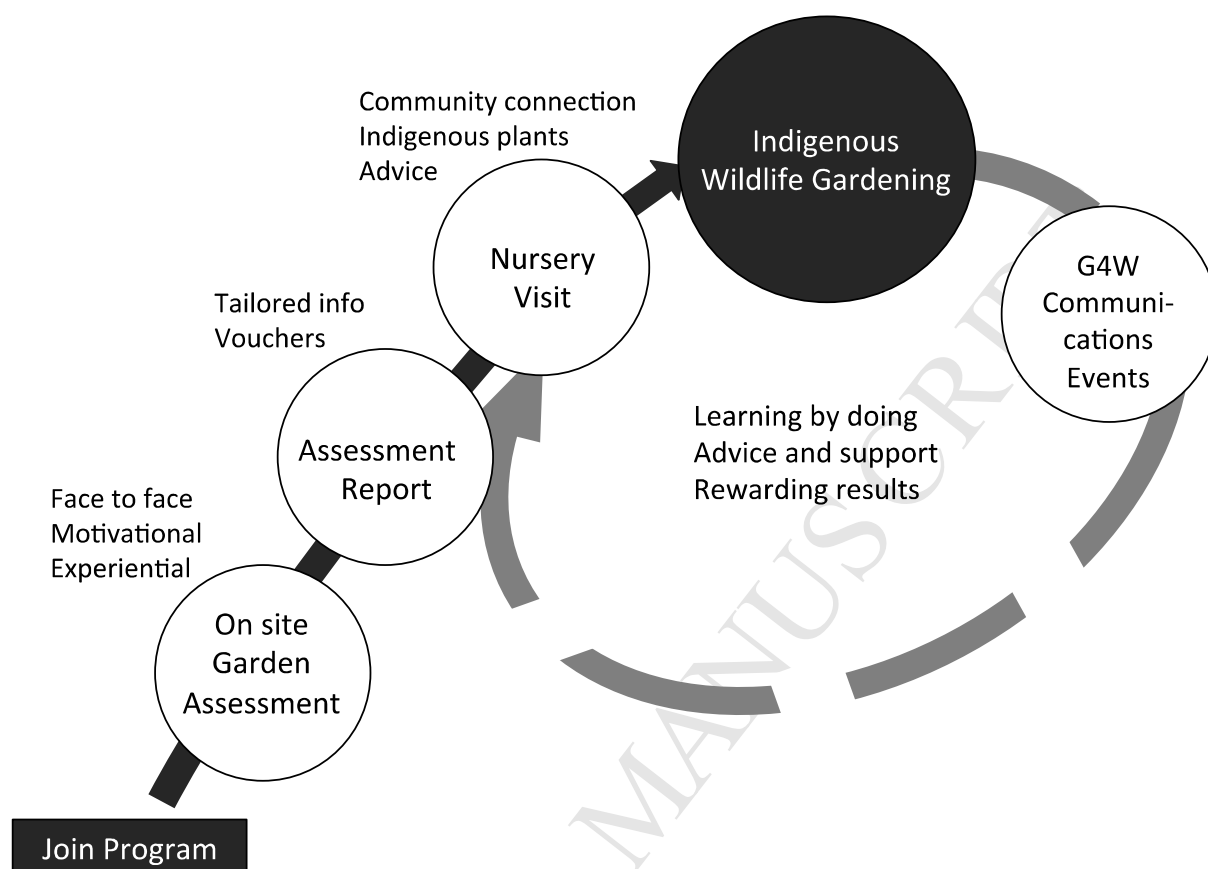
250

251 *3.2. Practising indigenous wildlife gardening*

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

262

263 Figure 1: G4W program elements (in circles) and their role in initiating (solid arrow) and
 264 supporting (dashed arrow) indigenous wildlife gardening
 265



266
267

268 Interviewees joined the program primarily to improve their gardening knowledge and
 269 gardens; the majority were not actively seeking information about the program or wildlife
 270 gardening [citation withheld for author anonymity]. Key factors that stimulated interviewees
 271 to commence wildlife gardening, depicted by the solid arrow in Figure 1, were an on-site
 272 garden assessment, assessment report, and nursery visit. The garden assessment was
 273 experiential and motivational; highlighting what contribution interviewees' gardening could
 274 make to conserving indigenous species. Interviewees valued the personal guidance and
 275 encouragement of assessors. As I7 noted "It was much better having someone come out and
 276 talk to you...[they] pointed out a lot of things that I could do that would make a difference".
 277 The assessment report, a written record of what was discussed, was used by many

278 interviewees as reference material. Free plant vouchers provided with the report spurred a
279 visit to the nursery and discovery of its use as a hub of advice and support. I6 recalled

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

283

284 Commencing indigenous wildlife gardening was a pivotal point.

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

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

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

302 Third, gaining knowledge and skills through their gardening not only enhanced
303 participants' competencies in indigenous wildlife gardening, but also provided motivation and

304 confidence to continue. For example I8, who spoke of persisting to finish the job, also
305 continued because *“I’m starting to learn more about the plants over the years, so I’m having*
306 *more of an input...I can make it the way ...I wanted it to be”*. This aligns with the importance
307 of action competence noted by Hungerford & Volk (1990) and learning by doing as the
308 process by which rural landholders adopt conservation practices that help them to achieve
309 personal goals (Pannell et al., 2006).

310 Fourth, accessible G4W advice, communications, and events supported interviewees to
311 continue. Face-to-face support was particularly valued, as recounted by I7 *“So they came out*
312 *and assessed again and so that got me going again a bit. So that personal, somebody coming*
313 *out to talk to you makes a difference”*. Fifth, rewarding results also sustained or increased
314 interviewee’s efforts, as has been previously reported for PEBs generally (Schultz & Kaiser,
315 2012). Rewards included having gardening success, as explained by I3 *“Some of the plants*
316 *have started to grow and flower... that is good, you feel that’s an achievement”*, and gaining
317 knowledge and skills, as related by I5, *“The program’s just given me a focus on learning and*
318 *watching, and like every day there’s something new to learn”*. The pleasure of hearing and
319 seeing wildlife was a key reward and motivation, as described by I14, *“seeing the small insect*
320 *eating birds and magpies and owls. We get owls here, so that’s always good to come out and*
321 *bang there’s a tawny frogmouth”*.

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

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

331

332 *3.3. Development of land stewardship*

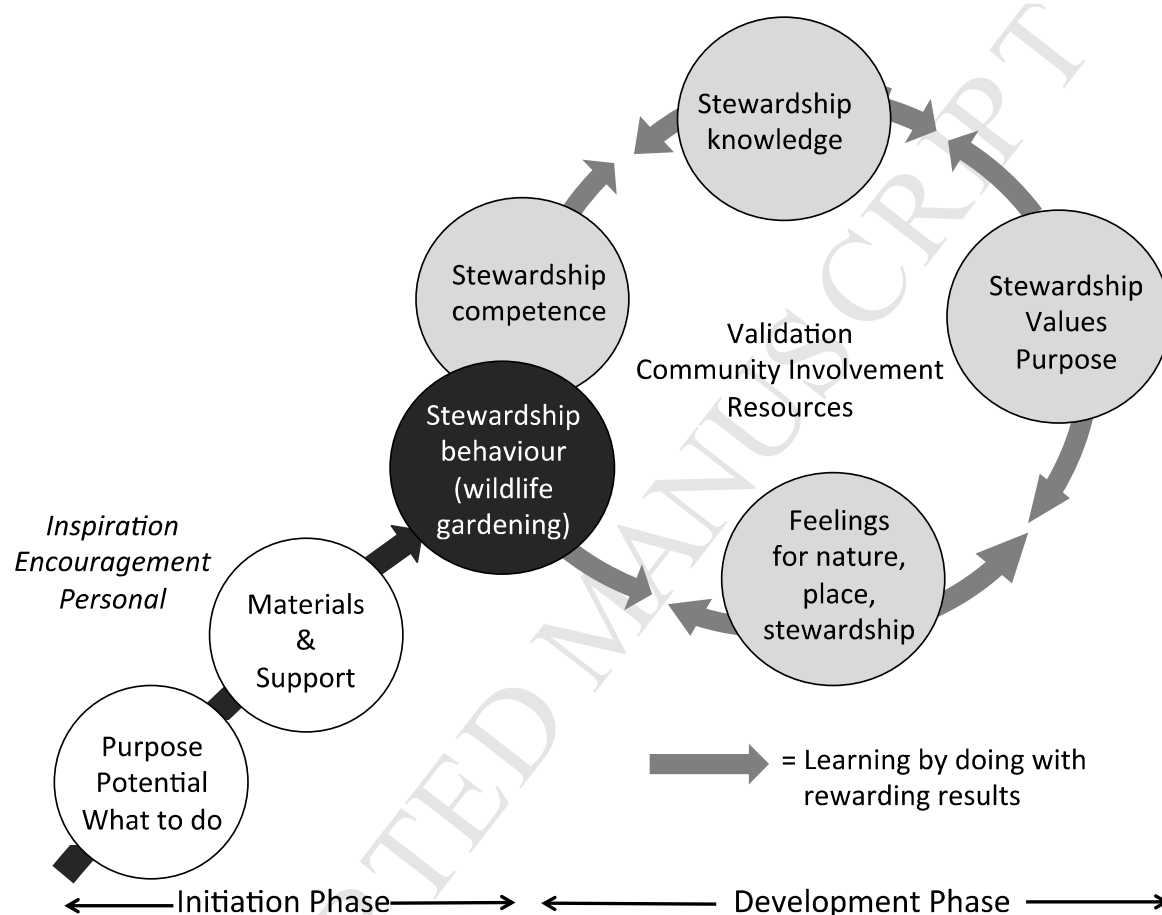
333 In practising indigenous wildlife gardening, all interviewees had carried out land
334 stewardship activities. However, they did not all describe their gardening purpose using land
335 stewardship qualities in terms of caring for Knox' landscape to conserve indigenous species,
336 contributing to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

347 Figure 2 sets out a model for the development of urban private land stewardship. It has
348 two phases, a first phase comprising initiation to land stewardship, and a development phase
349 comprising the intensification and further development of land stewardship. The model bears
350 similarities to Figure 1, but differs in two ways. One, it is concerned with development of
351 stewardship feelings, purpose, and meanings in addition to stewardship behaviour (wildlife

352 gardening). Second, it focuses not on G4W program elements specifically, but rather what
 353 generic factors help to initiate and support development of stewardship purpose and practice.

354

355 Figure 2: A model for the development of urban private land stewardship



356

357

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

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

370

371 Commencement of indigenous wildlife gardening is the juncture between the initiation
372 and development phases of land stewardship. The circular arrows in Fig 2 represent that
373 land stewardship develops through a complex interplay between performance of
374 stewardship activities; gaining stewardship competence, confidence, and knowledge;
375 acquiring stewardship values and purpose; and deepening attachments to place, including
376 the local landscape, nature, and community agencies and members sharing the stewardship
377 practice.

378

379 *3.3.1. Gaining stewardship knowledge and competence by doing*

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

390 *rate seems to be improving. Yeah. So it's a very positive feeling to be acquiring a skill*
391 *almost”.*

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

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

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

407

408 3.3.2. *Gaining stewardship values for indigenous plants*

409 All interviewees, irrespective of the extent of their stewardship activities or purpose, had
410 adopted G4W's values for plants in their gardens and gardening. When they joined the
411 program, no interviewees knew about the indigenous species of Knox and many, if not all, of
412 its environmental weeds. Strikingly, by the time of the interview they all used adjectives like
413 “right”, “wanted”, “good” or “needed” to refer to indigenous species and “wrong”, “a
414 baddie”, or a “spreader” for noxious weeds in their gardens. Species not designated by the
415 program to be invasive weeds were “acceptable”, particularly native species from other parts

416 of Australia. I6 explained “*If they’re natives I’m not as worried as long as there’s a lot of*
417 *indigenous as well... it annoys me knowing that I’ve got some that shouldn’t be there*” while
418 I4 said “*I admit I’m cheating; I’m putting a few that aren’t necessarily indigenous to this*
419 *area, but they’re native*”. These considerations sat beside other needs and connections
420 interviewees had for their gardens:

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

426

427 3.3.3. Strengthening land stewardship purpose

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

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

435

436 Some interviewees described helping Council or the Knox community as a purpose for
437 their indigenous wildlife gardening, a dimension of the ‘common good’ stewardship purpose.

438 I8 gave this as a primary reason for his work:

439 *In the backyard, I believe I’ve pulled out everything that’s non-indigenous to the City of Knox,*
440 *everything. And every plant that’s in there that is planted is indigenous to the City of Knox, and*
441 *there’s probably 1,200 of them so far. And I reckon I’ve got another 500 to put in. So I want it*

442 *like that because a) I think I owe them that, right, b) I'm not a greenie so I don't care whether the*
443 *plant comes from the City of Knox or from the middle of Western Australia, I don't care, but if*
444 *that's what makes them happy and attracts the wildlife I'm happy to do that. I8*

445

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

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

461

462 3.3.4. *Deepening feelings for nature, place, and stewardship*

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

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

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

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

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

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

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

490

491 In her review of place attachment research, Lewicka (2011) concludes that place is an
492 object of strong attachment although the relationships between who gets attached, to what

493 features of place, why and how attachment occurs, and how that attachment might be
494 expressed in behaviours, remain poorly understood. Lewicka (2011: 226) does note that
495 studies show “a positive relationship between strength of place attachment and strength of
496 neighborhood ties”. Various studies report that having and making experiences in a place is
497 a key mechanism by which people learn about place (Measham, 2006) and develop
498 emotional connections to its environmental qualities (Carr, 2002; Rogan, O’Connor, &
499 Horwitz, 2005). These findings corroborate this. There was no evidence that the suburban
500 setting diminished interviewees’ developing attachment to their land, nature, or fellow
501 participants.

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

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

512

513 3.3.5. Validation, community involvement and resources

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

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

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

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

537

538 *3.4. Urban gardening as context for developing land stewardship*

539 Urban gardening provides a different context for the development of land stewardship
540 than on public land or in rural contexts. First, gardens are viewed more strongly as places that
541 “make a house a home” than as places to “learn about nature”, or to “care for the planet”

542 (Bhatti & Church, 2004). Other studies have discussed the lack of connection gardeners make
543 between their gardens and the neighbouring environment (Clayton, 2007; Dahmus & Nelson,
544 2014), questioning whether providing this knowledge would facilitate development of
545 environmentally sustainable gardening behaviours. Similarly, a study of British birdwatchers
546 concluded that the number who consciously gardened to support birds was “surprisingly low”
547 (Cammack et al., 2011: 317) because they did not perceive their gardens as places where they
548 could improve habitat for these birds. Findings about G4W here and previously reported
549 [withheld for author anonymity] point to how personal guidance and encouragement about the
550 value of wildlife gardening for conserving local flora and fauna is an important motivating
551 factor.

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

559 Third, homes are “places that are the focus of deep attachments and places that are
560 ingredients in our sense of identity” (Holland, 2006: 122). When caring for nature is
561 practiced on one’s residential land, it becomes intertwined with the qualities and
562 relationships of home and family. Several participants recalled their indigenous wildlife
563 gardening activities as memorable because they were shared with family, like I13, “*and we*
564 *have a young son with a little bit of a learning difficulties, and ... this is, you know, great*
565 *for him*” or I16, “*one granddaughter in particular, she’s just got such an affinity for it*”.

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

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

588 The conservation outcomes of interviewees’ wildlife gardening (apart from
589 environmental weeds removed, indigenous species planted, or habitat features retained or
590 added) were not able to be measured within the scope of this study. Conservation ‘success’

591 in the context of the urban residential setting would be determined by how a garden
592 assisted a species or community of species, each with their distinctive ecological needs, to
593 persist (Goddard, Dougill, & Benton, 2010; Lindenmayer & Fischer, 2006).

594

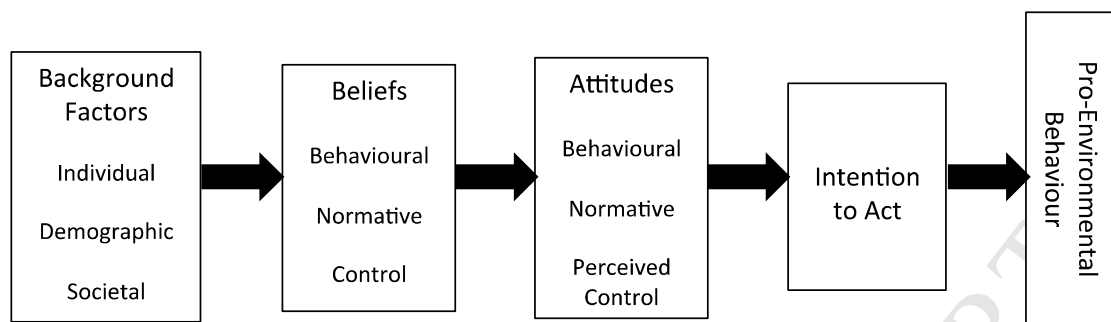
595 *3.5. Time and models of behaviour change*

596 The model presented in Fig. 2 describes the development of land stewardship *over*
597 *time*, as inductively derived from this exploratory case study. It shows that land
598 stewardship develops through a complex interplay between performing stewardship
599 behaviours; improving stewardship competence, confidence, and knowledge; and
600 deepening stewardship purpose, beliefs, and attachments. These are interesting insights in a
601 context where “almost all research in EP [environmental psychology] has relied on static
602 outcomes at one point in time thus missing a critical component of human behavior-
603 maturation” (Winkel, Saegert, & Evans, 2009: 324). It is important to understand and
604 distinguish models describing the relationship between factors that occurs *over a period of*
605 *time*, and those describing the relationship between factors *at a point in time*. For example,
606 the theory of planned behaviour (Ajzen, 1991) and its variants take a ‘snapshot in time’ of
607 how behaviour or intention to behave (the dependent end variable) is affected by
608 ‘precursor’ variables including beliefs, attitudes and norms. There are many PEB models in
609 the literature (refer Darnton, 2008 for various examples) depicting the development of PEB
610 as a linear process (Fig. 3) with the behaviour shown as the endpoint. These depictions
611 omit what impact performing the behaviour itself has on ‘precursor’ variables over
612 subsequent iterations.

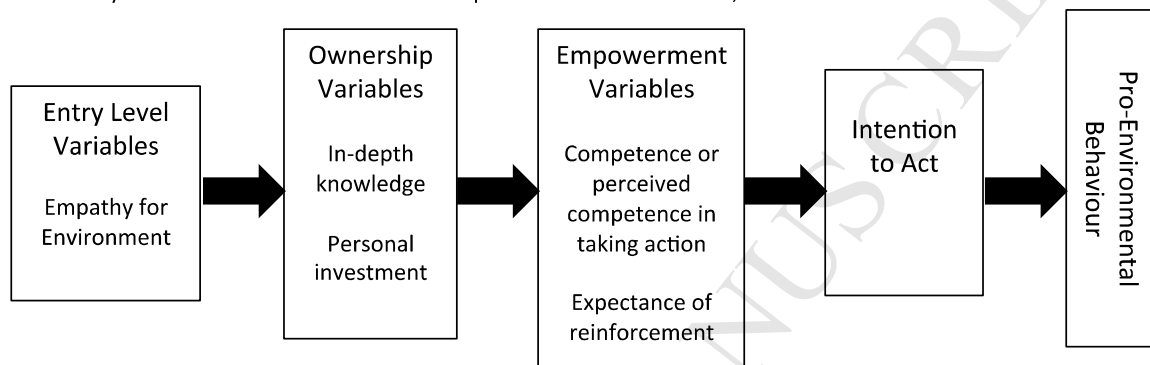
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Figure 4: Linearly presented PEB models with behaviour as endpoint



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



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

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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, Nicholson-Cole, & Whitmarsh (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

629 study of U.K. climate change campaigners found that “the relationship between values and
630 action is complex and bi-directional” (Hards, 2011: 37). Hards (2011: 37) described three
631 related mechanisms that shape environmental values: practising the behaviour; having
632 reinforcing “sensory, mental and emotional” contextual experiences; and interacting with
633 like-minded people (Hards, 2011: 37). Chawla (2009) presented a framework derived from
634 syntheses of behavioural research on how children develop conservation behaviours over
635 time, showing a feedback loop between taking action; developing knowledge, confidence,
636 skills, and motivation for conservation behaviour; and reflection and adaptation. Darnton
637 (2008: 39-56) provided an array of examples of models for a wide range of behaviours,
638 including PEBs. He distinguished between “models of behaviour”, designed to explain
639 determinant factors underlying behaviour and tending to be linear, and “theories of
640 change”, which show how behaviours change over time and demonstrate that “change is a
641 process, not an event” (Darnton, 2008: 1).

642

643 *3.6. Implications for fostering urban native biodiversity conservation*

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

653 If conservation is only promoted to urban residents as protecting remote ecosystems or
654 public reserves and requiring specialist expertise, it comes to be seen as “not, by and large
655 something people do, but something that is done for them or, sometimes, to them and their
656 land” (Adams & Mulligan, 2003: 295). This limits development of a powerful mechanism –
657 private land stewardship - for engaging urban communities in caring for the environments
658 they live in. As one of the few mechanisms to improve the habitat quality of the residential
659 land matrix this is a powerful complement to other urban biodiversity conservation activities.
660 Adopting a pragmatic approach that accommodates a mixture of native and non-native species
661 in a garden and multiple land use objectives can help engage more residents, who over time
662 increase their commitment to land stewardship and shape their gardens accordingly. Private
663 land stewardship, with its ethic of taking personal responsibility to care for the land and its
664 species over time for the common good, provides a good foundation for urban biodiversity
665 conservation with its need to adapt to changing circumstances. The use of a collaborative
666 framework involving local government and community group hubs not only supports
667 participants to continue, but builds shared goals and relationships that can be deployed to
668 conservation at a landscape scale. Connections with place, nature, and community that deepen
669 with interviewees’ stewardship ethic and practice suggest that interlinked social and
670 ecological benefits can arise from fostering urban private land stewardship.

671 Coming from an exploratory qualitative study using a small sample of G4W members,
672 these findings cannot be extrapolated to the G4W membership as a whole, generalised, or
673 directly transferred to other populations. Unfortunately, it was not possible to identify
674 members for interview who were unhappy with the program or wildlife gardening. A
675 previously reported survey of the G4W membership found few criticisms of the program and
676 a substantial uptake of wildlife gardening activities [citation withheld for author anonymity].
677 The findings reported here should be interpreted as highly nuanced insights into a modelled

678 process for developing land stewardship over time, secured from a group of urban wildlife
679 gardening program members who adopted stewardship behaviours, values and purpose to
680 varying degrees. The study did not incorporate data from G4W members who disagreed with
681 or did no wildlife gardening. Not knowing about environmental weeds was why interviewees
682 had not previously removed them, and not wanting to remove existing vegetation (for shade,
683 aesthetics, or other personal reasons) was why interviewees had not replaced them with
684 indigenous species or removed weed species after joining the program. The study's findings
685 should be tested and enhanced. Methods could include: quantitatively testing some of the
686 posited relationships from the broader program population and other populations; using
687 theoretical sampling to test and refine the model, such as looking for alternative examples or
688 'failures'; or testing the utility of the model to interpret findings in other land stewardship
689 development programs.

690

691 **4. Conclusions**

692 This investigation found empirical evidence that urban private land stewardship can be
693 readily fostered through a program that builds on a common urban residential relationship
694 with nature in the distinctive context of home – gardening. A partnership between a
695 community group and local government provides a framework that first introduces residents
696 to the potential of their gardening to contribute to species conservation and where ongoing
697 advice and materials can be obtained. Once residents commence their conservation-oriented
698 gardening activities, a stewardship development process can begin. Stewardship competencies
699 and confidence increase, along with attachment to stewardship practice and belief in its
700 purpose- a non-linear engagement of hearts, heads and hands. Connections to nature, place
701 and community concurrently strengthen. Learning by doing, with rewarding experiences and
702 supported by accessible resources, validation of the contribution by credible parties, and

703 involvement of community members, drives the process. Acknowledging a meaningful role
704 for individuals and their gardens is critical. Engaging urban residents to care for their land as
705 part of a community can help to improve habitat quality of the residential land matrix while
706 building connections with place and the social fabric of a community.

ACCEPTED MANUSCRIPT

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Figure 3 Captions

3a. Indigenous planting/structure in suburban front garden, alongside more usual suburban garden frontage.

3b. Frog pond in suburban back garden.

3c. Indigenous planting in hilly, treed front garden.

3d. Indigenous planting in suburban back garden.

Table 1

Attributes of interviewees and their properties

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

* One interviewee did not report their age

Table 2

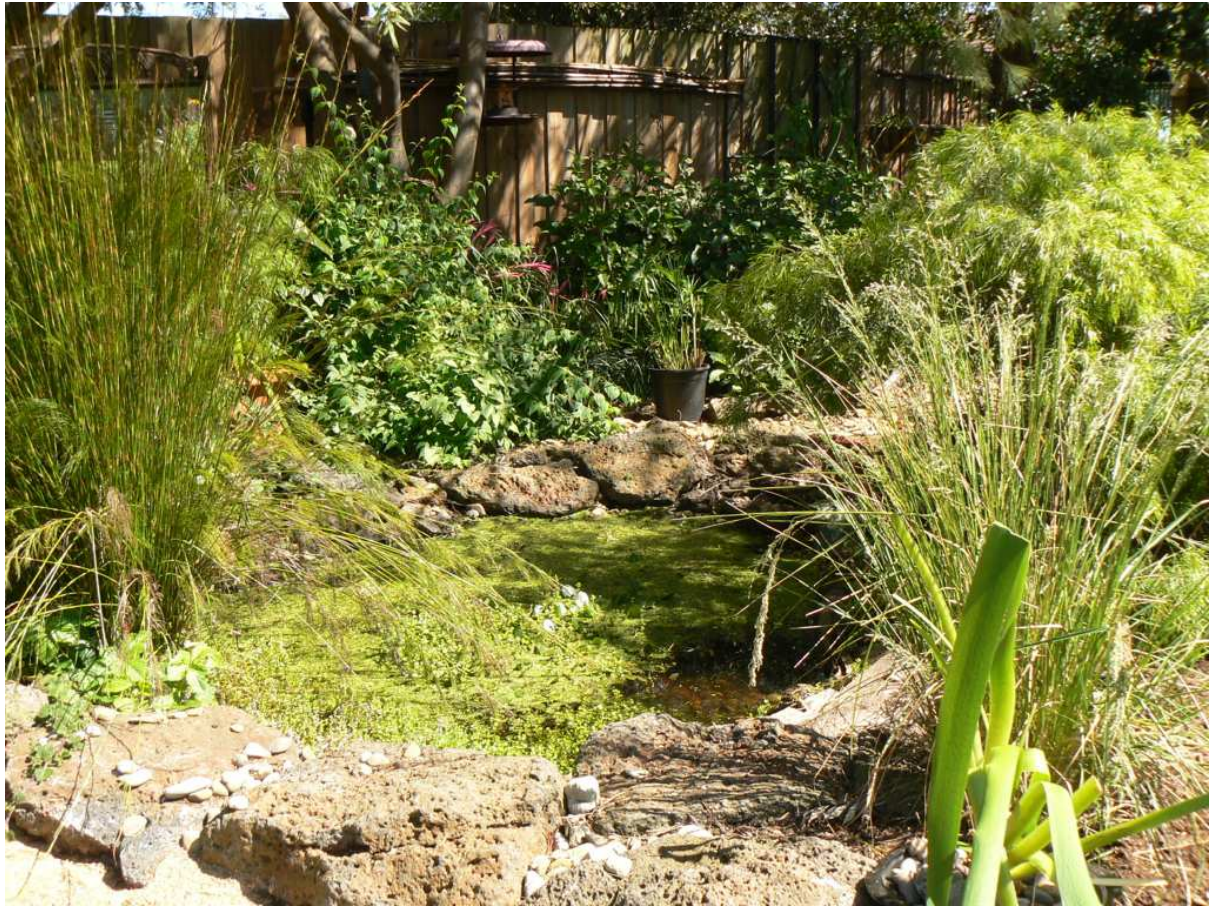
Interviewees: Background characteristics, stewardship purpose, extent of stewardship activities, and reported connections for Knox & stewardship

Ref No.	Background Characteristics					Stewardship Purpose Elements						Activities ¹	Connections	
	Prior gardening experience ²	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	Semi-rural		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	✓ ³	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	✓

¹Intensity of activities based on interviewee description, author's observation of gardens, and photos or videos of activities if offered by interviewee²Backyard= 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 wildlife³✓= presence or expression of element



ACCEPTED



ACCEPTED MANUSCRIPT



ACCEPTED MANUSCRIPT



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