



People and their plants: The effect of an educational comic on gardening intentions



Tayla Hands, Amy Shaw*, Maria Gibson, Kelly Miller

School of Life and Environmental Science, Deakin University, 221 Burwood Highway, Burwood, Victoria 3125, Australia

ARTICLE INFO

Keywords:

Education

Invasive

Weeds

ABSTRACT

Environmental weeds have ecologic and economic costs, harming native vegetation and costing the agricultural industry billions of dollars annually. Many environmental weeds are garden escapees; thus, what the public chooses to plant in their gardens is important. This research investigated the environmental attitudes (related to environmental weeds) of residents in the City of Knox, Melbourne, Australia and whether illustrative education (comic) could influence participants to choose native plants in the future. Two identical surveys (total 2000) were sent to residents chosen randomly within the City of Knox; half of the surveys had a comic added that demonstrated the pathway garden plants could take to invade bushland. Responses ($n = 181$) indicated that the majority of respondents hold pro-environmental attitudes in regards to gardens and environmental weeds, with most agreeing that residential gardens are important for urban areas and that gardeners have a responsibility to the environment when it comes to the use of plants that may be invasive. The results showed that significantly more participants that received the comic indicated they would choose mostly natives in the future than did those who did not receive the comic.

1. Introduction

Urbanisation has a major impact on our environment (Aronson et al., 2014) and is expected to increase, with 66% of the world's population expected to be living in urban areas by 2050 (United Nations, 2015). If we hope to conserve biodiversity in urban areas, action will need to be taken to ensure adequate populations of flora and fauna remain intact. This is not only relevant for public greenspaces, such as reserves, parks and remnant vegetation, but for private residential gardens, which have the potential to provide habitat for native flora and fauna (Goddard et al., 2010). Residential gardens often are not used for this purpose and generally are planted with non-native species for a variety of reasons (Groves, 1998). This presents a problem as many introduced species have the potential to become invasive. For example, in Australia it is estimated that 27,000 plant species have been introduced since European colonisation, with roughly 10% of these becoming self-sustaining in the environment (Groves et al., 2005).

Invasive plants, which often become environmental weeds, are a global problem, negatively affecting ecosystem function as well as animal abundance, diversity and fitness (Schirmel et al., 2016) and competing with native plant species for nutrients, water and space (Groves et al., 2005). Additionally, introduced plants can alter soil microbial communities and disrupt soil aggregate stability (Duchicela

et al., 2012); they can also alter naturally occurring nutrient cycles, disrupting what can be a sensitive dynamic between native species (Ehrenfeld, 2003). Non-native species also often require the use of pesticides or herbicides, contributing to the chemical load in the environment, which could be minimised by using plants better suited to the existing environment (Clayton, 2007). Conversely native plants, especially those indigenous to the area, are logically suited to thrive in the local climate and soil conditions. It also has been shown that native flora can provide higher quality food sources for native avifauna in urban environments (French et al., 2005). Daniels and Kirkpatrick (2006) determined that it was predominantly the native plants in gardens that were given preference by the native avifauna and not other environmental factors or the landscape. This preference for native plants is not only seen in birds: the abundance and diversity of native invertebrates has been shown to be improved through the introduction of more native plant species, due to the coevolution of native plants and herbivorous invertebrates (Grunzweig et al., 2015).

The biodiversity and conservation cost of environmental weeds in the natural environment is well documented (Coutts-Smith and Downey, 2006; Hejda et al., 2009; Humphries et al., 1993; Thorp and Lynch, 2000; Williams et al., 2009). In Australia, the annual economic cost of weeds is estimated to be between \$3.5–4.5 billion, with much of this cost taken up by the agricultural industry with estimates of on-farm

* Corresponding author.

E-mail addresses: hands@deakin.edu.au (T. Hands), amy.shaw@deakin.edu.au (A. Shaw), maria.gibson@deakin.edu.au (M. Gibson), kelly.miller@deakin.edu.au (K. Miller).

costs for control and the opportunity costs from lost production accounting for \$3.5–3.7 billion annually (Sinden et al., 2004). Only a small percentage of this cost includes expenditure on weed control for our parks and conservation reserves; however costs related to this would likely be comparable to that spent on agricultural weeds if widespread control programs were undertaken (Virtue et al., 2004). The true cost to the environment is much more difficult to calculate as biodiversity losses cannot readily be translated to monetary values, and therefore it is important that we educate the community on the impacts of environmental weeds to reduce their associated economic and environmental costs.

In the United States, researchers noted that extremely large numbers of environmental weeds originated as ornamental plants sold in nurseries (Randall and Marinelli, 1996; Reichard and White, 2001). For example, in California, Bossard et al. (2000) found that 41 of the 78 plant species considered most invasive were originally propagated by nurseries as ornamental plants. In Australia, Groves et al. (2005) showed that 66% of environmental weeds are garden escapees and what is planted in the garden can cause significant effects on bushland. Therefore, the support of home gardeners is necessary if we want to increase native plant biodiversity and reduce the spread of weeds from residential gardens (Goddard et al., 2010). However, there is currently a strongly held belief by urban residents that their gardens are separate from the environment, meaning they believe their gardens do not have any effect on the broader environment (Clayton, 2007; Hu and Gill, 2015). Since there is a tendency for members of the public to see their garden spaces as separate from native bushland they fail to recognise that the same struggles they endure with weeds in their own gardens are occurring nearby in important nature conservation areas (Blood and Slattery, 1996; Clayton, 2007).

Research has shown that there is a general perception among members of the community that nurseries are not able to sell invasive plants, entrusting that their purchase comes with no consequences (Blood and Slattery, 1996). This is not always the case, as invasive plants are still available for purchase through the horticultural industry, as regulation in many places is slow or non-existent (Groves et al., 2005). Gagliardi and Brand (2007) point out that in the U.S., market forces make it difficult for the horticultural industry to cease the production and sale of invasive species and that although bans on certain plants may be part of the solution, a multifaceted approach is required to stop the spread of environmental weeds.

Given their availability in nurseries, it is not surprising that those choosing invasive garden plants often do not realise that there are issues associated with them (Blood and Slattery, 1996). Evidence suggests that the public wish to know more about the origins of the plants they buy; a study in New South Wales, Australia, showed that gardeners would like more information on whether plants are non-native, native or indigenous to the area (Hu and Gill, 2015), mirroring the findings of many other studies (e.g. Brzuszek and Harkess, 2009; Gagliardi and Brand, 2007; Pérez et al., 2010). Further to this, Yue et al. (2011) found that gardeners may be willing to pay extra for plants labelled as native and/or non-invasive, suggesting that information about plants can influence a consumer's purchase behaviour.

How to approach educating the public about environmental weeds and the impact of gardening choices is an important topic to consider. Van Heezik et al. (2012) showed that two-way communication between home gardeners and an expert involving a biodiversity assessment, discussion and informative feedback to the home gardener resulted in a shift in attitude to more native-friendly practices in the garden. Though this education may be effective, as it is more personalised, it would not be cost effective for councils or other bodies to perform on a large scale.

There are various other ways to engage the public with environmental issues. More traditional methods involve heavy, information-only based campaigns, which have been shown to be ineffective and costly (Costanzo et al., 1986; Geller et al., 1983; McKenzie-Mohr, 2011). In more recent times, McKenzie-Mohr (2011) encouraged a

combined use of environmental knowledge and social psychology to effectively alter behaviours and attitudes. These tools can include using commitments (written or verbal), social norms (community standards), social diffusion (early adopter influence), prompts (direct reminders), communication (education), incentives (increasing attractiveness), and convenience (minimising barriers) (McKenzie-Mohr, 2011).

Cartoons and comics are prevalent in society and are often used for commentary on current issues, but are underutilised for educational purposes (Tatalovic, 2009). For those without a scientific background, text-based education can seem overwhelming, with numerous unrecognisable terms and complex explanations (Bucchi, 2008). With an illustration-based educational piece, this problem can be minimised, providing a much clearer and more interesting snapshot of a concept. This form of education also could be produced and distributed at a relatively low cost through online formats, especially considering the accessibility associated with the internet in comparison to traditional print and distribution methods, allowing for widespread engagement (Vance et al., 2009).

Comics can be quickly and easily understood and could potentially open a new avenue of engagement for society and science (Weitkamp and Burnet, 2007), indeed, science education through comics has become a new trend for young children and teenagers (González-Espada, 2003; Tatalovic, 2009). This is an area that only recently has gained research attention; however some studies have shown an encouraging level of engagement for young children (Kim et al., 2012; Park et al., 2011; Tatalovic, 2009; Weitkamp and Burnet, 2007). Another study by Hosler and Boomer (2011) showed students gained a better understanding of biological concepts after an educational comic was used in higher education classrooms. Perhaps another application of educational comics could be for environmental education purposes aimed at adults outside of the classroom. Given this possibility, and the vast array of global environmental damage caused by environmental weeds, the aim of this project was to investigate the attitudes of urban residents towards introduced plants and plant choice in their gardens and whether an educational comic can influence future gardening intentions.

2. Method

The City of Knox, a local government area located approximately 25 km east of the Melbourne Central Business District, Australia, was chosen as a case study. It is home to approximately 150,000 residents and covers 11 suburbs over 113.8 km². The demographic profile of the City of Knox is broadly similar to that of the state of Victoria (Australian Bureau of Statistics, 2011). The municipality is located at the foothills of the Dandenong Ranges and hosts several significant bushland areas which are managed as conservation zones. Despite this, 41% of the city of Knox's indigenous plant species are threatened with extinction from the area within a decade (Knox City Council, 2015). Given the current state of native vegetation within the municipality and its proximity to important bushland such as the Dandenong Ranges National Park, the area provides an excellent location to study residents' attitudes towards plant choices and environmental weeds. Locations such as the City of Knox are areas where garden escapees have the potential to cause environmental damage in short time frames, therefore the area was considered to be well suited for this study.

A self-administered survey was developed to explore current and future behavioural intentions and participant attitudes on gardening and native Australian plants. The majority of survey questions were closed-ended and utilised a 5-point Likert scale.

The survey was divided into three sections:

- *Future garden intentions and plant choice.* This section was used to assess the respondent's current gardening choices and their future gardening intentions, including whether they had previously purchased native plants or planned to in the future.
- *Views and attitudes on plants and the environment.* This section

Download English Version:

<https://daneshyari.com/en/article/6549414>

Download Persian Version:

<https://daneshyari.com/article/6549414>

[Daneshyari.com](https://daneshyari.com)