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Original article

Show me your garden and I will tell you how sustainable you are: Dutch citizens' perspectives on conserving biodiversity and promoting a sustainable urban living environment through domestic gardening

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ABSTRACT

This paper focuses on Dutch perspectives on the issue of gardening for biodiversity and sustainable urban environments. A semi-qualitative survey based on multiple choice, open, and visual questions were conducted with a representative sample of the Dutch population (N = 517). The aim of the survey was to get a better insight into the way Dutch domestic gardens contribute to urban sustainability and biodiversity conservation. Cultural Theory was used as a heuristic framework for survey design and analysis. The results show that the Dutch population is best represented by the Egalitarian and the Hierarchist perspectives. The Egalitarian perspective has strong ecological ideals, but these ideals are not reflected in how most of them design and maintain their gardens in practice. There seems to be a strong cognitive dissonance in the relation between a majority of the Dutch garden owners and the design and maintenance of their gardens. Only a small group of people with an Autonomous perspective is able to bring their high ecological ideals into practice in their yards. The Individualist perspective group has least ideological and practical concern for gardening, sustainability and biodiversity. The results have been discussed in the context of global goals for sustainable cities and biodiversity, as reflected in the Aichi targets and the Sustainable Development Goals. The paper intends to provide policymakers and urban planners with levers to experiment with incentives to bridge gaps between private space and public interests (the public/private dilemma).

1. Introduction

"*They paved Paradise, and put up a parking lot* – From a song by Joni Mitchell, 1970"

What can a tiny urban space such as a domestic garden contribute to urban sustainability and biodiversity conservation? Urban areas are the centres where all the 'bad' and all the 'good' of human existence come together (CBD, 2012; Crutzen et al., 2007). On the one hand urban life is coupled to a great amount of land use change on a global scale, affecting natural resources and biodiversity (Prokop et al., 2011; Steffen et al., 2005) and inside cities much land is turned into sealed surface for housing, industry and parking lots (Prokop et al., 2011). According to a report by the Environment Agency Austria (*Umweltbundesamt*) "[t]he highest [general soil] sealing rates can be observed in Malta (13%), the Netherlands (8%), Belgium (7.4%), Germany and Luxembourg (5%), and Cyprus and Denmark (3.6%) (Prokop et al., 2011, p.18)." At the other hand, cities provide great opportunity for increasing global sustainability because of the incredible creativity and human potential that emerges from urban living (Millard, 2010; Beatley, 2011; Mitchell and Mueller, 2009; Tidball, 2012).

In accordance to this paradoxical role of cities, the sustainable development and design of cities are becoming a key issue for global policy and civil action for nature in the 21st Century (CBD, 2012; United Nations, 2016a,b; TEEB, 2011; ICLEI, 2012). Even though there are many possible interpretations of sustainable cities (Beumer, 2017), UN Habitat (2015) defines sustainable urban development as "the spatial manifestation of urban development processes that creates a built environment with norms, institutions and governance systems enabling individuals, households and societies to maximize their potential, optimize a vast range of services so that homes and dynamic neighbourhoods, cities and towns are planned, built, renewed and consolidated restraining adverse impacts on the environment while safeguarding the quality of life, needs and livelihood of its present and future populations (UN Habitat, 2015).".

Within the focus on sustainable urban development there is much attention for strengthening green infrastructure (Schäffler and Swilling, 2013; Rudd et al., 2002) as it brings many of the vast range of services, such as "water purification, air quality, space for recreation and climate

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mitigation and adaptation (European Commission, 2017).” The relevance of green infrastructure and habitat connectivity for the protection of biodiversity – the variability and variety of life (CBD, 2010) – has been widely confirmed by researchers (Rudd et al., 2002; Maas et al., 2006; Van den Berg et al., 2014; Stansfeld et al., 2000; Tzoulas and James, 2004; Velarde et al., 2007; Tzoulas et al., 2007; Keune et al., 2013; Mitchell et al., 2013; Beumer, 2014a,b) and is also reflected in the UN Sustainable Development Goals (Goal 11) and in the *Aichi Targets of the Convention of Biological Diversity* (Targets 1 and 2) (United Nations, 2016a,b; CBD, 2011).

Awareness of the importance of green infrastructure in an urban environment slowly trickles down from global research to policymakers and at citizens’ grassroots level (Beatley, 2011; CBD, 2011; Meijer et al., 2013; Lachmund, 2013; Jorgensen and Keenan, 2012). Many citizens all over the world have been taking up their shovels for greening public spaces: traditional parks are turned into small urban farms to grow herbs and vegetables; brownfields are turned into colourful meadows; forgotten urban niches and roadsides are decorated with plants and flowers by guerrilla gardeners; insect hotels, green roofs and green walls enjoy popularity in commercial gardening centres, and swopping seeds has become a thriving activity in online and offline social networks (Beatley, 2011; Van Heezik et al., 2012; Miller and Hobbs, 2002; White, 2011; Bell et al., 2016). Such urban greening and gardening practices are increasingly studied and widely supported by research from ecologists and conservationists (Lachmund, 2013; McKinney, 2002; Mathey and Rink, 2010; Müller et al., 2010; Haase and Schetke, 2010; Müller and Kamada, 2011; Certomà, 2011; Francis and Lorimer, 2011; Kowarik, 2011; Cameron et al., 2012; Barton and Tan, 2013; Beumer, 2014a,b; Beumer and Martens, 2015a,b; Niinemets and Peñuelas, 2008; Ives et al., 2016).

Most focus in current research on the relevance of greening cities for biodiversity and sustainability has been on the greening of *public spaces* as they are directly and most obviously linked to ecosystem services of high *public concerns*, such as health, storm water run-off, temperature regulation, clean air, food and material provisioning (TEEB, 2011; Maas et al., 2006; Van den Berg et al., 2014; Mitchell et al., 2013; Beumer and Martens, 2015; Simonis, 2011; Theeuwes et al., 2012; Zwaagstra, 2014; Bolund and Hunhammar, 1999; Appleton, 2002; Lyytimäki et al., 2008; Kumar and Kumar, 2008; Ignatieva et al., 2011; Meléndez-Ackerman et al., 2014). In order to accommodate increasing insights into the role of green infrastructures in an urbanizing world, the relatively young field of study on the contribution of *private spaces* – such as domestic gardens − to biodiversity conservation and urban sustainability is helpful (Rudd et al., 2002; Cameron et al., 2012; Beumer and Martens, 2015a,b; Niinemets and Peñuelas, 2008; Meléndez-Ackerman et al., 2014; Galluzzi et al., 2010; Goddard et al., 2010; NWF, 2013; Goddard et al., 2013; Dewaelheyns et al., 2014; Larson et al., 2009; Larson et al., 2010; Chowdhury et al., 2011; Cook et al., 2012; Visscher et al., 2016; Lindemann-Matthies and Marty, 2013; Lin et al., 2017; Dewaelheyns et al., 2013; Kendal et al., 2012; Larson et al., 2016; Belaire et al., 2016; Dahmus and Nelson, 2014; Cilliers, 2010). This paper contributes to this rapidly emerging field of study, aiming to bridge the still existing gap in research between the physical contribution of gardens to urban sustainability and the perspectives underlying the design and maintenance of these spaces.

Private outdoor space can measure up to 40% of the urban environment (Zwaagstra, 2014). This delivers a high opportunity for increasing biodiversity and sustainability by taking ecological values into account at the domestic landscape level (Beumer, 2014a,b; Loram et al., 2008). At the same time, domestic gardens are often beyond the impact and reach of (local) policy makers, potentially leading to tensions between trends carried out in private spaces versus their impact on issues with a public interests (Beumer and Martens, 2015a,b). Such tensions are also illuminated by the results of this study, which indicate a high practical popularity of paved courtyards which opposes common ideals of natured cities and biodiverse gardens. Domestic spaces and the effects on their wider environments cannot be separated from the people who design, maintain, and use them. To enable policymakers to create levers to deal with such gaps between private and public interests (the public/private dilemma) (Haignere, 1999), it is important to gain better understanding of the way people consciously or unconsciously contribute to the public stakes of biodiversity conservation and urban sustainability via their own private outdoor spaces.

A semi-qualitative survey based on multiple choice-, open-, and visual questions was conducted with a representative sample of the Dutch population (N = 517). World Bank data of 2015 show that over 90% of the Dutch population lives in an urban environment and the percentage is still rising (World Bank Group, 2016). Therefore, the Netherlands make a suitable country for this study. With the main question in mind – *how do Dutch domestic gardens contribute to-, and reflect public values related to urban sustainability and biodiversity conservation?* – the paper was constructed around four complementary leading research questions:

1. How do respondents relate to global sustainability and conservation issues in their daily lives?
2. How do respondents relate to their domestic outside spaces?
3. What are respondents’ preferences with regards to yard maintenance, design and trends?
4. Do respondents connect their gardening activities to ideas of (local and global) sustainability and biodiversity conservation?

The basic assumption taken in this paper is that individual human action and public policy are both grounded in particular worldviews. In this paper these worldviews or perspectives are framed according to Cultural Theory (CT) archetypes (Beumer, 2014a,b; Mamadouh, 1999; Offermans, 2012; Thompson et al., 1990; Verweij et al., 2006). The paper assesses how these CT perspectives lead to certain strategic ‘garden-management’ schemes that are connected to higher and lower levels of public or private responsibility. The insights gained in this paper can be useful for conservationists, landscape architects, and policymakers in the field of urban development and planning when seeking to experiment with incentives to bridge any gaps between private space and public interests (public/private dilemma) (Haignere, 1999; Swedlow, 2013).

2. Methodology

2.1. Heuristic framework

Cultural Theory, originally developed by Michael Thompson and his colleagues (Thompson et al., 1990; Verweij et al., 2006; Thompson, 1997; Douglas, 1970) and further developed as a method for perspective analysis by Offermans (2012) and Beumer and Martens (Beumer and Martens, 2010, 2013), was used as a heuristic framework for the design and interpretation of the survey. As a typology of different worldviews or perspectives that can occur in a given society (Beumer, 2014a,b; Mamadouh, 1999; Offermans, 2012; Thompson et al., 1990; Verweij et al., 2006; Thompson, 1997), CT aims to represent a holistic picture of ‘perspective biases’ and their corresponding management styles. This is done by framing the perspectives on an axis of: 1. high or low commitment to social units (e.g. emphasis on publically carried responsibility versus emphasis on individual freedom); 2. high or low compliance to institutional authority (e.g. conformation to role differentiation, rules and regulations) (Offermans, 2012; Thompson et al., 1990; Verweij et al., 2006). The CT typology integrates both *rational choice theory* and *post-structuralism* (Verweij et al., 2006). Rational choice theorists assume that societies and cultures are fundamentally the same because they consist of human beings who share the same basic needs. Post-structuralists share the view that every person, culture or community is inherently unique (Giddens, 2009). CT is based on the notion that although cultures *do* differ, they do not differ endlessly