Title: Digging for the roots of urban gardening behaviours

Authors: Olivia Lewis, Robert Home, Thanasis Kizos

PII: S1618-8667(17)30378-3
DOI: https://doi.org/10.1016/j.ufug.2018.06.012
Reference: UFUG 26157

To appear in:

Received date: 16-6-2017
Revised date: 5-4-2018
Accepted date: 16-6-2018

Please cite this article as: Lewis O, Home R, Kizos T, Digging for the roots of urban gardening behaviours, *Urban Forestry and Urban Greening* (2018), https://doi.org/10.1016/j.ufug.2018.06.012

Digging for the roots of urban gardening behaviours

Digging for the roots of urban gardening behaviours

Olivia Lewis* [1,2], Robert Home [1], Thanasis Kizos [3]

1: Department of Socio-Economic Sciences, Research Institute of Organic Agriculture FiBL, Frick, Switzerland

2: Department of Environmental Studies, University of the Aegean, Mytilini, Greece

3: Department of Geography, University of the Aegean, Mytilini, Greece

*Corresponding author:

Olivia Lewis

Department of Socio-Economic Sciences

Research Institute of Organic Agriculture FiBL

Ackerstrasse 113, Box 219

5070 Frick, Switzerland

Tel +41 (0)62 865 72 72, direct dial: +41 (0)62 865 04 77

olivia.lewis@fibl.org

This work was supported by the Swiss National Science Foundation under Sinergia Grant CRSII1_154416 (Strategies for Better Gardens: integrated analysis of soil quality, biodiversity and social value of urban gardens). The work was also supported by the European Commission under an Erasmus+: Erasmus Mundus Scholarship – Category "B", and by Central European University under an MA Short Research Grant.

Thank you to all interviewed gardeners, for their willingness to participate in the study and share information about their gardening experiences, as well as to those garden organization leaders who helped arrange contact. We would also like to thank Stéphanie Lichtsteiner for her role in developing the interview guidelines used in this study.

Urban green spaces make a significant contribution to the social and ecological environment in cities, and the decisions of green space managers have direct impacts at both local and city scales. However most studies have focussed on public green spaces, despite privately managed gardens collectively forming a large proportion of urban green. The aim of this qualitative paper is to understand why people become involved in gardening and why they choose environmentally friendly gardening practices. We conducted semi-structured interviews with 23 gardeners in Lausanne, Switzerland and analysed them according to their content. Three major themes emerged as motivations for gardening: wellbeing, social aspects, and outputs (both tangible, such as food, and intangible, such as the feeling of having produced food). Motivations for gardening practices were grouped into extrinsic factors, such as practical constraints, inspiration from neighbours, following regulations, and social controls; and intrinsic, which were primarily based on knowledge and experience. Our results provide some evidence of the tangible and beneficial outcomes of gardening and provide additional support to urban decision makers with an interest in the management of urban green spaces.

Introduction

We live in a rapidly urbanizing world – 54% of the world's population lived in urban areas in 2014, reaching 74% in developed countries, such as Switzerland (United Nations, 2014), which renders urban green spaces increasingly important for contact with nature and as outdoor recreation areas (Frick, Degenhardt, & Buchecker, 2007). Urban planners are understandably reluctant to allow urban spread into surrounding areas, which means that cities and towns increase in density as the urban population increases. Decision makers then face pressure to meet the growing population's needs for housing and services so urban green spaces become attractive options to release for development (Home, Bauer, & Hunziker, 2012). However, people possess a deep-seated biological need for the connections with the rest of life that are gained by contact with

nature (Wilson, 1984). The higher density urban living that results in the loss of green spaces to development has potentially significant implications for citizens because of the importance of urban green spaces as nodes of contact with nature (Barthel, Colding, Elmqvist, & Folke, 2005).

Although urban green spaces have persisted, despite urbanization and densification of cities, their continued preservation requires commitment by cities in the form of planning instruments, and there is an increasing demand for evidence of tangible outcomes to justify such commitment (Allen & Cooper, 2003). This need to justify the existence and maintenance of areas that enable recreation and leisure experiences has led to the concept of benefits-based management (Friedt, Hill, Gomez, & Goldenberg, 2010).

Numerous studies have identified the direct and indirect social and environmental impacts (Drescher, Holmer, & Iaquinta, 2006; Maurer, Peschel, & Schmitz, 2000) and benefits to human health and well-being (Keniger, Gaston, Irvine, & Fuller, 2013; Niemelä et al. 2010) these spaces provide. However, the majority of studies have focused on public green spaces, such as parks, and semi-public green spaces, such as privately owned but communally accessible areas (Home, Bauer, & Hunziker, 2012). Gardening as a leisure practice has been reasonably well studied (e.g. Cheng, Stebbins & Packer, 2016), although with a particular emphasis on community gardens (Kingsley, Townsend & Henderson-Wilson, 2009; Parry, Glover, & Shinew, 2005; Sanchez & Liamputtong, 2016).

However, the primary point of contact with nature for many urban residents is in their own private or allotment gardens, which they have direct control over through management and design. Much of the literature on privately managed gardens focuses

on their outcomes, such as ecosystem services (Cabral et al., 2017), restorativeness (Cervinka et al., 2016), and food production (CoDyre, Fraser, & Landman, 2015). However, less literature has addressed the motivations behind gardeners' management decisions in private and allotment-type gardens and the relationships between motivations and management practices. Taylor and Lovell (2014: 285) pointed out that home food gardens in the global North "have been overlooked, understudied, and unsupported by government agencies, non-governmental organizations, and academics". Taylor and Lovell, (2015: 1) further wrote that "the home food garden represents a major lacuna in the rapidly expanding academic literature on urban agriculture in the developed world" and write that the contrast between a concentration of research on community gardens and a lack of research on urban home food gardens in the North is puzzling. Ruggeri et al. (2016: 8) appear to agree and point out that, "while multifunctionality of urban gardening is well documented, only a few studies investigated individual gardeners' motivations, which can be subjective and heavily affected by the local context in which it takes place". Taylor and Lovell (2014: 287) explain "the neglect of these gardens as a focus of academic research" by proposing that researchers may assume residential landscapes to be dominated by suburban lawns or to be too trivial for serious academic inquiry (Hondagneu-Sotelo 2010)

The aim of this contribution is to gain a better understanding of management decisions in private and allotment gardens, which can inform policy makers who wish to create targeted interventions to encourage more socially and environmentally friendly gardening practices. These aims can be expressed as the following research questions: why do people become involved in gardening? and why do gardeners choose particular gardening practices? Addressing these research question can contribute to answering part of the key research question proposed by Taylor and Lovell (2014: 294), which

they derived from their meta study of research into home food gardens: “How does access to land and social, economic, genetic, or material resources influence gardening practices, garden size and species composition, and the decision to garden?”

It is reasonable to assume that some motivations will be context specific, while others will be representative of the human condition, and a case study approach can contribute to differentiating between them (Yin, 2009). We address these aims using the case of Lausanne, Switzerland. Comparison between the results of this study and the results of previous research will identify motivations for ecologically oriented gardening practices that may be applicable in other contexts.

Social and environmental impacts of urban green spaces

Urban green spaces offer both personal and societal benefits as well as environmental impacts. At the personal level, Ward Thompson (2002) claims that access to some form of nature is a fundamental human need. Conedera, Del Biaggio, Seeland, Moretti, and Home (2015) show that the perceived benefits of contact with green spaces in cities tend to increase with close proximity of accessible green spaces, which private and allotment gardens usually offer. Benefits include: direct health benefits from physical activity (Pretty, Peacock, & Hine, 2006); contribution to obesity reduction (Coley, Kuo, & Sullivan, 1997); increased life expectancy (Takano, Nakamura, & Watanabe, 2002); general good health (Maas, Verheij, Groenewegen, de Vries, & Spreeuwenberg, 2006); and mental health benefits, such as improved self-esteem (Pretty, Peacock, Hine, Sellens, South, & Griffin, 2007).

On a societal level, natural elements, such as trees, in semi-public spaces surrounding urban housing promote increased use by, and interaction among, residents; encourage bonding among neighbours (Kuo & Sullivan, 2001); provide a greater sense of safety,

and reduce urban ills such as crime and violence (Kuo, Bacaicoa, & Sullivan, 1998; Kuo & Sullivan, 2001). However, these societal benefits are largely reliant on people meeting in these openly accessible spaces. This is less likely to occur in private and allotment gardens, which means the societal benefits are less easily transferable to private and allotment gardens than personal benefits.

Concerning environmental effects, private and allotment gardens contribute similar benefits to those provided by public and semi-public urban green spaces, including climate change mitigation; habitat provision and reduced fragmentation; reducing effects from air pollution; improving soil health; and maintaining a functional hydrologic cycle (Niemelä et al., 2010). Andersson, Barthel, and Ahrné (2007) showed that urban gardens are particularly biodiverse compared to other urban green spaces. In addition to direct environmental impacts, indirect impacts of management practices are also significant by affecting perceptions, attitudes and behaviours of people (McClintock, 2010; Blair, 2009). There are, however, trade-offs between these benefits (Bendt, Barthel, & Colding, 2013; McClintock, 2010), as gardening carries risks such as introducing new, potentially invasive plant species (Cameron et al., 2012), which may hybridize with local species and become more resilient (Milne & Abbott, 2000). The degree to which a garden might contribute to the local ecosystem is related to the physical structure of the garden (Barthel et al. 2010), but whether environmental impacts are positive or negative is largely dependent on how the gardens are managed.

Motivations for management for ecological gardening practices

Urban gardens can be managed in a variety of ways, and different management practices cause great variation in the potential food output of urban gardens and directly affect gardens' impact on the environment (McClintock, Cooper, & Khandeshi, 2013).

Motivations for ecological gardening practices are a special case in the literature, since these practices can make a difference in densely populated urban areas and factors that are not directly related to gardens may play a role in influencing gardening behaviour. Although Goddard, Dougil, & Benton (2013) observed that demographics and local landscape composition have an influence on wildlife-friendly gardening behaviours, Kiesling and Manning (2010) found that ability to influence attitudes and behaviours towards ecological gardening practices succeeded equally across a range of demographics, which suggests that variation in behaviour might be individual.

Gardener identity was associated with engagement in ecological gardening practices (Kiesling & Manning, 2010; Larson, Cook, Strawhacker, & Hall, 2010), but this was disputed by Goddard et al. (2013). Kettle (2014) identified a typology of gardener identities in Irish allotment gardens, which she named the 'Practical Gardener'; the 'Idealist/Eco-Warrior'; the 'Socio-Organic Gardener'; the 'Gucci Gardener'; and the 'Non-Gardening Gardener', and identified different gardening practices and structural differences associated with each identity, with idealist/eco-warriors and socio-organic gardeners being more favourable to adopting ecological gardening practices.

Another recurring topic in literature on the topic of gardener motivations is gardening to meet neighbourhood expectations (Nassauer, Wang, & Dayrell, 2009). In a UK study, the majority of interviewees 'believed that they have a duty to maintain neighbourhood standards through their gardening' (Goddard et al., 2013, p. 264), and felt their neighbours would disapprove of certain choices. Pressure to meet local standards can lead to environmentally undesirable behaviours, such as watering lawns in summer (Larson et al., 2010), but social norms were also found to be important motivations for ecological behaviours in allotment gardens (Andersson et al., 2007). Kiesling and

Manning (2010) suggest that neighbourhood norms are a promising vehicle for the diffusion of beneficial environmental practices and may complement dissemination of knowledge of ecological gardening practices.

Although gardeners rely on knowledge sources such as: 'science-based knowledge […] books and web pages of botanical gardens' (Andersson et al., 2007: 1272) and 'garden magazines; garden-books; internet; TV-shows […] garden trade fairs; garden courses' (Barthel et al., 2010: 259), the social surroundings of gardeners also play a role in the dissemination of knowledge. Advice given by friends, neighbours, and family can be a particularly important factor in choice of practices (Goddard et al., 2013; Andersson et al., 2007; Barthel et al., 2010). Social-ecological memory is also considered to influence management decisions, and is itself affected by participation (habitats/rituals and oral communication), reification (rules-in-use and physical forms/artefacts), and external sources (Barthel et al., 2010). In allotment gardens, interactions between gardeners can facilitate knowledge transfer (Andersson et al., 2007), but the practices passed along are not necessarily the best for sustaining ecosystem services.

Niwa (2009) states that gardened spaces have variable benefits for landscape services, biodiversity, and management of water, and that these impacts may not be the product of conscious management decisions: 'gardeners often seem ignorant of the ecological significance of some of their practices' (Barthel, Folke, & Colding, 2010: 263). Taylor and Lovell (2015) reported that vulnerable populations may be exposed to health and environmental hazards, such as those caused by, sometimes indiscriminately, using synthetic chemical fertilizers and pesticides due to a lack of knowledge of safe gardening practices. Certain maladaptive practices are characterized by Holling and Meffe (1996: 330) as the 'pathology of natural resource management'. An increasingly

popular means of involvement in gardening for those who might not have the requisite knowledge is to engage in a community garden.

Motivations for participation in community garden projects

McClintock and Simpson (2014) surveyed representatives of groups involved with urban agriculture projects in the US and Canada and found that the most common of the diverse motivations for engaging in community gardens are community building, concerns about food quality, environmental concerns, and interests in sustainability. Pourias et al. (2016) included sub-samples of community and allotment gardeners in their survey that aimed to identify motivations for gardening and found that the dominant motivation for participation was "the food function", which refers to the quality of garden produce and "the quantitative and economic contribution that the gardens represented" (Pourias et al., 2016 p.259). However, they also identified seven additional functions, which they named: social, leisure, contact with nature, health, emancipation from urban life, learn and teach, and impact on city (Pourias et al., 2016). Curiously, the social function was mentioned more frequently by allotment gardeners, who manage their gardens autonomously, than by community gardeners, for whom the social aspect could have been expected to play a central role (McClintock & Simpson, 2014). Duchemin et al. (2008), in their study of community gardens in poor areas that had the specific goal of reducing food security, similarly identified food security, socialization, and education as motivations for participation in the community garden projects. Drake and Lawson (2015) studied best practices in community garden management, including some projects in which some individual gardeners managed parts of the gardens, to address participation, water access, and outreach, and found that the social dynamics of community gardens are not just focused on maximizing yields, but often include environmental and community well-being. However, community

gardeners must also reach consensus on how to maintain the overall site, which raises questions as to whether these results would be transferrable to autonomously managed allotment gardens or private garden. Similarly McClintock and Simpson's (2014) choice to survey representatives of community gardens, rather than participants, raises doubts as to whether these findings could be applied to motivations for individual gardeners to adopt specific practices in gardens for which they are the sole decision-makers.

Motivations for gardening in private or allotment gardens

Clayton (2007: 222) places motivations for gardening in private gardens into two categories, 'one involving social benefits and functions and one involving benefits intrinsic to nature'. Ruggeri et al. (2016) found that motivations for gardening could be assigned to two types or gardeners: one with a marked preference for gardening as a means for physical and psychological well-being and learning new skills, with the other being primarily motivated by yield. Increased healthiness of self-grown food and socializing motivations were not regarded as relevant (Ruggeri et al., 2016).

Other motivations reported in the literature include whether the gardener has a rural heritage/background: Frauenfelder, Delay and Scalambrin (2011:19) report that 'beyond differences in nationality or professional status (employees vs. labourers), gardeners are unified by their rural family origins'. However, this was not found in newer gardeners by Slavuj Borcic, Cvitanovic, and Lukic (2016), so is probably context specific.

Similarly to motivations for participation in community gardening, food security has also been found to be a motivation for autonomous gardening, particularly among low-income gardeners (see Martinho da Silva, Oliveira Fernandes, Castiglione, & Costa, 2016; Partalidou & Anthopoulou, 2016). Corcoran and Kettle (2015) point out that urban agriculture has grown in popularity as a response to conditions of crisis and

austerity. On the other hand, Haller, Crole-Rees, & Dumondel (2013) assert that 'in Western Europe, poverty generally does not seem to be a driving force for urban gardening. Informal food production has been found to be a recreational activity' (p. 205). For higher-income gardeners, motivations tend to be broader and include food quality and environmental concerns: 'to be self-sufficient, to live in an environmentally sustainable way, and to have fresh, nutritious produce were all more important concerns for [food-producing] respondents with higher levels of education and income' (McClintock, Mahmoudi, Simpson, & Santos, 2016:10; see also Martinho da Silva et al., 2016; Scheromm, 2015).

The economic situation of Switzerland, which had the second highest net income of the EU and surrounding countries (Eurostat, 2017), suggests food production is more likely to be recreational rather than economically-driven. On the other hand, Frauenfelder et al. (2011) point out that allotment gardens in Switzerland are especially popular among lower class segments of the population. McClintock and Simpson (2014), in their study of urban agriculture projects, found that groups face many similar challenges in terms of funding, labour, and access to space, but certain barriers and needs are greater in some cities than in others. However, private and allotment gardens are self-funded, and labour is usually supplied solely by the gardener, so access to space appears to be the only of these challenges that might be applicable to private and allotment gardeners.

Despite the wealth of research into motivations for participation in community gardens, and for food gardens in the global South, the differences in context mean that it is not tenable to draw conclusions from this research to answer the research questions for this study. It appears therefore that primary research is needed. With variability due to

context in mind, this study focuses on two types of gardens: allotment and private gardens in a single city: Lausanne.

Methodology

Study area: Gardens in Lausanne

The city of Lausanne is located in French-speaking Switzerland, with a permanent resident population of 133,521 in the city and 354,204 in the agglomeration in 2014 (Statistique Vaud, 2014, T99.01.02). The average monthly income in the city of Lausanne is CHF 4849, which is below the average in Switzerland CHF 6957, although higher incomes are found in surrounding agglomeration, such as Belmont sur Lausanne, which has an average monthly household income of CHF 7929 (Newsnet, 2018). Within the city of Lausanne, 44% of the municipal area is public green space (including the *zones foraines*), and 14% of the total municipal area (24% of the intra-urban area, excluding *zones foraines*) is private green space, including private gardens and semi-public green spaces such as the surroundings of apartment buildings and institutions (Lausanne, 2012). Private gardens, which are privately owned and managed, are mostly, but not exclusively, situated next to the owner's house. There are two principal forms of allotment-type gardens – family gardens and *plantage/potager* gardens. Plantage gardens and potager gardens are essentially identical, with the only difference being that they are managed by different city departments (Roud, 2013). Plantage gardens are managed by the *Service de parcs et domaines*, while potager gardens are managed by the *Service du logement et des gérances*.

[Table 1 around here]

The family gardens, as shown in Table 1, have larger plots, and are older, but exist on fewer sites. The family gardens are leased to members of the Lausanne Family Garden

Association, which is a member of the umbrella Swiss Family Garden Association (SFGA). The SFGA sets rules and statutes that the gardeners must follow (Lausanne 2017), and which act as a substitute for a charter of gardening practices for family gardens. Plantage/potager gardens are leased directly to individuals by the city under the condition that the lessees must live within a five-minute walk of their plot. In Lausanne, all plantage/potager gardeners must sign a charter when becoming a member, agreeing to not use synthetic chemical products, to prepare soil according to organic gardening concepts, to encourage the growth of plants in suitable conditions, and to use environmentally-friendly products (Lausanne, 2016). In addition to the aforementioned garden types, there are some community gardens such as university gardens, school gardens, and the gardens of non-profit organizations (Crole-Rees et al., 2015).

Purchasing a home with private garden in Switzerland requires a considerable amount of financial resources, and thus these gardens are generally only available to relatively wealthy gardeners. The allotment-type gardens, on the other hand, are relatively inexpensive to access (the plantage/potager gardens even more so than family gardens) and therefore open to all classes of society. These allotment-type gardens have, however, evolved from being sites of food production for the working class, and have taken on a leisure aspect.

The city considers the plantage/potager type gardens as ‘a solution for the future’, due to their small size, which allows a wide variety of people to participate, while they can be ‘installed in the interstices of the city and, if necessary, to vanish in case of new constructions’ (Conseil Communal de Lausanne, 2011, pp. 6). This trend is reflected in Geneva, where the family gardens are also large (170-400m^2), and ‘the current state policy is thus to create community gardens at the foot of apartment buildings so that

people can enjoy where they live' (Ernwein, 2014, pp. 81). Lausanne may be considered ahead of the Swiss trend, as the city has both fewer family gardens than other Swiss cities, and introduced plantage gardens earlier.

To use the terminology of Johnson and Glover (2013), although the gardens seem to be 'outwardly public', actual participation in the act of gardening renders them rather a 'club space' in which the ownership may be public but it is easy to deny access. Nevertheless, for those who are members, the close proximity of these gardens to each other means that there is a high degree of contact with neighbours, and a high level of awareness of what the neighbours do in their gardens.

Methods

We conducted Interviews, based on a qualitative semi-structured questionnaire, with individual gardeners (persons responsible for making management decisions) or in certain cases a couple or small family. We additionally interviewed two plantage and two university gardeners to explore the motivations and influences of gardeners in these newer types of gardens. The interviews were carried out in February-March 2016.

We asked participants about their motivations for gardening, why they chose a particular method of gardening, and their perceptions about other gardeners. The questions were mainly open-ended and follow-up questions were asked as appropriate. We conducted the interviews with the informed consent of the participants, and the results have been anonymised to ensure their privacy in accordance with the 2008 WMA Declaration of Helsinki: Ethical principles for medical research involving human subjects. Interviews were recorded (with permission of the participant to record and reproduce the quotations, which appear only with pseudonyms) to allow content to be qualitatively analysed using MAXQDA.

The sample was selected through non-probability sampling (as the total population of gardeners was unknown), specifically convenience sampling and snowball sampling. In practice, the initial private gardeners were found through personal contacts and going door-to-door in Lausanne, and the remaining private gardeners were contacted at the recommendation of other participants. Some family gardeners were also found through participating private gardeners. Other family gardeners were contacted directly at their plots, as were the two plantage gardeners, and still more were contacted through the organizations managing the respective gardens (i.e., family garden associations). Rather than attempting to gather a representative sample, we interviewed gardeners holding a wide range of perspectives (purposive sampling) to enable exploration of the spectrum of behaviour and influences. We conducted 23 interviews with the aim of achieving data saturation in the interview responses, which were confirmed by a focus group with seven additional family gardeners. The final sample consisted of managers of 10 family gardens, nine private gardens, two plantage gardens, and two university gardens. We conducted the interviews in person with participants in the communes of Lausanne, Prilly, Renens, Eclubens, and Servion, in the gardens, in participants' homes, or in cafes. We conducted 17 interviews with individuals, three with couples, and one with a family (2 parents and adult son). The interviews lasted between 32 and 75 minutes.

We considered this sample size to be sufficient to respond to the research questions because, as stated by Mason (2010, p. 2) 'one occurrence of a piece of data, or a code, is all that is necessary to ensure that it becomes part of the analysis framework. Frequencies are rarely important in qualitative research, as one occurrence of the data is potentially as useful as many in understanding the process behind a topic'. The results presented are not intended to be representative of the frequency of topics but rather to show the spectrum of opinions and positions raised by interview participants.

Results and discussion

Gardener demographics

The gardens of the participants were mostly (78%) both ornamental (meaning that plants were grown that could not be eaten) and productive (meaning that plants were grown for food); three gardens were ornamental only and two productive only. Fifteen of the 20 productive gardens produced both fruit and vegetables; five produced only vegetables. The reported time spent each week gardening varied from one to ten hours. Two of the gardeners had hired help; the others managed the garden by themselves or with help from household members. As reported by the 20 productive gardeners, the most commonly-produced foods were lettuces and tomatoes (15 each), followed by carrots, raspberries, and beans (10 each).

The average time, across all 20 participants, that they had had their garden was almost 11 years, but considering the types of gardens separately shows high variation: allotment gardeners averaged 3.5 years while private gardeners averaged 25 years.

There were 28 participants in the 23 interviews, of whom 15 are male and 13 are female: shares that roughly correspond to those of a 2014 (non-random) survey of allotment gardeners in Lausanne (~60% of the 201 respondents were male, Jahrl and Home, 2014), but more balanced than the gender ratio of gardeners observed by Frauenfelder et al. (2011) in Geneva, which was heavily male.

Ages were given by 22 respondents, who reported a mean of 60 years, ranging from 21 to 86. The average reported household size (for 21 respondents, excluding university gardeners) was 2.3, with a range from one to four household members. Households in which children under age 18 living in the household reported formed 20% of the

sample. The private gardeners (avg. age 68.44) were older than the allotment gardeners (excluding university gardeners) (avg. age 56.92). The allotment gardeners (excluding university gardeners) also had an average larger household size (2.5) compared to average household size of private gardeners (2.0). The average ages and household sizes suggest the allotment gardeners were more likely to be parents living with children.

The majority of the participants identified themselves as Swiss (70%); there were also participants from eight other countries (2 from United Kingdom; 1 each from France, Germany, Guatemala, Poland, Portugal, Serbia, and Turkey). This is roughly representative of Lausanne's population, of which the permanent foreign resident population was 35.9% in 2014 (Swiss Statistics 2015).

Concerning incomes, 15 participants responded (of the 21 who were asked; the university gardeners were excluded since they use association budgets) and the results reveal generally high incomes, with 67% of reported monthly incomes higher than 7500 CHF, which is considerably above the Lausanne average of 4849 CHF. This finding challenges Frauenfelder et al.'s (2011) claim that allotment gardens in Switzerland are the domain of lower class segments of the population, although the finding might be an artefact of the sampling. Almost half of those that reported their occupation were retirees. The others were occupied in the private and public sectors (17%, 13% respectively) or self-employed (9%). The remaining 13% reported that they do not work.

We also asked the participants whether parents or other family members had a garden while they were growing up, and if so, whether they spent much time there. Most (60%) responded that there was a garden and they were somehow involved in its management or spent a lot of time in it ('active' exposure), while 22% said no family members had a

garden, and the rest experienced 'passive' exposure (there was a garden but they were not involved in management/upkeep, or spent little to no time there).

Motivations for gardening

As expected for a voluntary pastime, the overall feeling towards gardening was positive, as demonstrated by some gardeners stating that everything about gardening was important to them. Three major themes emerged as motivations for gardening: wellbeing, social aspects of gardening, and outputs (both tangible and intangible).

Wellbeing

Wellbeing refers to reasons people gave for gardening, or enjoying their garden that were related to how gardening made them feel, mentally and/or physically. These responses fell into two categories – one related to the interaction with nature provided by gardening and one related to the act of gardening. Beyond the actual act of gardening, many gardeners discussed a sense of enjoyment that came from interaction with nature. People reported that they enjoy simply being in the garden, engaged in non-gardening activities: 'I can just stand around just looking, just looking at things you know?' (Private Gardener 4).

The fact that gardening involves manual work differentiates it from other work or hobby activities that participants may be involved in, especially in a country with high rates of sedentarism (57% in men and 70% in women in Geneva in 1997-99) (Bernstein, Costanza, & Morabia, 2001). The act of gardening was therefore unsurprisingly cited as a reason to enjoy gardening. Gardeners reported that they enjoyed the 'tactile' and 'practical' aspects of gardening. One compared it to doing sport, while another said that 'it allows you to exert yourself' (Private Gardener 7). Some specifically mentioned that

they enjoy it because it is different from their normal activities, even older respondents. University Gardener 2 said 'the garden is […] a space where they can do what they want and be able to express themselves creatively with their hands', indicating a connection between physical activity and mental wellbeing. Gardening was also described as a 'therapy', and like a vacation. A few gardeners described gardening as giving them a purpose, or just a place to go: 'I think that for my husband it's very very good as well, because it gives him an activity' (Family Gardener 6). This was especially highlighted as a positive aspect among retirees.

Many gardeners had responses related to wellbeing, both about participating in the physical act of gardening and about spending time in the natural environment of the garden. This supports the ideas presented in the literature that exercise resulting from contact with nature can boost mood (Pretty et al., 2007), as well as that visual contact with nature is important for wellbeing (Conedera et al., 2015; Ulrich, 1984). Both the site and the action are therefore important in this type of leisure, consistent with the findings of Cosgriff et al. (2009, p. 28), who described 'an integrated experience of doing *and* being in nature', which evolved over time.

Social aspects

Gardeners described enjoying the social aspects of gardening, including community among gardeners (particularly in family gardens), the ability to use the space for socializing with friends and family, and the fact that gardening represents continuity in family tradition. Some mentioned the aspect of community (chatting with neighbours, exchanging seedlings or giving each other advice) between gardeners when discussing what they enjoyed about gardening gardeners mentioned the aspect of community between gardeners when discussing what they enjoyed about gardening. This was not

necessarily an expectation when joining the garden: 'I was very surprised. Yes, I was surprised that…well, that it is so nice' (Family Gardener 6). However, one gardener did describe problems that can occur: 'people…they develop a kind of…of protectionism' (Family Gardener 8). Another noted that there can be problems with the rules not being well followed. Some family gardeners also described the space as somewhere to enjoy socializing with friends and family. Finally, several gardeners, some of whom came from agricultural families, mentioned that they chose to have a garden because it was something their family had done. Some mentioned having their own space in the garden as a child to manage themselves. Only one of these gardeners was cultivating the same land as his family had before him.

Surprisingly, the community aspect of shared gardens was something that participants had not seemed to anticipate when signing up for a garden, but was valued once discovered. This finding is consistent with the results of Van der Pas & Koopman-Boyden (2009), who stated that social environment is as relevant to wellbeing as the activity itself. This suggests that although people might begin gardening for one reason, their motivations can evolve, even away from specific goals towards enjoying the 'being' and atmosphere, including the community aspects, of the garden. In Switzerland, allotment gardens seem to be still mainly conceptualized as an individual or small-group activity, until participants begin gardening. This may be due to the originally designed role of gardens as vehicles to provide the working class with a healthy occupation and sites of food production (Frauenfelder et al., 2011). Highlighting the possibilities for community engagement might then be a way to encourage family or plantage gardening. The plantage gardens, with their 5-minute access rule, could also help encourage interactions among gardeners who are also neighbours, and thus strengthen community ties.

Some gardeners were motivated to have a garden by family tradition, yet only one of the gardeners was cultivating the same site as his family, suggesting, as observed by Frauenfelder et al. (2011), an emphasis on the continuation of the practice rather than location. This may be because home gardeners have tended to move away from their family home, where their parents often still lived, and allotment gardens have always been viewed as temporary, rather than sites to be inherited. For such gardeners, encouraging new practices may be more difficult since there could be emotional attachment to continuing to garden in a certain way. Some gardeners had not grown up with a garden, and as urban gardens continue to be promoted, this segment may be expected to grow, particularly in light of the policy in Lausanne of making smaller parcels available, to be more accessible to inexperienced gardeners. Our results thus support the findings of Slavuj Borcic et al. (2016) that continuation of tradition is not necessarily a prerequisite to interest in this leisure practice, although we did find this can be a motivation for some gardeners.

Outputs

Gardeners cited certain outputs as motivations to maintain a garden. The primary interest was food, but learning opportunities were also mentioned (e.g. 'what's good is getting to know the plants a bit […] the seeds' (Plantage Gardener 2)). The interests of food-motivated gardeners can be loosely classed in three categories: fresh/better tasting food, safer food, and self-produced food. Some people mentioned that they like having fresh food, implying that the taste is better. Several gardeners stated that they like knowing their food was not treated with any synthetic chemical products and they know exactly what went into it ('traceability'). This was also mentioned as a way of ensuring

children receive safe food. Aside from the aspect of food safety and its taste or freshness, many gardeners reported satisfaction from having food that they had produced themselves: 'its's wonderful to be able to have your own food that you've grown yourself. I think there's something almost miraculous […] it makes you realize what food is, and where it comes from' (Family Gardener 10).

Many gardeners cited growing food as a reason to enjoy gardening. The context of the statements and high household incomes (7,501-10,000 CHF/month, slightly higher than the 2016 average household income of 6957 CHF/month in Switzerland (Newsnet, 2018)), support the idea of Haller et al. (2013) that food gardening in the Swiss context is for leisure, rather than economically-motivated. This result is in contrast to the findings of Corcoran and Kettle (2015), who found that urban agriculture can be motivated by crisis and austerity. This disagreement suggests that the motivation of necessity is context dependent, with members of communities in crisis motivated by food security, while members of wealthier communities may perform the same activity for pleasure.

Gardeners are also motivated by environmental awareness and desire to separate themselves from industrial agriculture, supporting the findings of McClintock et al. (2016), Martinho da Silva et al. (2016), and Scheromm (2015). This rise in environmental and food quality awareness might be responsible for new gardeners becoming interested in the practice even when their family was not involved. Kettle (2014, p. 43) for example, identified a group she called the 'idealist/eco-warrior' gardener type who are motivated by 'wider concerns for the environment and ecological sustainability'.

Motivations for choosing particular gardening practices

The motivations gardeners expressed for choosing a certain method of gardening have been categorized into extrinsic influences and intrinsic influences. These codes were generated based on what participants said influenced their own gardening, as well as ideas they had about what influenced the garden management of others.

Extrinsic influences

Many gardeners mentioned that they like to observe other gardens and get ideas from them. This was to varying extents – for instance when asked if he mostly looks at plots in the family garden or elsewhere, one Swiss family gardener replied 'I don't go elsewhere, no no no. I'm not a "garden-phile", to that point' (Family Gardener 5). Another, private ornamental gardener, responded 'I go on gardening trips with other fervent gardeners and we sort of look at special gardens' (Private Gardener 6). Participants cited various types of media as sources of knowledge and inspiration. These included films, books, internet, magazines, radio, and journals. Gardeners most often cited three types of people as influences: friends, family, and neighbours. Neighbours were mentioned the most often, sometimes passively (i.e. observation), but some gardeners described actively seeking out the advice of others. Two gardeners mentioned organized learning, referring to gardening courses or conferences. A few gardeners mentioned in passing the idea of a 'Swiss' garden, mostly applied to other gardeners, or how a garden should be maintained in Switzerland: 'typical for a somewhat official project, there can't be things lying around and in a mess. Especially in Switzerland' (University Gardener 2).

Gardeners cited different practical constraints as influences on their gardening practices, although not all constraints were applicable to all gardeners. These were: cost, space,

availability (of plants/seeds), time, and physical capacity. The family garden rules caused some gardeners to select certain practices over others. For example, synthetic chemical pesticides and fertilizers were not allowed at some sites. However, this particular rule did not always change behaviour but rather reinforced what gardeners already did. Other rules relating to garden appearance were met with mixed feelings. Some people felt constrained by the rules and not able to garden in the way they would like to: 'Sometimes I would leave for a while, for example, some weeds before planting something, because like I said before, I think that helps prevent infestations, if you don't plant something it leaves the soil exposed, but I'm obliged to, before the controls, to spend a lot of time weeding or making the pathways pretty' (Family Gardener 4). The rules seemed to be enforced to different degrees at different sites.

These results indicate that, although observation and discussion with neighbours influences gardening, gardeners did not feel obliged to maintain a certain 'standard' of garden for the sake of the neighbourhood. This contrasts with the prevailing literature that gardeners try to live up to neighbourhood standards (Goddard et al., 2013; Larson et al., 2010). However, it should be considered that there is a performative aspect to urban gardening, in which 'adherence to a […] set of values' is shown through gardening practices (McClintock et al., 2016). However, gaining status through adhering to a certain gardening style can be carried out in different ways depending on the underlying values. As stated above, food quality and environmentalism seem to be rising values motivating gardening. Therefore, the gardeners who preferred a 'messier' appearance for environmental reasons may also be displaying their adherence to values, but to a different set of values than those held by more traditional, neat gardeners.

Intrinsic influences

Participants mentioned their past experiences as being the source of their knowledge on gardening, some of it coming from childhood. Several participants grounded their justification for their gardening practice in moral terms, or principles. These gardeners touched upon current food systems, protecting nature, and future generations. For example: '…personally, I have an enormous respect for nature. So I could never do it another way, really. When I have neighbours who have magnificent vegetables, I envy them, but I know that to have that, they all put fertilizers' (Family Gardener 8). Other gardeners described wanting to impact the environment in a certain way, but were more focused on specific ecosystem services outcomes than general principles. These included cultivating plants 'which aren't edible or have a role in production, but which […] is there for protection against certain illnesses' (University Gardener 1), choosing flowers that repel insects, and trying to maximize biodiversity. Gardeners are influenced by their own, and their families', food preferences or tastes. Choices of gardening practices were also influenced by aesthetic preferences, particularly in ornamental gardens. These were expressed in terms of garden structure (e.g. lawn vs. rocks), which plants were cultivated, and choosing to use plant protection products to preserve flowers.

Conclusions

Although often small individually, Urban gardens have a cumulative effect on the environment, both directly and indirectly, as well as individual and broader social effects. The management of these gardens, and selection of certain gardening practices over others, influences the overall socio-ecological effects of the garden. Gardening is in general a popular leisure activity and in order to better understand the effects of that

activity, both on the gardeners and on the gardens, it is necessary to better understand the influences on gardeners. In this paper we aimed to gain an understanding of the motivations of urban gardeners in Lausanne, Switzerland, both for choosing gardening as a form of leisure and for choosing environmentally friendly gardening practices. This study expands upon the existing body of research by posing these questions in a different socio-ecological context. When interpreting these results however, it should be remembered that this study was qualitative, and findings that did not echo the findings of prior research may indicate phenomena that are context specific, but may also be due to the methodology. Further quantitative investigation into the characteristics and motivations of gardeners would overcome this limitation and provide future researchers with evidence to identify which results are truly generalizable.

Three major themes emerged as motivations for engaging in gardening: wellbeing, social aspects of gardening, and outputs (both tangible and intangible). These findings are in agreement with those of Pourias et al. (2016) who found that "the food function", although dominant, was accompanied by a range of motivations that can be seen as being related to social and physical wellbeing. Given that the study by Pourias et al. (2016) included both allotment gardeners and community gardeners, it appears that these motivations may be transferrable across contexts. On the other hand, the findings by Ruggeri et al. (2016) that increased healthiness of self-grown food and socializing motivations were not regarded as relevant suggests there might indeed be a contextual component in interpreting the food function, with food security playing a greater role for less affluent gardeners and food quality playing a greater role for wealthier gardeners such as those in Lausanne.

With regard to motivations for particular behaviours in gardens, this study identified motivations that could be classified as extrinsic: practical constraints, inspiration from neighbours, following regulations and social controls; and intrinsic, which were primarily based on knowledge and experience. Compared to other studies, notably those of McClintock and Simpson (2014) and Drake and Lawson (2015), the role of neighbourhood standards as a social control appeared to be quite low in the case of Lausanne. This difference may be attributed to cultural differences, but also may reflect differences in sampling. In any case further research would be required to fully explore the relationships between social controls and practices in autonomously managed allotment and private gardens.

In contrast to previous study, such as Goddard et al. (2013) and Taylor and Lovell (2015), lack of knowledge did not appear to be an important limiting factor for gardening practices. Furthermore, the sources of knowledge nominated by participants were very similar to those found in Stockholm, another wealthy city, by Andersson et al. (2007) and Barthel et al. (2010). The degree of knowledge, albeit self-reported, is in contrast to that found by Taylor and Lovell (2015), whose study was conducted in poor areas of Chicago, which suggests that knowledge, and consequent gardener safety and avoidance of environmental damage, may be dependent on the possession of social and material resources.

This does not however mean that knowledgeable gardeners will automatically be ecological gardeners. The results of this study support the conclusion that gardeners have '"got to want to know"' (Goddard et al., 2013, p. 265). Van Heezik, Dickinson, & Freeman's (2012) finding, that some gardeners will use more information when given it, appears to apply in Lausanne where, in general, gardeners are not hindered by a lack of

access to knowledge. In addition to knowledge, this study found evidence of the influence of tradition, feelings of responsibility for the environment, and aesthetic preferences when choosing gardening practices. That these influences were found in different strengths in different respondents suggests that gardener typologies, such as that of Kettle (2014) might also be relevant to Lausanne and would be a worthy topic of future research.

In summary, these findings contribute to answering part of the key research question proposed by Taylor and Lovell (2014: 294), as to how access to land, and to social and material resources influence gardening practices and the decision to garden. In doing so we provide some evidence of the tangible and beneficial outcomes that Allen and Cooper (2003) suggest are necessary. The results contribute to closing the research gap that Ruggeri et al. (2016) point out and furthermore provide additional support to urban decision makers with an interest in the management of urban green spaces.

References

Allen, L., & Cooper, N. (2003). Benefits based programming curriculum manual. Ashburn, VA: National Recreation and Park Association.

Andersson, E., Barthel, S., & Ahrné, K. (2007). Measuring social-ecological dynamics behind the generation of ecosystem services. *Ecological Applications, 17*, 1267-1278. doi: 10.1890/06-1116.1

Barthel, S., Folke, C., & Colding, J. (2010). Social-ecological memory in urban gardens – retaining the capacity for management of ecosystem services. *Global Environmental Change, 20*, 255-265. doi: 10.1016/j.gloenvcha.2010.01.001

Barthel, S., Colding, J., Elmqvist, T., & Folke, C. (2005). History and local management of a biodiversity-rich, urban cultural landscape. Ecology and Society, 10(2), 10. Retrieved from http://www.ecologyandsociety.org/vol10/iss2/art10

Bendt, P., Barthel, S., & Colding, J. (2013). Civic greening and environmental learning in public-access community gardens in Berlin. *Landscape and Urban Planning, 109*, 18-30. doi: 10.1016/j.landurbplan.2012.10.003

Bernstein, M.S., Costanza, M., & Morabia, A. (2001). Physical activity of urban adults: a general population survey in Geneva. *Sozial- und Präaventivmedizin, 46*, 49-59. doi: 10.1007/BF01318798

Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *Winter, 40*(2), 15-38. doi: 10.3200/JOEE.40.2.15-38

Cabral, I., Keim, J., Engelmann, R., Kraemer, R., Siebert, J., & Bonn, A. (2017). Ecosystem services of allotment and community gardens: A Leipzig, Germany case study. *Urban Forestry & Urban Greening, 23*, 44-53.

Cameron, R.W.F., Blanŭsa, T., Taylor, J.E., Salisbury, A., Halstead, A.J., Henricot, B., & Thompson, K. (2012). The domestic garden – its contribution to urban green infrastructure. *Urban Forestry & Urban Greening, 11*, 129-137. doi: 10.1016/j.ufug.2012.01.002

Cervinka, R., Schwab, M., Schönbauer, R., Hämmerle, I., Pirgie, L., & Sudkamp, J. (2016). My garden – my mate? Perceived restorativeness of private gardens and its predictors. *Urban Forestry & Urban Greening, 16*, 182-187.

Cheng, E., Stebbins, R., & Packer, J. (2016). Serious leisure among older gardeners in Australia. *Leisure Studies*, advance online publication, 1-14. doi: 10.1080/02614367.2016.1188137

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

CoDyre, M., Fraser, D.G., & Landman, K. (2015). How does your garden grow? An empirical evaluation of the costs and potential of urban gardening. *Urban Forestry & Urban Greening, 14*(1), 72-79.

Coley, R., Kuo, F., & Sullivan, W. (1997). Where does community grow? The social context created by nature in urban public housing. *Environment and Behaviour, 29*(4), 468-492.

Conedera, M., Del Biaggio, A., Seeland, K., Moretti, M., & Home, R. (2015). Residents' preferences and use of urban and peri-urban green spaces in a Swiss mountainous region of the Southern Alps. *Urban Forestry & Urban Greening, 14*, 139-147.

Conseil Communal de Lausanne. (2011). Politique de la Ville de Lausanne en matière de jardins familiaux et potagers: Plan directeur des jardins familiaux et potagers (Préavis n°2011/04). Retrieved from: http://webapps.lausanne.ch/apps/actualites/Next/serve.php?id=1963

Corcoran, M.P., & Kettle, P.C. (2015). Cultivating civil interfaces: moving beyond class distinctions and ethno-national divides on allotment sites in Dublin and Belfast. *Local Environment*, 20(10), 1215-1230.

Cosgriff, M., Little, D.E., & Wilson, E. (2009). The nature of nature: how New Zealand women in middle to later life experience nature-based leisure. *Leisure Sciences: An Interdisciplinary Journal, 32*(1), 15-32. Doi: 10.1080/01490400903430822

Crole-Rees, A., Heitkämper, K., Bertschinter, L., Haller, T., Dumondel, M., & Verzone, C. 2015. Urban agriculture: an opportunity for farmers? A Swiss case study. *Acta Horticulturae, 1099*, 951-958. Doi: 10.17660/ActaHortic.2015.1099.121

Drescher, A.W., Holmer, R.J., & Iaquinta, D.L. (2006). Urban homegardens and allotment gardens for sustainable livelihoods: management strategies and institutional environments. In B.M Kumar & P.K.R. Nair (Eds.), *Tropical homegardens: A time-tested example of sustainable agroforestry* (pp. 317-338). Netherlands: Springer.

Duchemin, E., F. Wegmuller, and A.M. Legault. 2008. Urban agriculture: multi-dimensional tools for social development in poor neighborghoods. Field Actions Science Reports. The Journal of Field Actions, 1. http://factsreports.revues.org/113. Accessed 5 April 2018.

Ernwein, M. (2014) Framing urban gardening and agriculture: On space, scale and the public. Geoforum, *56*, 77-86.

Eurostat. (2017). Ilc_di04: Mean and median income by household type – EU-SILC survey.

Federal Statistical Office. 2014. Household budget survey 2014. Retrieved from: https://www.bfs.admin.ch/bfs/en/home/statistics/economic-social-situation-population/income-consumption-wealth/household-budget.assetdetail.1401400.html

Frauenfelder, A., Delay, C., & Scalambrin, L. (2011). "Joindre l'utile à l'agréable": le jardin familial et la culture populaire. Retrieved from: http://www.swissinfo.ch/media/cms/files/swissinfo/2011/05/giardini-30273354.pdf.

Frick, J., Degenhardt, B., & Buchecker, M. (2007). Predicting local residents' use of nearby outdoor recreation areas through quality perceptions and recreational expectations. *Forest Snow Landscape Research, 81*(1/2), 31-41.

Friedt, B., Hill, E., Gomez, E., & Goldenberg, M. (2010). A benefits-based study of Appalachian Trail users: Validation and application of the benefits of hiking scale. PHEnex, 2(1). Retrieved from http://ojs.acadiau.ca/index.php/phenex/issue/view/122/showToc

Goddard, M.A., Dougil, A.J., & Benton, T.G. (2013). Why garden for wildlife? Social and ecological drivers, motivations and barriers for biodiversity management in residential landscapes. *Ecological Economics, 86*, 258-273. doi: 10.1016/j.ecolecon.2012.07.016

Haller, T., Crole-Rees, A., & Dumondel, M. (2013). Attitudes towards growing food in cities: the case of Lausanne, Switzerland. *Journal of Socio-Economics in Agriculture, 6*, 201-223. Retrieved from http://econpapers.repec.org/article/chaysa001/v_3a6_3ay_3a2013_3ai_3a1_3ap_3a201-223.htm

Holling, C.S., & Meffe, G.K. (1996). Command and control and the pathology of natural resource management. *Conservation Biology, 10*, 328-337. doi: 10.1046/j.1523-1739.1996.10020328.x

Home, R., Bauer, N. & Hunziker, M. (2012). Psychosocial outcomes as motivations for visiting nearby urban green spaces. *Leisure Sciences*, *34*(4), 350-365.

Hondagneu-Sotelo, P. 2010. Cultivating questions for a sociology of gardens. Journal of Contemporary Ethnography 39 (5):19p. doi:10.1177/0891241610376069.

Jahrl, I. & Home, R. (2014). Encouraging organic cultivation practices in Swiss allotment gardens. In: Rahmann, G. and Aksoy, U. (Eds.) *Building Organic*

Bridges, Johann Heinrich von Thünen-Institut, Braunschweig, Germany, 4, Thuenen Report, no. 20, pp. 1059-1062.

Johnson, A.J., & Glover, T.D. (2013). Understanding urban public space in a leisure context. *Leisure Sciences: An Interdisciplinary Journal, 35*(2), 190-197. doi: 10.1080/01490400.2013.761922

Keniger, L.E., Gaston, K.J., Irvine, K.N., & Fuller, R.A. (2013). What are the benefits of interacting with nature? *International Journal of Environmental Research and Public Health, 10*(3), 913-935. doi: 10.3390/ijerph10030913

Kiesling, F.M., & Manning, C. (2010). How green is your thumb? Environmental gardening identity and ecological gardening practices. *Journal of Environmental Psychology, 30*, 315-327. doi: 10.1016/j.jenvp.2010.02.004

Kettle, P. (2014). Motivations for investing in allotment gardening in Dublin: a sociological analysis. Irish Journal of Sociology, 22(2), 30-63.

Kingsley, J.Y., Townsend, M., & Henderson-Wilson, C. (2009). Cultivating health and wellbeing: members' perceptions of the health benefits of a Port Melbourne community garden. *Leisure Studies, 28*, 207-219. doi: 10.1080/02614360902769894

Kuo, F.E., Bacaicoa, M., & Sullivan, W.C. (1998). Transforming inner-city neighbourhoods: Trees, sense of safety, and preference. *Environment and Behaviour, 30*, 28-59.

Kuo, F. E., & Sullivan,W. C. (2001). Environment and crime in the inner city: Does vegetation reduce crime? *Environment and Behaviour, 33*(3), 343-367.

Larson, K.L., Cook, E., Strawhacker, C. & Hall, S.J. (2010). The influence of diverse values, ecological structure, and geographic context on residents' multifaceted

landscaping decisions. *Human Ecology, 38,* 747-761. doi: 10.1007/s10745-010-9359-6

Lausanne. 2012. Le patrimoine vert lausannois: caractéristiques. Retrieved from: http://www.lausanne.ch/thematiques/nature-parcs-et-domaines/politique-ecologique/preavis-nature-objectifs-et-bienfaits/extrasArea/autoGenerated1/links/01/linkBinary/Annexe%202,%20Caracter%C3%BCristiques%20du%20patrimoine%20vert%20lausannois.pdf

Lausanne. 2016. Charte des plantages [plantage charter]. URL: http://www.lausanne.ch/thematiques/nature-parcs-et-domaines/la-nature-et-vous/bonnes-pratiques-et-conseils-nature/jardins-potagers/plantages-lausannois/extrasArea/0/links/01/linkBinary/Charte%20des%20plantages%20A4.pdf

Lausanne. 2017. Les jardins familiaux. Retrieved from: http://www.lausanne.ch/thematiques/nature-parcs-et-domaines/la-nature-et-vous/bonnes-pratiques-et-conseils-nature/jardins-potagers/les-jardins-familiaux.html

Maas, J., Verheij, R. A., Groenewegen, P. P., deVries, S., & Spreeuwenberg, P. (2006). Green space, urbanity, and health: How strong is the relation? *Journal of Epidemiology & Community Health, 60*(7), 587-592.

Martinho da Silva, I., Oliveira Fernandes, C., Castiglione, B., & Costa, L. (2016). Characteristics and motivations of potential users of urban allotment gardens: the case of Vila Nova de Gaia municipal network of urban allotment gardens. *Urban Forestry & Urban Greening, 20,* 56-64.

Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung/Forum: Qualitative Social*

Research, 11(3). Retrieved from: http://www.qualitative-research.net/index.php/fqs/article/view/1428/3028

Maurer, U., Peschel, T., & Schmitz, S.. (2000). The flora of selected urban land-use types in Berlin and Potsdam with regard to nature conservation in cities. *Landscape and Urban Planning, 46*, 209-215. doi: 10.1016/S0169-2046(99)00066-3

McClintock, N. (2010). Why farm the city? Theorizing urban agriculture through a lens of metabolic rift. *Cambridge Journal of Regions, Economy and Society, 3*, 191-207. doi: 10.1093/cjres/rsq005

McClintock, N., Cooper, J., & Khandeshi, S. (2013). Assessing the potential contribution of vacant land to urban vegetable production and consumption in Oakland, California. *Landscape and Urban Planning, 111*, 46-58. doi: 10.1016/j.landurbplan.2012.12.009

McClintock, N. & Simpson, M. (2014) A Survey of Urban Agriculture Organizations and Businesses in the US and Canada: Preliminary Results. Portland State University, Toulan School of Urban Studies and Planning, Portland, OR. Available at www.urbanfood.org.

McClintock, N., Mahmoudi, D., Simpson, M., & Santos, J.P. (2016). Socio-spatial differentiation in the Sustainable City: A mixed-methods assessment of residential gardens in metropolitan Portland, Oregon, USA. *Landscape and Urban Planning, 148*, 1-16. doi: 10.1016/j.landurbplan.2015.12.008

Milne, R.I., and Abbott, R.J. (2000). Origin and evolution of invasive naturalized material of Rhododendron ponticum L. in the British Isles. *Molecular Ecology, 9*, 541-546. doi: 10.1046/j.1365-294x.2000.00906.x

Nassauer, J.I., Wang, Z., & Dayrell, E. (2009). What will the neighbours think? Cultural norms and ecological design. *Landscape and Urban Planning, 92,* 282-292. doi: 10.1016/j.landurbplan.2009.05.010

Newsnet (2018) Einkommen im schweizweiten Vergleich.(Switzerland income comparison) https://files.newsnetz.ch/extern/infografik/reineinkommen/. Site visited April 5, 2018.

Niemelä, J., Saarela, S., Söderman, T., Kopperoinen, L., Yli-Pelkonen, V., Väre, S., & Kotze, D.J. (2010). Using the ecosystem services approach for better planning and conservation of urban green spaces: a Finland case study. *Biodiversity Conservation, 19,* 3225-3243. doi: 10.1007/s10531-010-9888-8

Niwa, N. (2009). La nature en ville peut-elle être agricole ? De la Suisse au Japon. *Urbia: Les cahiers du développement urbain durable, 8,* 103-126.

Partalidou, M., & Anthopoulou, T. (2016). Urban allotment gardens during precarious times: from motives to lived experiences. *Sociologia Ruralis.* Advance online publication. doi: 10.1111/soru.12117

Parry, D.C., Glover, T.D., & Shinew, K.J. (2005). 'Mary, Mary quite contrary, how does your garden grow ?': examining gender roles and relations in community gardens. *Leisure Studies, 24*(2), 177-192. Doi : 10.1080/0261436052000308820

Pourias, J., Aubry, C. & Duchemin, E. (2016). Is food a motivation for urban gardeners? Multifunctionality and the relative importance of the food function in urban collective gardens of Paris and Montreal. *Agriculture and Human Values, 33(2),* 257–273.

Pretty, J., Peacock, J., & Hine, R. (2006). Green exercise: the benefits of activities in green places. *The Biologist, 53*(3), 143-148.

Pretty, J., Peacock, J., Hine, R., Sellens, M., South, N., & Griffin, M. (2007). Green exercise in the UK countryside: effects on health and psychological well-being, and implications for policy and planning. *Journal of Environmental Planning and Management, 50*(2), 211-231.

Roud, G. 2013. "État des lieux et potentiel de l'agriculture urbaine en Suisse Analyse de deux projets d'agriculture urbaine sous l'angle des régimes institutionnels des ressources naturelles." thesis, Cahier de l'IDHEAP, Chavannes-Lausanne.

Ruggeri, G., Mazzocchi, C. & Corsi, S. (2016) Urban Gardeners' Motivations in a Metropolitan City: The Case of Milan. *Sustainability*, 8(12), 1099-1118.

Sanchez, E.L., & Liamputtong, P. (2016). Community gardening and health-related benefits for a rural Victorian town. *Leisure Studies*. Advance online publication. Doi: 10.1080/02614367.2016.1250805

Scheromm, P. (2015). Motivations and practices of gardeners in urban collective gardens: The case of Montpellier. *Urban Forestry & Urban Greening, 14,* 735-742.

Slavuj Borcic L., Cvitanovic M. & Lukic A. (2016). Cultivating alternative spaces – Zagreb's community gardens in transition: From socialist to post-socialist perspective. *Geoforum, 77,* 51-60.

Statistique Vaud. (2014). Table T99.01.02: Population résidante permanente, 2010-2014. Retrieved from www.scris.vd.ch/Data_Dir/ElementsDir/3820/15/F/i99.01.02.xls

Swiss Statistics. 2015. Agglomeration portraits – Lausanne. Retrieved from: http://www.bfs.admin.ch/bfs/portal/en/index/international/03/04/agglomerationen/5586/key.html.

Takano, T., Nakamura, K., & Watanabe, M. (2002). Urban residential environments and senior

citizens' longevity in mega-city areas: The importance of walkable green space. *Journal of Epidemiology and Community Health, 56*(12), 913–916.

Taylor, J. & Lovell, S. (2014). Urban Home Food Gardens in the Global North: Research Traditions and Future Directions. *Agriculture and Human Values. 31(2)* pp 285–305

Ulrich, R.S. (1984). View through a window may influence recovery from surgery. *Science, 224*(2), 420-423.

United Nations, Department of Economic and Social Affairs, Population Division. (2014). *World Urbanization Prospects: The 2014 Revision, Highlights* (ST/ESA/SER.A/352). New York: United Nations.

Van der Pas, S., & Koopman-Boyden, P. (2009). Leisure and recreation activities and wellbeing among older New Zealanders. In P. Koopman-Boyden & C. Waldegrave (Eds.), *Enhancing wellbeing in an ageing society (EWAS) monograph no. 1*, (pp. 117-132). Hamilton, New Zealand: The Population Studies Centre.

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*, 34. doi: 10.5751/ES-04712-170134

Ward Thompson, C. (2002). Urban open space in the 21st century. *Landscape and Urban Planning 60*(2), 59-72.

Wilson, E. O. (1984). Biophilia. Cambridge, MA: Harvard University Press.

Yin, R. 2009. Case Study Research: Design and Methods. Fourth Edition. SAGE Publications. California, 2009.

Table 1. Overview of family gardens and plantage gardens (data source: Conseil Communal de Lausanne 2011).

	Family gardens	Plantage gardens
First site established	1917	1996
Plot size (m^2)	100-300	6-48
Equipped with cabins?	some	none
Sites (#)	10	20*
Plots (#)	550	323*
Area (ha)	11	2.5*

*this data is for plantage and potager gardens combined