Case Study

Allotment Gardens Contribute to Urban Ecosystem Service: Case Study Salzburg, Austria

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Abstract: Allotment gardens are an important feature in the urban landscape. They provide a range of ecosystem services (ES) and hence combine utility, social meaning, and beauty. Allotment gardens have been deeply embedded for almost two hundred years in European urban development. In many European countries, there is a great and rising interest in allotment gardening in traditional and new forms. Allotment gardens are often not well recognized as an important part of urban green in planning. Investigations into the ES they provide will help integrate them better in urban planning. This paper examines in which way urban allotment gardens contribute to ES in a case study in Salzburg, Austria. In this study, 156 allotment gardeners in four allotment associations were surveyed on the role allotment gardens play in recreation, food production, nature experience (learning and teaching about nature), ecological gardening, and environmental behavior. The results show the importance of allotment gardens in recreation and nature experience and the declining importance of traditional food production. There is an increasing interest in ecological gardening and a general environmental awareness among allotment gardeners. **DOI: 10.1061/(ASCE)UP.1943-5444.0000264.**

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Introduction

An *allotment garden* (U.K.), *community garden* (North America), *allotment plot*, or only *allotment* is a plot or parcel of urban or suburban land made available for individual, non-commercial gardening. A few or up to several hundreds of individually cultivated allotment plots used by individuals or families are part of an *allotment site*. The facilities on the allotment sites differ from each other but will often feature amenities, such as clubhouses, restroom facilities, fence enclosure, picnic areas or open barbeques, children's playgrounds, and other communal leisure facilities, all maintained by the allotment association members.

The individual size of an allotment plot generally ranges in Austria between 250 and 400 square meters, and the plots often include a shed for tools and shelter. The individual gardeners are usually organized in an *allotment association* for the allotment site. Individual allotment associations are often members of the National Allotment Association. The local allotment association for the allotment site leases the land from an owner who may be a public, private, or ecclesiastical entity, and who usually stipulates that it be only used for gardening (i.e., growing vegetables, fruits, and flowers), but not for residential purposes [this is usually also required by the federal Allotment Garden Law (Bundes-Kleingartengesetz)]. Gardeners have to pay a small membership fee to the association, which pays the rent to the landowner. The allotment holders have to abide by the corresponding rules and by the allotment garden law. However, the membership entitles them to certain democratic rights in decision-making on the allotment site. Gardeners are in this way free to shape and use their rented parcel and create an individualized natural space according to their own wishes by their own intentions and for their own use. These individually designed and used green spaces provide several general but individually site-specific ecosystem services, the most well-known being fruit and vegetable production and recreation. Allotments are no longer seen as a way to alleviate the distress of the urban poor. Allotment gardeners come from all parts of society; allotments have become an important part of the urban cultural landscape, and the urban green provides ecosystem services for the gardeners and the neighborhood (Crouch and Ward 1994).

Allotments hold a small but an important share of recreational areas. In Germany, about 11% of the recreational areas are allotment gardens, in Austria 4%. Allotments are an important feature in the urban landscape. In Halle (3.6%), Berlin (3.5%), and Leipzig (3.2%), allotment gardens comprise a relatively high proportion of the whole urban territory. In Dresden (2.3%) and Duisburg (1%), the share of allotments is less (Table 1). However, they combine utility, social meaning, beauty, and ecosystem services (ES). Allotment gardens are deeply embedded within the cultural landscape and have been a familiar feature for almost two hundred years in Britain (Crouch 2003). Allotments are underpinned by the long-term cultivation of nature. It is through everyday encounters with the environment that allotment gardeners can make sense of the intimate geographies in their lives (Crouch 1997).

The history of the allotment is one of conflict, contestation, and vulnerability, and subsequently such parts of the urban green have traditionally been marginalized (De Silvey 2003). Yet the desire to have a plot continues to remain significant as an increasingly intricate and dynamic element of contemporary urban life (Crouch 2003). In Britain, there are about 245,000 allotment gardens. Due to a renaissance in interest, there is a constant increase in demand for allotment gardens, and there are 100,000 people on waiting lists (Allotment Plots 2013; Crouch 1997). The prediction of the demise of the allotment movement was not realized (Crouch 1997). Traditionally, the vernacular participation in the urban green by the allotment gardens and its general cultural, social, and

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Table 1. Allotment Gardens in Germany and Austria (Data from Breuste 2010)

	Number of allotment gardens	Number of allotment garden estates	Total area in km^2
Germany	1,020,000	Not exactly known	466.40
Saxony	220,000	4,000	90.00
Austria	35,500	364	8.96
Berlin	76,165	950	31.37
Leipzig	33,650	213	9.63
Vienna	24,965	235	—
Dresden	23,668	366	7.67
Halle	12,000	160	4.79
Munich	8,592	82	—
Duisburg	6,289	105	2.30

ecological significance has been marginalized in a multiplicity of ways, located on marginal and redundant land, and existing at the margins of governmental discourse (De Silvey 2003). In research, too, the subject of allotments has suffered neglect (Buchardt 2002).

There have been six larger empirical surveys in Central Europe over the last 20 years focused on investigating utilization and behavioristic aspects of allotment gardeners in Central European cities. These were conducted in Salzburg (Austria) and the German cities Darmstadt, Halle/Saale, Berlin, Regensburg, and Osnabrück (Atzensberger 2005; Bargmann et al. 1989; Breuste and Breuste 1994; Farny and Kleinlosen 1986; Koller 1988; Weber and Neumann 1993). Between 269 (Salzburg, Austria) and 1,097 (Halle/Saale, Germany) individuals were surveyed regarding their behavior, activities, and motivations. Not all studies had the same objectives, used the same methods or the same questionnaires but several elements of these surveys are comparable. All are based on interviews and had been preceded by standardized questions in oral interviews and by distributed questionnaires. Research targets were mostly on utilization of the allotment plots and activities of the allotment gardeners. The Central European studies show:

- the reduction of fruit and vegetable production;
- the rise of recreational aspects in utilization of the plots;
- the change of plot structure from vegetation production to lawns and marginal flower beds;
- and the high intensity of recreational use by frequency and duration of stay on the plots.

Ecological aspects of behavior or ecosystem services were not investigated by the aforementioned studies. Only the study by Breuste et al. (1996) included soil pollution by heavy metals. Silveira and de Oliveira (2014) investigated the amount of permeable area necessary in allotments to improve soil infiltration such that the risk of flooding in Brazilian cities is reduced.

Ecosystem services (ES) are the benefits people obtain from ecosystems (MEA 2005). Since the first theoretically founded reflections on ES in the 1990s (Costanza et al. 1997; Daily et al. 1997; De Groot et al. 2002) or at least with the publication of the Millennium Ecosystem Assessment (MEA 2005) and the TEEB study (2011), it became clear that people strongly depend upon nature and its services (Breuste et al. 2012).

The ecosystem service concept has already been integrated into ecosystem services of cities and towns where the services for many inhabitants are essential and needed (Ahern 2007; Tratalos et al. 2007). Urban green areas and urban water areas are the main providers of urban ecosystem services (Bolund and Hunhammar 1999; Chiesura 2004; Kottmeier et al. 2007; Niemelä et al. 2010; Toy and Yilmaz 2010). Their services need to be evaluated quantitatively and included in urban design and planning.

Besides several studies on ecosystem services at the city level, there are only a few studies at the site or local level in urban areas and on selected urban green space types. Most of the studies are on public green and public open spaces (Breuste et al. 2013a, b; Niemelä et al. 2010; Qureshi et al. 2010).

The British Royal Horticulture Society (2013) lists eight reasons for allotment gardening in the U.K.:

1. "Get the freshest produce: the flavor and freshness of food straight from the plot is streets ahead of most supermarket produce.
2. Save money: A bag of salad costs as much as a packet of rocket seed, and sometimes a lot more! One packet of seed will give you dozens of bags-worth of tasty salads.
3. Get some exercise in your own 'green gym': Getting outside in the garden is a proven winner for health and stress relief. 'Allotments are the ultimate stress-buster'.
4. Avoid additives: If you care about what goes into and onto your food, growing your own organically is the best way of taking control. You can avoid chemical additives that are sometimes found in shop-bought food.
5. Get to know neighbors: Having an allotment is one of the best ways of getting to know people in your local area. 'Allotment communities are genuine communities, with people from all sorts of backgrounds and ages.'
6. Save food miles: Think of the carbon saved by growing your own; a smaller distance from 'plot to plate' also means tastier, fresher food.
7. Grow the food you enjoy. The number of varieties of fruit and veg available to home gardeners is huge compared to the number available in shops.
8. A great escape: Sometimes it's just great to get away from the house, and normal day-to-day chores! For many, allotments are a perfect stress-buster!"

The survey investigates in which way urban allotment gardens contribute to ecosystem services. It is known that especially this part of the privately used green spaces in Central European cities is intensively used (Atzensberger 2005; Bargmann et al. 1989; Breuste and Breuste 1994; Farny and Kleinlosen 1986; Koller 1988; Weber and Neumann 1993). Recreation and food production and nature experience (learning and teaching) were selected as examples of ecosystem services for the study because these are crucial services provided by allotments for urban dwellers. The ecological behavior and gardening of the allotment holders was further included in the survey to study how they can contribute to ecosystem service supply in cities.

Methodology

Study Area

Salzburg has about 147,000 inhabitants. More than half of the residences are in single-family and detached houses in which 51% of the population lives (Stadt Salzburg 1996). Salzburg has only marginal industry and was instead developed having primarily administrative and cultural functions. As a result, the city of Salzburg has much fewer allotment gardens than Linz or Vienna with a denser built-up residential area and an industrial history.

The first allotment site was founded in 1940 and is included in this survey ("Dauerkleingartenverein Thumegg"). In 1958, the State Allotment Gardeners Association (Landesverband der Kleingärtner Salzburg) was founded. Eight allotment sites in Salzburg belong to the association and also have distinct local allotment gardeners' sub-associations (Tables 2 and 3).

Table 2. Allotment Sites of the Salzburg Allotment Gardeners Association (Data from Breuste 2007)

Number	Allotment site	Founded	Land owner	Area (m^2)	Number of allotments
1	Thumegg	1940	City of Salzburg	27,177	68
2	Leopoldskron	1956	City of Salzburg	23,500	54
3	Kasern	1964	City of Salzburg	42,000	96
4	Taxham	1971	Chuch council Siezenheim and Federal Allotment Gardeners Association	10,964	35
5	Liefering-Herrenau	1982	Private	54,000	125
6	Kendlersiedlung	1988	Private	15,652	42
7	Pulvermacherweg	1991	Private	15,583	37
8	An der Glan	1998	Private	11,473	34
				200,349	491

Table 3. Total Number of the Salzburg Allotments (Data from Breuste 2007)

Organization of the allotment sites	Allotments	Area (m^2)
Salzburg Allotment Gardeners Association	491	200,349
Railway (ÖBB)	93	22,124
Separate allotment site "Robinighof"	64	18,254
Others	Not known	41,999
Salzburg total	648	282,726

In 2006, the 648 Salzburg allotment gardens covered an area of 28.3 ha. In comparison to the 6,567-ha total area of Salzburg, this is not very much. Since 1960, 48.2% (23.1 ha) of the allotment gardens have been lost mostly to residential development. This is an alarming reduction! In contrast, since 1988 the area of allotment gardens has only been reduced by 5.6 ha, and 243 allotments have been lost.

From the eight allotment sites of the Salzburg Allotment Gardeners Association four were selected for a survey (Table 4).

Questioning of Allotment Holders

To reach the target of the investigation, allotment gardeners were interviewed. This was the most suitable method to obtain findings about behavior and attitudes to qualify and quantify activities related to:

- recreation;
- food production;
- nature experience (learning and teaching about nature); and
- ecological gardening and environmental behavior.

A questionnaire was developed to address these specific research agendas. The questionnaire for the allotment gardens was divided into five sections: utilization of the allotments, ecologically relevant behavior, food production, nature experience and learning about nature, and environmental consciousness. All data remained anonymous.

With regard to the utilization of the allotments, the gardeners were asked questions about the size of their allotment and the motivations for choosing it (e.g., recreation and recovery, space for children to play, quiet, place for retreat, etc.). Other questions targeted information about duration of stay, activities undertaken, travel time to the allotment garden and mode of transportation. Still other questions sought comparisons to the use of other public green spaces in the city and the partitioning of the allotment (area used for cultivation of fruits/vegetables, lawn, terrace, etc.).

The allotment gardeners were also asked about their gardening skills and utilization strategies. They were asked about improvements and changes they had made in their gardens (construction of cabins, planting of trees and bushes), about the use of insecticides and pesticides, and about the use and consumption of their own fruits and vegetables.

The interview concluded with some socio-demographic data about the interviewee (age group, education, engagement, living situation).

All in all, 156 persons were interviewed in the four different allotment sites. The questionnaires were given to all the directors of the allotment associations, who distributed them to the gardeners. Sixty-five questionnaires were collected from the allotment site LH, 32 questionnaires from TH, 26 questionnaires from PW, and 33 questionnaires from LK (see Table 4). Interviews were conducted on the allotment sites from September to November 2012.

Table 4. Surveyed Allotment Sites (Author's Illustration)

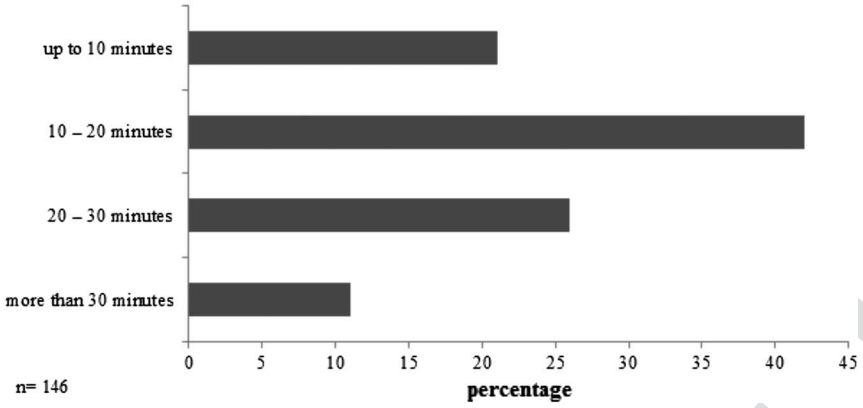
Allotment site	Number of allotments	Number of answered questionnaires	Year of foundation	Location
Liefering-Herrenau (LH)	125	65	1982	fringe
Thumegg (TH)	68	32	1940	inner city
Leopoldskron (LK)	54	33	1956	inner city
Pulvermacherweg (PW)	37	26	1991	fringe
Total number of allotment gardens/ answered questionnaires	284	156		

Results

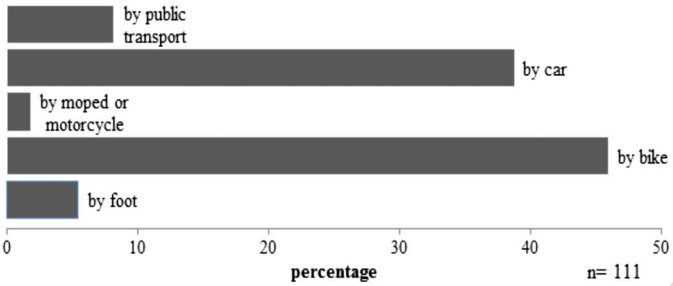
The Allotment Gardeners

Most of the questioned persons (60%–75%) are over 60 and retired, but they mostly started gardening shortly before retirement over the age of 50. About one-third of the allotment gardeners have rented their plot for over 30 years and another third for over 10 years. About 23% have been allotment gardeners for over 20 years. Only a minority of gardeners is under 40 (1.6% in LH). Allotment gardeners (association members) seem to be primarily in retirement or shortly before retirement, but other younger family members (children and grandchildren) are involved as non-members. Normally, an older couple or a single older person is responsible for the site, doing most of the management and spending most of the leisure time on the plot. The younger family members are frequent users and profit in a certain way from the provided ecosystem services.

The majority (more than two-thirds) of the questioned persons were male.



F1:1 **Fig. 1.** Time to reach the allotment site



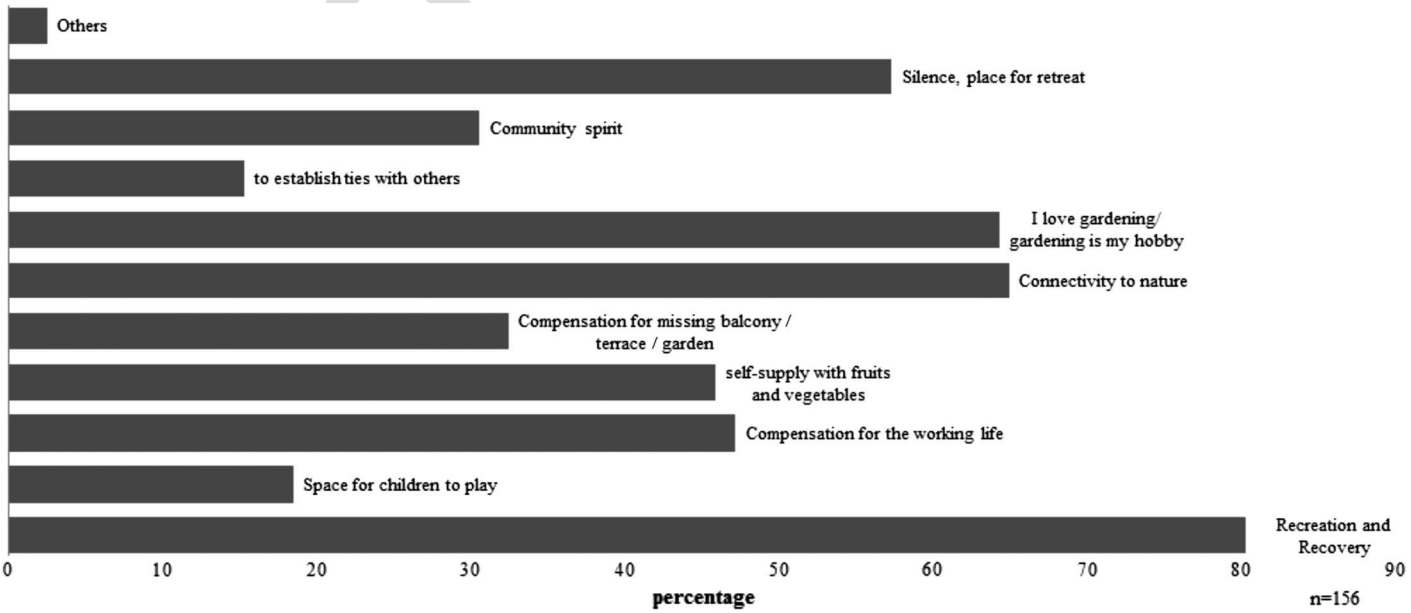
F2:1 **Fig. 2.** How to reach the allotment site

256 ### *Where the People Come From*

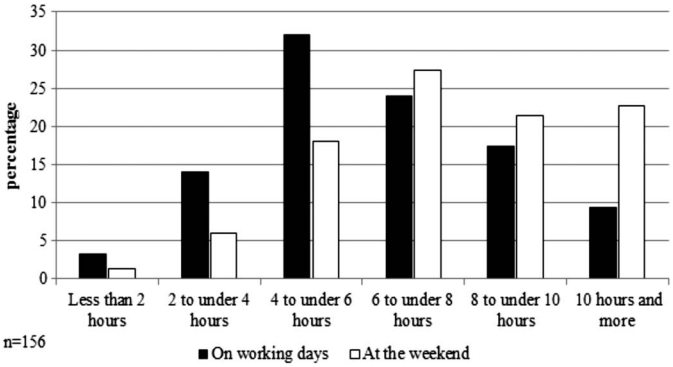
257 One-third to one-half of the gardeners are from the nearby urban
258 districts and can reach the garden by a short distance from their
259 residence (Fig. 1). However, this number also shows that about
260 50% or more are not residents of the nearby neighborhoods.
261 Originally embedded allotment sites in a residential neighborhood
262 are declining in favor of recreational sites for people from the whole
263 city or even the surrounding areas. The growing distances can be
264 compensated for by readily available and faster means of transport
265 as compared to the past (private cars) (Fig. 2).

266 ### *Reasons for Allotment Gardening*

267 For the majority of the gardeners, allotment gardening is for relax-
268 ation and recreation, even when it is partly hard work. About
269 80% of the questioned persons express this as main reason for their
270 allotment use. The allotment gardening is the main hobby for the
271 majority (66%–93%). Connectivity to "nature" is for 65% a main
272 reason for gardening. Other reasons—such as to have a quiet place
273 for retreat (57%), to balance out stress from work (47%), and self-
274 sufficiency with fruits and vegetables (46%)—are also important.
275 Much less important are reasons like compensation for absent
276 private green (32%) or community spirit (31%) (Fig. 3).
277 The interviewed allotment gardeners are very satisfied with their
278 gardens, and the majority (68%) does not feel disturbed by any-
279 thing. Even the strict regulations, binding them in some activities,
280 disturb only 10% of the questioned persons.
281 The majority of the allotment gardeners use the plot in summer
282 several times per week (59%) or even daily (36%) (Fig. 4). Even in



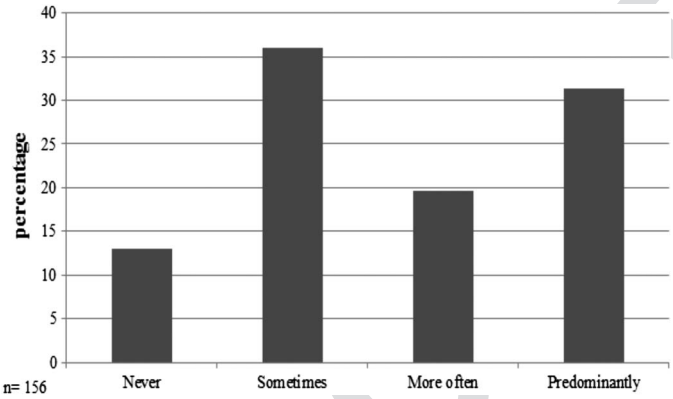
F3:1 **Fig. 3.** Reasons to use an allotment garden



F4:1 **Fig. 4.** Leisure time spent in the allotment

winter, 22% use the garden several times a week, and only 29% seldom use it. On a working day in summer, the majority spends four to six hours on the plot for gardening as recreation (32%). In the PW allotment site, the majority (45%) spends even more than eight hours there. Only 17% of the questioned persons spend less than four hours.

The summer weekend day is, by the majority, mostly fully spent in the allotment garden (over six or even over eight hours). Fifty percent would like to reduce the maintenance activities in the allotment gardens to have more time to relax. For 64%, reduced maintenance is the leading idea regarding their gardening, accompanied by beautification (59%), and environmental sustainable design (50%).



F5:1 **Fig. 5.** Summer holidays spent in the allotment garden

Reasons for Allotment Gardening

Of the questioned allotment garden owners, 31% spend their summer holidays predominantly on the allotment plot. Another 36% answered that they sometimes spend their summer holidays at their allotment.

Frequency, duration of stay and spending holidays in allotment gardens show the high importance of recreation in the allotment gardens. Most of the leisure time of allotment gardeners is spent on the allotment plot (Fig. 5).

The interviewed allotment gardeners are infrequent users of public urban green spaces. More than two-thirds (68% in summer and 71% in winter) express that they use them fewer than "a number of times" per month or less. Only a minority of less than 10% of the questioned allotment gardeners use public urban green spaces several times a week or even daily (Fig. 6).

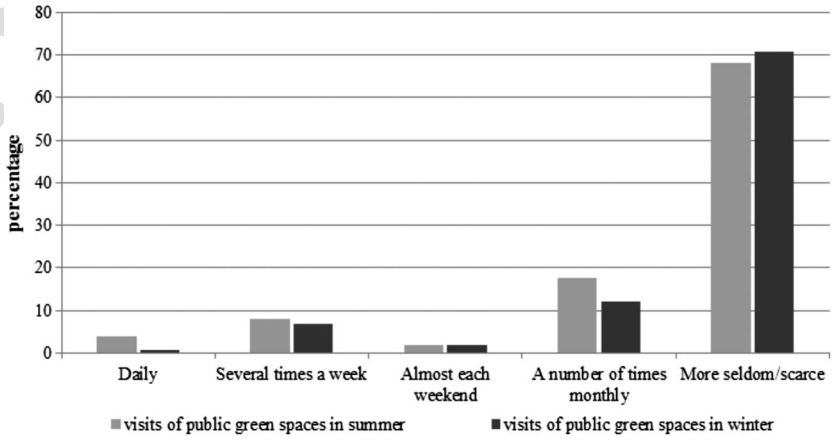
Partitioning of the Allotment Gardens

The structure of the allotment gardens mirrors the utilization structure. A majority of gardeners (45%) use only 10% to 20% of the space for cultivation of fruits and vegetables (Fig. 7). Another 29% of the gardeners use 20% to 30% of the space for this. In this study, 26% of the gardeners use 40% to 50% of the allotment for lawns, and another 25% of the gardeners use even 70% to 80% of the allotment for lawns. Many of the allotment gardeners have changed their garden structure from food production (fruit and vegetable beds) to relaxation (lawns). They have reduced their management intensity and spend more time relaxing than in the past.

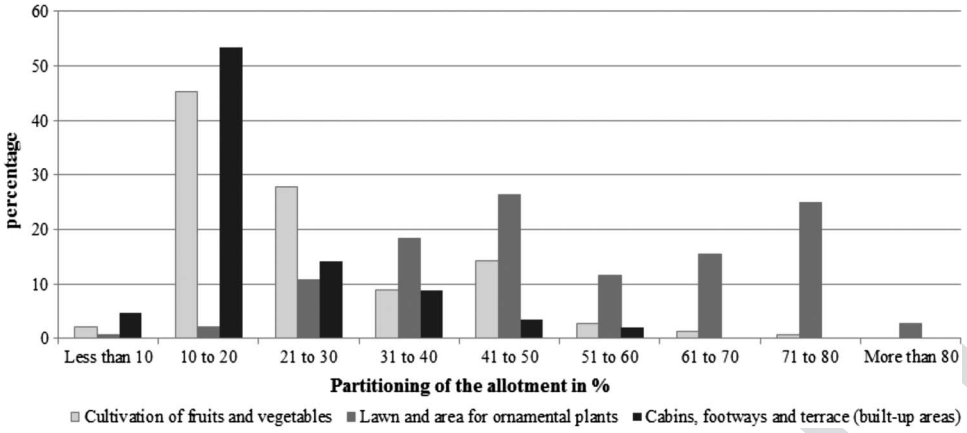
Of the questioned persons, 25% express that they have added more lawn during the last 10 years, 24% reported less space devoted to vegetable patches, and 24% reduced the general amount of maintenance. Other changes include 41% of interviewees enlarging the flowerbeds, and 28% enlarged the leisure areas (terrace, pergola, barbecue area, etc.). Only 17% report that they have not changed use of space in their gardens (Fig. 8).

Food Production

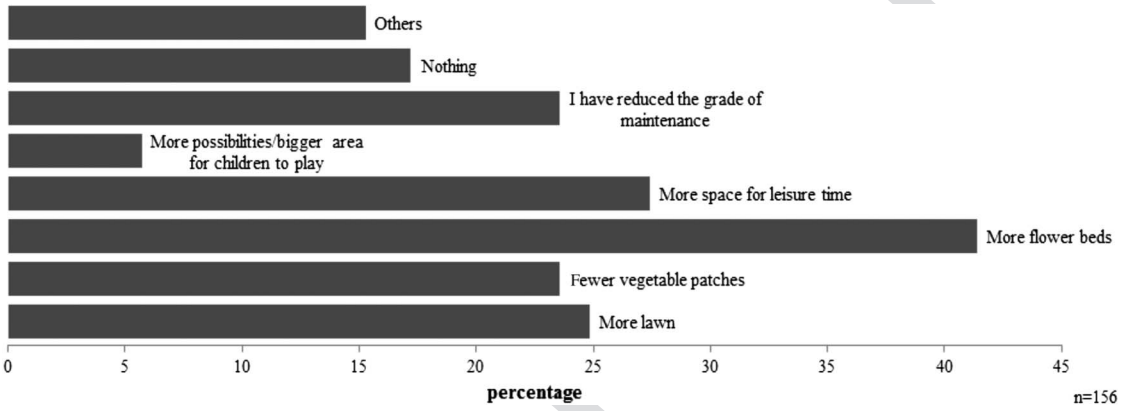
Most of the allotment gardeners have improved the allotment garden in general since they started allotment gardening on the plots. This includes improvement of soils by self-produced organic fertilizer (85%), planting of trees (54%) and shrubs (82%), and



F6:1 **Fig. 6.** Utilization of public urban green spaces



F7:1 **Fig. 7.** Partitioning of the allotment gardens

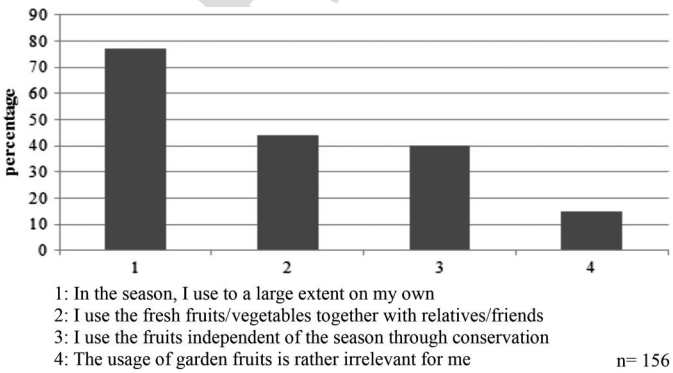


F8:1 **Fig. 8.** Changes in dividing the allotment garden during the last ten years

cultivating fruits and vegetables (76%). About half of the questioned persons (44%) never use chemical fertilizers, while the others (54%) rarely use them. The practiced soil and plant management targets the improvement of the fertility of the allotment gardens.

The produced food is used fresh during the season mostly by allotment gardeners (71%) and their families (45%) (more than one answer was possible). Many (41%) conserve fruits or vegetables to use during winter (see Fig. 9).

The majority of gardeners (52%) produce only up to 10% of their overall fruit consumption on their allotment gardens. This is comparable with 44% for vegetable consumption.



F9:1 **Fig. 9.** Consumption of garden fruits and vegetables

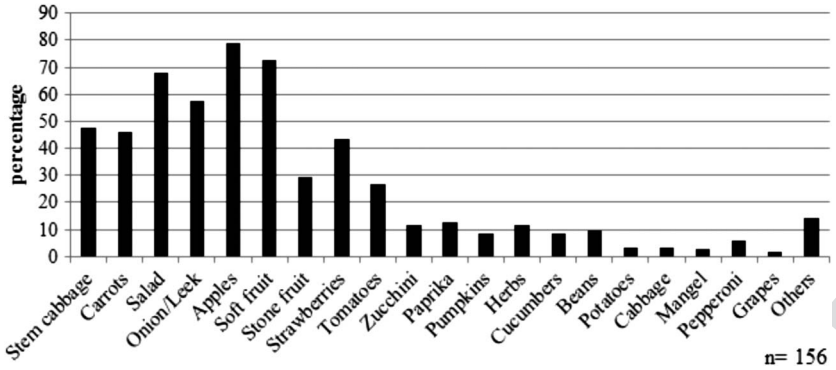
The reasons for producing one's own food production are healthier production (47%) and better quality and taste (41%). A wide variety of different fruits and vegetables are produced; albeit, particularly for this latitude, common fruits and vegetables like apples and soft fruits as well as lettuce and carrots are most often grown. Cabbage, Swiss chard, or grapes were only produced by a minority of allotment holders (Fig. 10).

Nature Experience (Learning and Teaching about Nature)

More than 60% of the allotment gardeners learned gardening by doing, another 48% from other gardeners, 47% from elder family members and only 38% from media use (more than one answer was possible).

A majority of gardeners (66%) learned about nature through allotment gardening, 31% about their general relation to nature and ecological behavior, 28% about horticulture and garden management. In this study, 78% of the questioned persons valued the allotment garden as an important or even very important place for learning about nature by the younger generation.

The allotment garden is a place for nature observation. Bigger animals like birds, small mammals and also amphibians are frequently observed. In contrast, worms, spiders, and mollusks were observed less often (Fig. 11). The majority of the gardeners (74%) call the attention of the younger generation to observe animals. If the allotment gardeners compare where they mostly make their



F10:1 **Fig. 10.** Consumed fruits and vegetables

animal observations, it is 80% on the allotment plot, followed by forests (34%) and only 9% in urban public green spaces.

Ecological Gardening and Environmental Behavior

Most of the allotment gardeners assess their general behavior as ecological or sustainable. Between 60% and 79% express that they behave sustainably, for the most part. More than two-thirds and up to 85% of the questioned persons connect this with the consumption of ecologically produced fruits and vegetables. This is, of course, based on their own ecologically produced food but includes also a generally more sensitive consumption of organic food because most of the fruit and vegetable consumption does not come from their own garden. About one-third of gardeners (30%–57%) use public transportation more frequently than a private car. Up to one-third of the people also often arrive by bike. Other aspects of ecological behavior are seldom expressed.

The allotment gardeners express that their gardens are already sustainable (54%). Only 21% express that they are open for a change in management to a more sustainable garden. Only 18% have no association with the ecological garden idea.

Discussion

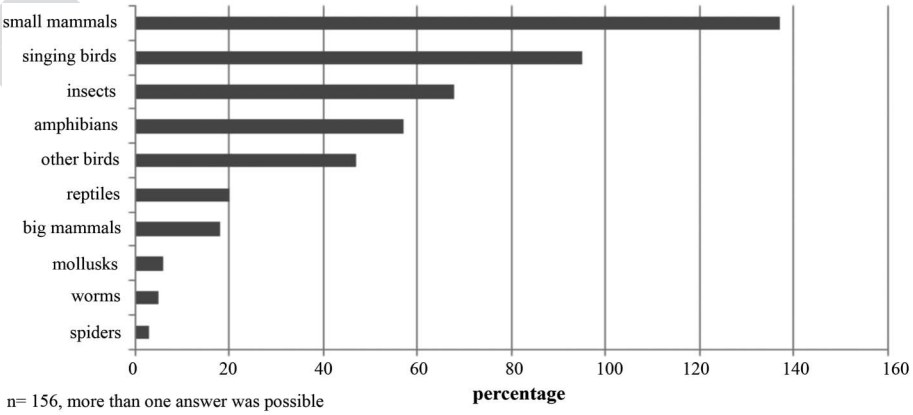
Comparing Recreation in Allotments and Urban Parks by Frequency and Activities

The survey shows a very intensive use of the allotment gardens by frequency and duration of stay. A comparison of the use intensity of these privately used green areas with public urban green seems to be meaningful. Park usage and physical activity research and the theory of urban park geography are still in its infancy (Brown 2008; Hamilton 2011). Use intensity of green spaces generally depends on several factors:

- acceptability of attractive public green space offerings;
- demand by people, depends also on amount of available free time (groups with more pensioners, stay-at-home parents, etc.);
- availability of alternative attractive green spaces (like forests, wetlands, allotments, etc.);
- and other attractions to spend leisure time (Priego et al. 2009).

A few recent studies from different continents show the quantity, frequency of visits, and activity of urban park usage for recreation: Breuste et al. (1996), Breuste and Breuste (2000) for Halle/Saale, Germany; Breuste et al. (2013a) for Buenos Aires, Argentina; Qureshi et al. (2010) for Karachi, Pakistan; Breuste et al. (2013a) for Buenos Aires and Shanghai; Ioja et al. (2013) for Bucharest, Romania; Veal (2006) for Sydney, Australia; Hamilton (2011) for Kingston, Canada or Priego et al. (2009) for Cordoba, Spain, Concepcion, Chile and Halle/Saale, Germany.

Sasidharan et al. (2005) showed important cultural differences in urban recreation patterns and of park usage and activity participation. Comparisons on a worldwide scale are only partly working. Hamilton (2011) recorded 1,098 park users. The overall findings in park usage revealed that the most prevalent park users were female (52%). Adults (aged 18–65) were the most prevalent age group (47%). Physical activity findings showed that 45% of users were sedentary, 40% were walking (moderate physical activity), and 15% were engaged in vigorous activity. This shows that physical



F11:1 **Fig. 11.** Observed animal groups in allotments

activities were mostly sitting and walking. Another study from the Netherlands surveying 750 park users shows that relaxation is preferred to sports. However, to get in touch with nature and to escape the city were rated as being more important reasons for the park user (Chiesura 2004). These findings are similar to this study: besides recreation and rest, the main reasons for the use of allotments are the connectedness to nature and having a quiet place for retreat. However, compared to the less physical activities found in urban parks, this study suggests that recreation in allotment gardens is more active since another main reason for visiting the allotment is gardening.

The duration and frequency of stay differ in public parks and range from the majority of weekly (more than 50%) to daily visitors (more than 60%) (Veal 2006). Visits are mostly under two hours (Breuste et al. 2013a, b).

A comparison of park use to the frequency and duration of stay in allotments shows that allotments are much more intensively used urban green spaces than parks. The high intensity of use found in this study is also supported by several allotment garden studies in Central Europe (Atzensberger 2005; Bargmann et al. 1989; Breuste and Breuste 1994; Farny and Kleinlosen 1986; Koller 1988; Weber and Neumann 1993).

With a long-term rental, often more than 20 years, the allotment gardeners create a very individual and personal relationship to a small part of semi-private urban green. The importance of allotments for humans traces back to their provision of cultural ecosystem services, such as learning from nature and recreation from which urban residents benefit (Barthel et al. 2010; Glover et al. 2005; Hou et al. 2006) and which was also shown in this study. This personal and emotional connection to private green is even more pronounced in private gardens (Brook 2003), which can be regarded as an extension of the house where owners are free to create their own natural "paradise" (Alexander 2002). This is also true for allotments and contributes to their successful establishment for more than 150 years in Central Europe. Hence, users of allotments also have a limited ability to design one's own nature spaces by individual gardening activities. Beside the residence, the allotment garden is a second center of life for allotment gardeners. They spend most of their leisure time there, often even the holidays, and reduce other open space activities in the city, even visits to public urban parks.

Allotment gardens can mostly be reached within 30 minutes from home, for longer distances often by car or bicycle (e.g., Breuste and Breuste 1994). The high intense usage of the allotment gardens indicates a high degree of satisfaction with this part of the urban green—much more than with most of the public urban green (Breuste 2007).

Can Allotments be Good Places to Experience Nature?

The U.K. was a forerunner in Europe for experiencing nature in cities (e.g., Johnston 1990), including parks, forests, and succession land, but not including allotment gardens and other forms of gardening. Experiencing nature was not listed as one of the eight good reasons to get an allotment garden by the Royal Horticulture Society (Royal Horticultural Society 2013). The definition of "nature" must be broader and include all forms.

The allotment gardens are an excellent way to learn and understand nature and its processes, to change behavior by this knowledge and to teach younger generations. The city is one of the most important places to learn about nature for the majority of people, and allotments could be an important place for this. The results of this Salzburg study show the existing importance of the role of allotments in nature education. Two-thirds learned about nature through gardening, and more than three-quarters value the allotment as an important place for the new generations to learn about nature.

There used to be many activities in Central European cities to teach about nature on public property (Schemel 1998). Forests, public parks, wetlands and other natural areas in cities have been identified for their potential to offer nature experiences and informally teach about nature, for example, through short walks. The learning-by-doing and the passing knowledge on from one generation to the next has been surprisingly underestimated or even excluded from concepts of learning about nature in cities (Register 2006).

Currently, there is no possible comparison of studies showing in which areas—public urban green or allotment gardens—nature observation is more important. Determining which has more value is also not very important. It is important, however, that allotment areas should be regarded now also as places to learn about nature. There is the potential to learn about nature not only on "community wildlife sites" (Johnston 1990) but also on allotment gardens.

Changes of Allotment Structure and Management—Change of ES?

The allotment gardens have changed in structure tremendously over the last 50 years. There is a shift from food production to beauty and recreation. The plots are used more as leisure grounds than productive sites. This has an important influence on the ecosystem services provided by them. The food production is still of importance for those gardeners who express their interest in a controlled and healthy food production and who do not trust the quality of food provided by supermarkets anymore. It can be expected that this group of gardeners can, in the future, increase further. Thus, like domestic gardens, allotments address social and environmental paradoxes of the late modern life where both function as a private place for leisure and social isolation from a global world that is confronted with increasing environmental, social, and consumer concerns (Bhatti and Church 2004).

On the other hand, it is clearly visible that the gardeners do not want to invest as much time as in the past for the garden management, including vegetable beds, etc. The reduction of time for these activities is linked to spending more time on physical recreation. It should not be forgotten, however, that physical work in lesser proportions is still an important part of gardening in the understanding of most of the gardeners.

The equipment of gardens with leisure facilities has increased significantly over the last several decades. Those amenities of the allotment like the garden house, terraces, barbeques, and playgrounds for children, even movable swimming pools have now more share of the plot (Breuste 2010).

Allotment gardens have become leisure areas with interactive learning and experiential opportunities about nature and natural processes throughout the year. This is also supported by the results of comparable studies on the subject (Atzensberger 2005; Bargmann et al. 1989; Breuste et al. 1996; Breuste and Breuste 1994, 2000; Farny and Kleinlosen 1986; Koller 1988; Weber and Neumann 1993) and includes a shift from productive to recreational services and learning in a generally leisure-dominated society.

Healthy Food Production by Allotment Gardening

Food production is not the main service of allotments in Salzburg and Germany (Atzensberger 2005; Bargmann et al. 1989; Breuste and Breuste 1994; Farny and Kleinlosen 1986; Koller 1988; Weber and Neumann 1993). This is perhaps different from other countries

(Kingsley et al. 2009; Leake et al. 2009; Turner 2011), especially the United Kingdom (Degnen 2009). For instance, among the eight reasons to get an allotment garden listed by the Royal Horticultural Society (2013), three of them relate to food production (fruits and vegetables).

For nearly half of the allotment gardeners, the actual production of fruits and vegetables covers only up to 10% of their overall consumption. The production of fruits and vegetables in Salzburg allotment gardens has decreased over the last several years, but a growth of this service can be expected when healthy food is more highly valued than actual recreation. All allotment gardeners produce food because of the health and taste argument. The fact that 44% never use chemical fertilizers shows that healthy production of food is important for them. As health (De Vries 2012; Dixon et al. 2009; Ferres and Townshend 2012; Kingsley et al. 2009; Leake et al. 2009; Schoneboom 2010) and food security (Deppe 2010) in urban societies become rising issues, it can be expected that the food production service of allotments will change in the future. The allotments and the allotment holders are prepared for this. Activities like planting trees and shrubs and organic fertilization of soils are already activities of most of the allotment gardeners. McCormack et al. (2010) show in American community gardens an already increased consumption of fresh fruit and vegetables. To improve the sustainability of compact cities through local food production (despite limited space), Tian et al. (2012) suggest developing "sky gardens" on the roofs of buildings.

Conclusions

This study shows by a survey of allotment owners in Salzburg (Austria) the importance of allotment gardens for providing ecosystem services. In particular, the contact with and learning about nature was identified as important ecosystem services including also recreational purposes and gardening as basic human activities. Moreover, this study shows that traditional food production is no longer the main purpose of allotment gardens. The trend to reduce the intensity of land use in allotment gardens means also a chance to further develop other ecosystem services like habitat provision and biodiversity from which urban residents gain by increased contact with nature. The allotment gardens are part of the urban fabric and a lesser known part of the urban green. This study shows that allotments are as important and successful as domestic gardens and urban parks by providing urban residents a range of ecosystem services. Privately used urban green seems to be a crucial part of the urban green infrastructure, providing important benefits as this and other studies have shown. Therefore, further studies should also include such private and semi-private urban green sites for further investigation rather than focusing mostly on public urban green. Further studies might also investigate why younger people are less engaged in allotment gardens than elderly people.

It can be expected that allotments will gain even more importance in European cities due to a shift in lifestyle by modern society, increasing awareness about environmental and social problems, and ongoing urbanization. Therefore, urban planners and city management should be aware about the value of allotment gardens in the urban fabric, which is confirmed by this study. It is surprising that with this potential, allotment gardens are less privileged urban green structures in comparison to others and very often lose to development decisions.

There is an especially strong need to secure allotment garden sites into the urban fabric primarily for recreation but also for other ecosystem services and biodiversity. The demand to produce healthy food by allotment gardeners will grow. Allotment gardens can be a social and ecological stabilizing factor for urban societies.

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