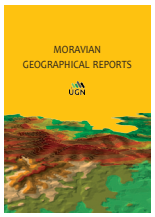

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How are allotment gardens managed? A comparative study of usage and development in contemporary urban space in Germany and Poland

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Abstract

This article aims to analyse the development and use of allotment gardens (AGs) and plots in Westphalia and Lippe (Germany) and Wielkopolska (Poland) to assess what functions are feasible in their current stage, thus, contributing to an ongoing discussion on the role of AGs in contemporary urban space. The analysis considered ecosystem services, green infrastructure and urban agriculture. Characteristic features of AGs were identified by means of a survey of plot-holders, in-depth interviews with representatives of allotment associations, and exploratory walks. The management and use of AGs differs in both regions in terms of accessibility, common areas, impact on the landscape and plots development. AGs in Westphalia and Lippe are accessible and developed in a way which meets needs of external users. They fit harmoniously into the surrounding landscape. However, AGs in Wielkopolska are not as accessible, prioritise internal users, and do not always blend in with their surroundings. In Westphalia and Lippe, in addition to recreational and edible plant-growing plots, there are also educational and integration ones, while in Wielkopolska main categories of plots were more numerous and varied; from recreational with a predominance of ornamental plants to fully-cultivated. However, the considerable freedom that Polish plot-holders enjoy gives rise to the gradual marginalisation of edible-plant growing.

Keywords: *allotment gardens, plot development, plot types, comparative analysis, Germany, Poland*

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1. Introduction

The development of allotment gardens (hereinafter AGs) in Europe dates back to the 18th century. The first AGs, both in Germany and Poland, were created in the period of intensive industrialisation, during the first half of the 19th century (Poland was partitioned under Russian, Prussian and Austro-Hungarian rule at the time). In the years 1830–1840, AGs were established in Cologne, Leipzig, Berlin, Frankfurt, as well as in Koźmin Wielkopolski and Wrocław, which are currently located within todays Polish borders, but were still part of the Prussian partition at that time (Duś, 2014; Weckwerth, 1999). AGs were built on the outskirts of dynamically developing industrial cities or in areas unsuitable for the construction of buildings inside urban centres. They were designated for the poor, usually living in multi-family buildings, to improve their living conditions by being able to produce food for their personal use, and spend time in the open air (e.g. Acton, 2011; Bellows, 2004; Crouch and Ward, 1997; Keshavarz and Bell, 2016). Throughout their history, AGs always adapted to changing conditions. In times of war and crisis, crops grown on plots alleviated food shortages, and huts often acted as dwellings (Calvet-Mir and March, 2019; Colasanti et al., 2012; Drake and Lawson, 2014; Pawlikowska-Piechotka, 2010). After 1945, when Europe was divided into East and West, economic development and strong urban growth meant that interest in AGs in Western countries decreased (Drilling et al., 2016). In West Germany during the 1970s, when a household could buy all its vegetables cheaply in supermarkets, AGs were deemed to be something outdated, and there was no need to cultivate vegetables any more (Maćkiewicz et al., 2021). Conversely, during the socialist era in the Soviet bloc countries,

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AGs gained popularity and were important for sourcing horticultural produce, which was not readily available on the market. These regimes were supportive and even protective of allotment gardening (Tóth et al., 2018). Later, the socio-economic transformation in these countries was accompanied by numerous changes in AGs, i.e. an increase in the number of vacant and neglected plots, as well as the productive function being systematically limited in favour of recreation (Bewältigungder Leerstandsproblematik…, 2013; Dzikowska et al., 2019; Szkup, 2013,). In the meantime, AGs in Western Europe have reinvented themselves. The previous idea of coping with famine has been replaced by a focus on healthy food production and socially and physically active environments (Simon-Rojo et al., 2016). However, the question arises about the extent to which all these aforementioned changes and different socio-economic conditions have influenced the spatial development of AGs and plots and their function in contemporary urban space? By studying AGs in West Germany and Poland, the article attempts to answer the following research questions:

1. What does the development of contemporary AGs and their constituent plots look like?
2. What functions of AGs and plots are feasible due to their current development?
3. Is the development of AGs and plots different in both regions? If so, in what aspects?

Doing so the study contributes to closing a significant research gap. While publications devoted to the issue of allotment garden development can be found in the literature, they are few of them, and these usually only refer to single gardens (e.g. Dymek and Bednorz, 2017) or AGs in one particular city (e.g. Seville City Council, 2017; Szkup, 2013). It is definitely more often the case that references to the development of allotment gardens or allotments constitute the background not the substance of the research (see e.g. Borysiak et al., 2017; Duś, 2014; Sovová and Krylová, 2019). Selected aspects of this issue are addressed only to a limited extent in publications focusing on the design of allotment gardens (see Długozima, 2012; Treija et al., 2016; Zammit and Erjavec, 2016), their iconosphere (Sulima, 1990) and architecture (e.g. Hochhäusl, 2014; Romanowski, 2012; Tschuppik, 2001). Therefore, there is a lack of studies that approach the development of allotment gardens in a comprehensive way, while taking into account a broader, e.g. regional, spatial scope, not to mention the lack of studies which would approach this issue in an international context.

This article is the result of a multifaceted research on the functioning of modern allotment gardening in Germany and Poland. So far, we published the paper comparing the legal regulations on allotment gardening (Kacprzak et al., 2020) and the paper concerning the profiles of allotment gardeners (Maćkiewicz et al., 2021). This article provides new insight into the use and development of AG in contemporary urban space. The article is structured as follows: Section 2 presents the theoretical background, Section 3 characterises the case study areas and methods applied and the research design. Section 4 explores the development of AGs in terms of their legal basis (4.1), spatial management (4.2) and development of plots (4.3). Section 5 discusses our study findings. Conclusions and recommendations are provided in Section 6.

2. Theoretical background

With the development of cities, the contemporary form of AGs came into being. Consequently, AGs are an integral part of the functional, spatial and landscape structure of modern urbanised areas (Bellows, 2004; Crouch and Ward, 1997; Duś, 2011) and thus constitute a multifunctional object of urban policy (Drescher et al., 2006; Drilling et al., 2016; Poniży and Stachura, 2017). From the urban planning perspective, AGs help soften the perception of the urban landscape, especially densely built-up urban areas, by offering green spaces for recreation in the immediate vicinity of multi-storey residential buildings (Costa et al., 2016). However, in many European countries, the growth of urban populations and the associated need for compact development and transport systems has subjected AGs to urbanisation pressures (Koopmans et al., 2017; Trembecka and Kwartnik-Pruc, 2018). AGs are often treated as a stock of potential investment land (Giedrych and Poniży, 2013; Maćkiewicz et al., 2018). Therefore, AGs' location, functional connections and landscape cohesion with their surroundings is an important issue. What is of particular importance is the accessibility of AGs to the general urban population (Bonny, 2010; Acton, 2011), and how land use and infrastructure is adapted to the needs of a wide range of users and the policies of the modern city. Contemporary AGs should therefore be considered as part of green infrastructure (Breuste, 2010; Szczepańska et al., 2016). According to Mell (2008), green infrastructure refers to the connective matrices of green spaces that can be found in and around urban and urban-fringe landscapes. By providing multiple complementary ecological, economic and social benefits, it enables planners to create multifunctional, innovative and sustainable places. In addition, it promotes the ecosystem, as well as human health and well-being (Tzoulas et al., 2007), and provides abiotic, biotic and cultural functions to develop and contribute to sustainable urban development (Ahern, 2007). AGs play an important role for individual plot users as well as for the general urban population, environment and urban economy (Appel et al., 2011; Van den Berg et al., 2010). They contribute to improving the quality of life, facilitate social interaction, activate residents, enable recreation, including education and therapy, and strengthen the sense of proximity to nature (Costa et al., 2016; Sovová and Krylová, 2019). AGs also have an impact on the local natural environment such as habitats, biodiversity and microclimate (Barrico et al., 2018; Cabral et al., 2017; Speak et al., 2015).

Since the beginning of the 21st century, AGs have also been considered in terms of the concept of ecosystem services (Barthel and Isendahl, 2013; Breuste and Artmann, 2015; Camps-Calvet et al., 2015), i.e. the values and benefits that city dwellers can attribute to internal ecosystems located in the city. The Millennium Ecosystem Assessment (2005) classified 4 different groups of ecosystem services: provisioning services, regulating services, supporting services and cultural services. AGs provide services for all the above-mentioned groups (Kronenberg et al., 2013; Langemeyer et al., 2016; Speak et al., 2015). For the reasons outlined above, they should be treated as a multifunctional element of sustainable urban space, and thus receive special legal protection, and be managed in a well-thought-out way that would take into account both their multiple functions and the interests of the local community. In this context, it is extremely important to investigate the spatial management of AGs, which determines and guides the implementation of various services.

It cannot be denied that AGs providing productive services are unique when compared with the other managed green spaces in the urban space, as they are one of the entities in the production system of urban agriculture (Mougeot, 2006),

and are also taken into consideration in the concepts of urban agriculture (Drilling et al., 2016; Duží et al., 2017) and urban foodscape (Morgan, 2014; Port and Moos, 2014; Viljoen and Bohn, 2014). Research by Barthel et al. (2010, 2015) demonstrates that food security has always been a key resilience facet for people living in cities. Moreover, they point out that agricultural production, including that carried out in allotment gardens, is not "the antithesis of the city", but often an integrated urban activity that contributes to the resilience of cities. So far, the scientific discourse reveals a lack of research on the relationship between allotment management and food production. It is therefore worth extending this research stream, since evaluating AGs' spatial development and use is becoming increasingly essential to urban agriculture, as well as to spatial planning and ecosystem services.

The discussion on the development of AGs is also part of concepts concerning the identification and shaping of urban space. The literature distinguishes between the following types of space: public (under the control of society in general), semi-public (under social control), semi-private (shared use, under communal control) and private (under private control, ensuring that residents maintain their territoriality) (Newman, 1996; Lefebvre and Nicholson-Smith, 1991). AGs can be considered a 'special space'. The view expressed by DeSilvey (2003) is that AGs are a kind of 'third space' characterised by multiple dichotomies – private and public, production and consumption or work and leisure – and all at the same time. Spilkova and Vágner (2016) draw attention to the issue of private space-public space relations in the context of garden accessibility. They are of the opinion that "public access gardens with the open regime (or partially regulated open regime) of the allotments represent a suitable solution beneficial both for the continuity of the allotment gardens and for the public quest for green areas and community development" (Spilkova and Vágner, 2016, p. 238). It is emphasised that maintaining large public landscaped areas is costly, while AGs are an "efficient complex" maintained by allotment holders (Duś, 2011; Spilkova and Vágner, 2016). On the other hand, scientific publications also point out that the development of allotments, as private space, can be an expression of "fierce individualism" and can consequently lead to the urban landscape being disrupted (Acton, 2011; Costa et al., 2016). The section indicates that the development of AGs connects with many theoretical concepts of the shaping of urban space and is part of a broader geographical debate on the usage of public and private spaces. However, there is still a research gap in terms of the relevance of issues relating to the spatial management of AGs in the concepts presented.

3. Methods and data

3.1 Case study area

Germany and Poland are both pioneers and current leaders in European allotment gardening (Tab. 1). In 2017, the number of plots in each country exceeded 910,000 (BDG, 2018a; Environmental, 2018). In German allotments, there were 911,900 plots, covering about 40,000 hectares, which were used by 5 million people – plot-holders, their families, friends and acquaintances. In Poland, there were 911,200 plots, which were covering almost 32,000 hectares. It has been estimated that about 3–4 million people used them. In both countries allotments feature a common space. On German allotments, this common area makes up 30–40% of the total surface of AGs, whereas in Poland it is 21% (BMVBS, 2008, 2013; LV, 2019a; Environmental, 2018).

The distribution of allotments in both countries is highly diversified by region (Fig. 1) and associated with industrialisation and urbanisation processes. Allotment gardening is typical for urban areas. Plot-holders' organisations exert a very strong influence on the way allotment gardening functions and develops. The German Federation of Allotment Gardens (Der Bundesverband Deutscher Gartenfreunde e. V., BDG), established in 1921, is a non-governmental organisation representing the interests of allotment associations in Germany. Its main aim is to promote allotment gardening, social communities, and also environmental and landscape protection (BDG, 2018b); 19 national and 330 regional associations operate under the patronage of the BDG. In Poland, the Polish Allotment Federation (Polski Związek Działkowców, PZD), set up in 1927, plays a leading role in the management of allotments as a nationwide allotment association for establishing and running family allotments, as well as representing and protecting the interests of its members. The most important aims of the organisation include developing AGs, ensuring active recreation and opportunities to grow horticultural crops for the personal use of plot-holders and their families, protecting the natural environment, and improving both the ecological standards of the surroundings and the social conditions of local communities (Charter of Polish Allotment Federation, 2018).

Field studies were conducted in two regions in 2016–2018. In the German state of North Rhine-Westphalia, there are about 120,000 plots (13.2% of all German plots) in over 1,600 gardens (5,500 ha) managed by two regional associations that belong to the BDG (LV, 2019a). Among them is the Regional Federation of Allotment Gardens Westphalia and Lippe (Landesverband Westfalen und Lippe der Kleingärtner e.V. – hereinafter referred to as Westphalia and Lippe region), an organisation operating in the eastern part of the state, with 72,000 members and 750 gardens (LV, 2019b; LWLK, 2018). In Poland's Wielkopolskie Voivodeship, there are 89,300 plots (9.8% of all Polish plots) in 564 gardens (4,100 ha). The Polish Allotment Association in Poznań District (PZD Okręgowy Zarząd Poznań – hereinafter referred to as Wielkopolska region) is a unit of the PZD and covers the central part of the Wielkopolskie Voivodeship. It comprises 291 gardens (2,500 ha) and the total number of plots is 52,400 (PZD, 2019). These regions were selected for the study due to their similar origins. In both the past and the present, these regions are among the leading regions for the development of allotment gardening in both countries. An additional factor for the choice of these

Specification	Germany	Poland
Number of plots	911,900	911,200
Covered area (ha)	40,000	32,000
Average area of plots (m^2)	370	351
Common space (%)	30–40	21
Number of plots per 1 mil. inhabitants	11,032	23,727

Tab. 1: Allotment gardening in Germany and Poland
Source: own work based on materials from BDG (BDG, 2018a), VGRdL. (2019) and data from Statistics Poland (Environmental, 2018)

regions was their cooperation between the most important regional allotment gardening organisations spanning more than 30 years.

3.2 Research design

In the first stage of the study, the research area was selected using the desk research method, and a survey questionnaire was prepared. Then, based on statistical data from national and regional allotment associations (BDG and PZD) and Statistics Poland, the state of development of modern allotment gardening in Germany and Poland and in the two selected regions was identified. In the next stage, the legal basis of allotment gardening in both countries was assessed in order to determine its influence on the way that allotment gardens and plots are managed. The materials gathered during desk research were verified during the field research. This field research formed the basis for assessing the management of allotment gardens and plots. The survey results were subjected to statistical analysis. In this way, it was possible to capture the characteristic features of the present-day development of German and Polish AGs and plots. Furthermore, similarities and differences between the two regions regarding these features were identified. The basic types of plots were also distinguished. In the final stage of the research procedure, recommendations were formulated (Fig. 2).

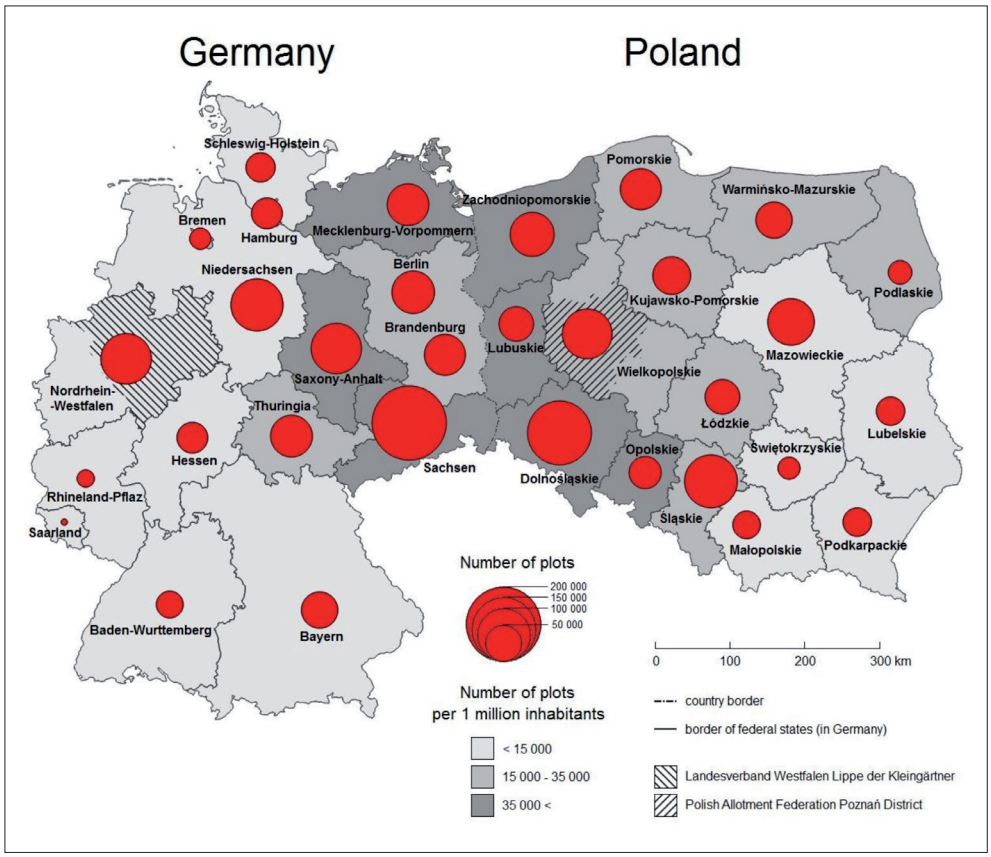

Fig. 1: Allotment gardens in Germany and Poland in 2017
Source: own work based on materials from BDG (BDG, 2018a), VGRdL (2019) and data from Statistics Poland (Environmental, 2018).

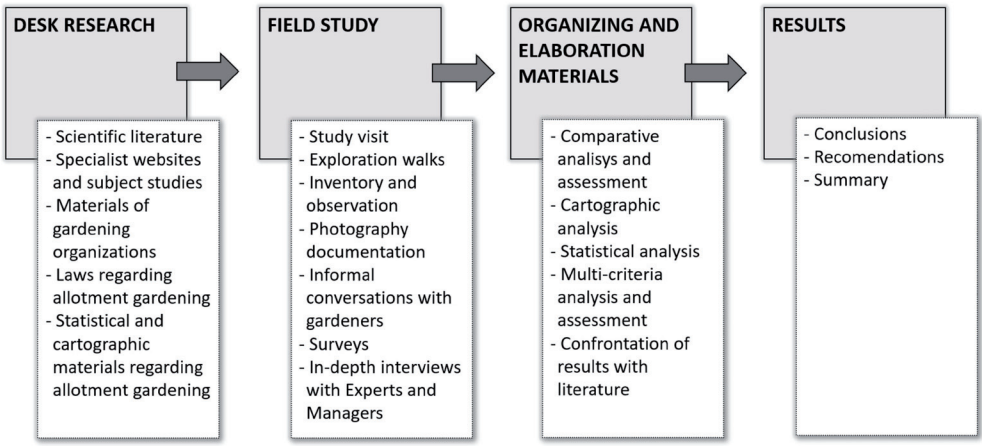

Fig. 2: Research design

Field studies of AGs conducted in Germany and Poland from June to September 2016 were of particular importance. The research was conducted in gardens situated in North-Rhine Westphalia, in Westphalia and Lippe region (42 gardens, 5.7% of the total number of gardens in the region), which were managed by the BDG. In Poland, the research involved gardens located in the Wielkopolskie Voivodeship and associated with Wielkopolska region (32 gardens, 6.2% of gardens in the district) of the PZD. AGs in the two regions were selected on a random basis. As a part of study visits, comparative analysis and assessment were made of various elements, including spatial-functional patterns of gardens, constructions and communal garden infrastructure, as well as garden equipment, fencing, the internal networks of thoroughfares (access roads, paths), available utilities including irrigation methods, protection of gardens against negative influences from the neighbourhood, management of waste and sewage, the structure of crops and choice of trees and shrubs, and also the elements enhancing the biodiversity of gardens. Moreover, a lot of valuable information, e.g. concerning the practical application of legal solutions existing in both countries was gathered during exploratory walks (by means of interacting with allotment gardeners). In the course of field research, an inventory of allotment management was produced, photos were taken and observations were made of how the gardens function. An important part of the research was informal conversations with gardeners, as these allowed us to obtain unofficial data. Surveys were carried out among plot-holders and participation was voluntary (Tab. 2).

Paper questionnaires were distributed to the allotment holders present on the plots, who completed them in the presence of the researchers. Some of the questionnaire forms were left in the garden offices under agreement with the garden managers along with the request that they would be filled in by the allotment holders and returned by post. The questionnaire comprised of 33 questions (open, close, multiple-choice) relating to the aspects such as the infrastructure available on the plot, plot architecture and use of AG infrastructure. Altogether, 780 paper questionnaires were distributed (440 in Westphalia and Lippe region, 340 in the area of Wielkopolska region and the rate of return was 25.4% (112 surveys) in Germany and 35.6% (121 surveys) in Poland. Statistica: test ANOVA, Pearson's coefficient ® were used for the analysis of study findings.

Specification	Germany (%)	Poland (%)
Age structure[1]		
Less than 35 years	7.3	4.1
36–50 years	24.5	11.6
51–65 years	39.1	50.4
66–80 years	27.3	33.1
80 and more years	1.8	0.8
Educational structure[2]		
Basic	5.5	1.7
Vocational	51.4	24.2
Secondary	31.2	55.8
Tertiary	11.9	18.3
Professional activity[3]		
Full-time	47.3	35.5
Part-time	7.3	2.5
Pensioner	43.6	60.3
Other	1.8	1.7

Tab. 2: Socio-professional features of plot-holders according to the case study survey
Notes: [1]Germany (N = 110), Poland (N = 121); [2]Germany (N = 109), Poland (N = 120); [3]Germany (N = 110), Poland (N = 121)
Source: authors' survey

Surveys were supplemented by the interviews with persons managing the AGs (e.g. Manager DE 1–4, Manager PL 1–5). Four coded structured interviews (9.5% allotments) were obtained from Westphalia and Lippe region and five interviews (15.6%) from Wielkopolska region. Valuable information was also collected during 30–60-minute, in-depth interviews (Expert DE and Expert PL) with the president of Westphalia and Lippe region, as well as with the president of Wielkopolska region. Managers and experts were asked about the development and use of an AG and plots. The in-depth interview method provides insight, as it is an interview about the research objective (Kvale and Brinkman, 2009; Seidman, 2013; Yeo et al., 2013).

The case study method used enabled us a comprehensive assessment of the management of AGs and plots in two regions: Westphalia and Lippe in Germany and Wielkopolska in Poland. This method, typical for social sciences, produced answers to the research questions, thus enabling analysis of complex phenomena of spatial, social and economic nature. The case study method refers to real phenomena and provides the opportunity to generalise on the basis of a well-documented case (Yin, 2009; Flyvbjerg, 2006; Kuhn, 1987). Using both case study and survey research in this study facilitated a multifaceted description of the investigated phenomenon. Although from a formal point of view, the sample is not representative, after a review of the literature and an analysis of materials received from BDG and PZD and interviews with the heads of these organisations, it was concluded that the cases show characteristic features of the way how German and Polish allotment gardens are managed. The sample size is related to the organisational and technical capabilities of the authors.

4. Results

4.1 Legal basis of allotment gardens and plot development

Two acts of law, the Bundeskleingartengesetz of 1983 in Germany and the Act on family allotments of 2013 in Poland, are the basic legal documents regulating how AGs function in both countries (Bundeskleingartengesetz, 1983; Ustawa o rodzinnych ogrodach działkowych, 2013). The provisions of the German and Polish laws on the organisational principles of how gardens function are similar. In both cases, the idea is as follows: AGs are to be divided into separate plots, have public infrastructure and operate according to the provisions for environmental protection. However, it should be emphasised that the German legislation also indicates a need for landscape protection. The presence of a hut is acceptable in both countries but the permissible surface of a hut in Poland is currently by 11 m^2 greater than in Germany (DE 24 m^2, PL 35 m^2). Moreover, only German regulations impose functional divisions on plots: a minimum of one third must be designated for the cultivation of horticultural crops. Thus, the productive function of allotments is supported or even "secured". The Polish act puts the emphasis on the role of AGs and such issues as the establishment and functioning of AGs, their

development and the obligations of plot-holders. The acts do not regulate the choice and location of plants nor the operation of environmentally-friendly elements, such as apiaries.

In the case of Germany, questions related to AGs are also regulated at the state level. According to Article 29(3) of the North Rhine-Westphalia constitution, AGs should receive support (Verfassung…, 1950). This appeal is made to all entities, e.g. the country, communes or associations and involves both financial assistance and support for horticulture as a whole (Kleingärten und Kleingartenanlagen, 2019). Both countries apply regulations on AGs specifying how they function. In Germany, they are formulated by allotment associations and include rules for obtaining a plot, organising and developing it, and rules for the participation of plot-holders in work on an AG alongside other responsibilities. Questions of environmental protection and animal husbandry in gardens are regulated, for instance, in Dortmund's AGs, the rules of integrated protection against pests should be complied with, which means no herbicides are allowed. Healthy plant residues must therefore be composted to improve soil quality. Tall trees are not acceptable, neither deciduous nor coniferous. The breeding of large animals, e.g. cattle and other livestock, and also pigeons, is not permitted, although apiaries are allowed. According to the regulations, any buildings should blend in with the landscape. Moreover, fencing, garden gates and paths must be adjusted to the general image of the garden (Mitgliedsbuch..., 2010). In Poland, the "Regulations on family allotments" prepared in 2015 by the Polish Allotment Federation are currently in force and set specific rules on how plots can be used and developed, as well as how an AG functions and can be developed, and the rules on using the common area and garden infrastructure. Planting ornamental trees including conifers is allowed on condition that they are slow-growing species and forms. A plot must be equipped with a compost bin and its holder is obliged to compost organic waste. There can be apiaries in gardens and under proper hygiene and sanitation conditions, pigeons, hens and rabbits can also be kept (Regulamin…, 2015).

Moreover, particular AGs apply internal regulations (in accordance with the provisions of the act and general regulations), for example, on the issues of water availability, car parking, etc. A comparison of current regulations on German and Polish AGs showed that they differ, e.g. in terms of the provisions regarding the duties of plot-holders (obligatory work for an AG), adjustment of garden infrastructure to the landscape, the permissible surface of huts, compulsory cultivation of one third of the plot, the choice of plant species and the approach to biodiversity.

4.2 Spatial management of allotment gardens

Research conducted in both regions revealed many differences and similarities in the development and use of AGs and their plots (Tabs. 3 and 4). In both countries, AGs consist of two areas – the common space and individual plots with publicly accessible thoroughfares (roads, paths). It was observed that the individual plots vary in size (area occupied) in the different AGs. In the Westphalia and Lippe region, common space accounts for about one third of the total area of AGs and sometimes consists of several functional parts. These common areas have such features as educational centres (specialised building or common room with an extensive educational area), restaurants, bars, recreational area (gazebo with barbecue, benches) and educational plots, including sensory flower beds adapted for those with disabilities. The species structure of the plants in this part of the garden corresponds to the legal requirements. It is worth noting the high level of investment in this part of the garden and the care for its appearance. All plot-holders are under the obligation to engage in maintaining the communal parts of an AG used for integration, activation, education and therapy purposes.

However, in the AGs surveyed in Wielkopolska region, this is usually a compact and multifunctional area occupying about one fifth of the garden. This part is usually equipped with a community centre and office (with usually a small educational display – bookcase, table with books and leaflets), recreational area with a playground and playing field, information boards and garbage containers, outbuildings, shop and a place for storing various types of waste (including often bio-waste coming from the plots). Educational paths, which are a kind of novelty in the development of common space, are rare. The standard of this space is usually lower than in their German counterparts. The common space of Wielkopolska region AGs surveyed

Specification	Germany		Poland	
	Number of indications	%	Number of indications	%
Paved paths	72	64	72	60
Parking	70	63	57	47
Benches	31	28	21	17
Washing places	46	41	24	20
Playgrounds	23	21	29	24
Sports field/sports equipment	0	0	12	10
Allotment community centres	31	28	63	52
Compost bins/	18	16	25	21
Outbuildings	1	1	16	13
Notice boards	58	52	90	74
Restaurant/bar	16	14	3*	2
Shop	0	0	13	11

*Tab. 3: Use of AG public infrastructure by plot-holders in Germany (N = 112) and Poland (N = 121) (Note: *Shop with outdoor/seasonal bar area e.g. bench, table or umbrella). Source: authors' survey*

often feature tall trees and coniferous plants (including thuyas, spruces and junipers), which is not in accordance with the existing regulations.

Respondents' views on the use of public infrastructure confirms the differentiated management identified for the gardens (Tab. 3). The elements most often used in AGs in both regions are paths, parking lots and notice boards. In the AGs studied, a difference can be seen in the level of use of such aspects of public infrastructure as sports fields, outbuildings, restaurants or bars and shops.

The degree to which a garden is accessible and how it fits into its surrounding landscape varies between the regions studied. The field research and the analysis of orthophotos showed that the standard AG in the Westphalia and Lippe region blends into its surroundings and as such constitutes a harmonious part of the landscape. Fencing (gate, fence) does not isolate the garden space from adjacent areas. It is accessible to both the community of plot-holders and external users and the communal areas in AGs are open to everyone. Garden paths often act as a shortcut/a way through the garden and connect to thoroughfares in the neighbourhood. On the other hand, a standard AG in Wielkopolska region is often a closed space for use by authorised persons. Often fencing on AGs is high and made of precast concrete blocks tightly enclosing the garden space. Locked gates are frequently solid and non-transparent, equipped with locks, cameras and intercoms, thus making it difficult for outsiders to access AGs. As a result, the garden is often a barrier to movement and inconsistent with its surroundings. Plot-holders are anxious about their property as well as the safety of their guests, especially children. That is why AGs often are accessible only by plot-holders, their families, friends and groups who are formally invited. Finally, there is no obligation to work on maintaining the space of AG and its community.

Moreover, in German conditions, some cities require specific kinds of huts and special construction designs are available. As a result, huts are a relatively harmonious component of AGs. As there is no similar requirement in Polish law, it is often the case that AGs in Wielkopolska region are not consistent with their surroundings. The lack of architectural and construction standards regarding huts (in terms of design, colour and building materials) results in excessive diversity, which in extreme cases gives the impression of slums. In agglomerations, residents' access to urban greenery and thus to AGs is important. However, strong urbanisation pressure may limit this possibility. Therefore, in the matter of AGs, especially with regard to how they develop, it is important to listen to experts, who are the official representatives of AGs and cooperate with local authorities.

The scope of collaboration between urban authorities and AGs in the regions studied is diverse and interpreted in various ways. German experts perceive this cooperation as AGs being present in spatial planning and in the process of landscaping an urban unit: "(…) in the state, 95% of AGs

Criterion	Germany	Poland
Relation to spatial planning of city	strong – presence of AGs in spatial planning of an urban unit. New AGs are created in accordance with spatial development plans	moderate – not all AGs are included in the spatial development plans, some AGs are intended for other functions
Common space	proportion of surface area of AG from 30 to 40%	proportion of surface area of AG from 18% to 22%
Functions of common space	priority for space development is education, integration, activation, therapy, growth in biodiversity; moreover, the maintenance of joint space requires the engagement of all plot-holders	development enabling integration, neither participation nor personal engagement required in maintenance of joint space of AG
Common space available for visitors not related to AG	freely accessible	available for limited groups of people – usually: plot-holders' families and their friends; gate often locked, intercom, closed-circuit television and instant monitoring, key, remote control
Landscape cohesion (relation with surroundings)	development of AGs blends into landscape to large extent: • gardens open to the urban community • fences, gates fit harmoniously into their surroundings; they do not constitute an insurmountable barrier for city dwellers • garden paths are often integrated into the transport routes of the city	development of AG blends into landscape to various degrees, not always coherent • few gardens open to the urban community • high fence, usually concrete, surrounding the garden; • the garden is usually a barrier to traversing
Functions of AG	recreation and plant-growing with stable productive function	recreation and plant-growing with a tendency to marginalise the productive function
Environmentally friendly development and elements of AG's infrastructure	display plots/educational plots and educational boards and paths in the common area	few AGs have educational boards or paths in the common area

Tab. 4: Comparison between the development of AG in Westphalia and Lippe region (Germany) and Wielkopolska region (Poland). Source: authors' elaboration based on survey, interviews and study visits

belong to the city or commune, thus the resources of AGs are taken into account and their future functioning in the development of the city is determined" (Expert DE). The city promotes AGs as open green areas (Manager DE1), mainly for recreation and ecological food production (Manager DE2). In Polish conditions, when speaking about cooperation, attention is usually paid to financial issues – "(…) a city's authorities usually subsidise AGs, but only those open to city inhabitants" (Expert PL). It is also important that the city helps in an attempt to put an end to the phenomenon of permanent residence on plots (Manager PL4).

According to experts, in cities in the two regions analysed, the availability of AGs and plots (supply) is guaranteed. At present, in Westphalia and Lippe region "(…) the areas of AGs are large enough, and new AGs are created in accordance with spatial development plans. In new residential areas, a need for AGs will be recognised and they will be designed and equipped accordingly. Currently, no AGs are being liquidated, neither partially nor entirely" (Expert DE). It is worth emphasising that "(…) according to the applicable regulations, already existing AGs must be redesigned in order to be more open and have attractive spaces, play areas and infrastructure. The liquidation of AGs due to the construction of housing estates or industrial investments is very rare. This is likely to happen in the future when there is greater demand for housing" (Manager DE4). In the Wielkopolska region "(…) the number of plots ensures any willing owners have the possibility of obtaining one. The liquidation of AGs carried out by urban authorities is the result of the city's development plans, i.e. the construction of roads and housing, and this is most often only partial, involving a few plots. The city of Poznań has taken steps to restore liquidated plots and, where possible, to use this opportunity to designate additional areas of the city for the creation of a larger AGs than the liquidated ones. Possibilities for new AGs have appeared in smaller cities (Mosina, Czerwonak, Środa Wielkopolska), although in large cities, the location of new AGs is restricted by a lack of vacant areas. It is important, however, for any restored AGs (those replacing liquidated ones) to be situated in new housing neighbourhoods" (Expert PL).

German and Polish experts are united in the view that AGs must be developed in compliance with the provisions of the legal acts on allotment gardening (Bundeskleingartengesetz, 1983; Ustawa o rodzinnych ogrodach działkowych, 2013). In both countries, there is an ongoing debate on the ways of developing AGs with respect to their future role in the urban structure and how they are perceived by its inhabitants. In Poznań, where "(…) demand and supply for AGs are balanced, care should first be taken to improve the development standards of existing ones. On the other hand, in towns with a surplus of plots, AGs are often poorly developed and resemble a chessboard, with abandoned plots adjacent to cultivated ones. In the near future, if it is not possible to give plots to those willing to take them on, field and legal regulations ought to be introduced in agreement with the city authorities to make it possible to improve AGs and return free areas to the city" (Expert PL). In Germany, experts meeting at the 2007 congress (Kleingärten mit Zukunft..., 2007) noted that extending the social functions of AGs was followed by modernisation of allotment gardening, which is visible in the development of AGs and plots. Developing the technical infrastructure (water, sewage system, electricity) on a plot influences its maintenance costs. Thus, questions arise about access of plots for the less affluent. It is worth emphasising that over the last few years support for investment in AGs from external funds has increased in Wielkopolska region, and this support comes primarily from local governments (city and commune offices). In 2017, 26 AGs received subsidies for the infrastructure construction or modernisation. The local government helped to build and modernise allotment community centres and external fencing, to make renovations and harden AGs pathways, as well as modernise the electricity supply network. Moreover, grants from the Provincial Environmental Protection and Water Management Fund supported the construction of educational paths in four AGs. Other subsidies helped to start outdoor gyms, enriching the recreational possibilities of two AGs. The city of Poznań has for several years supported investments in AGs. PLN 250,000 (EUR 56,000) was allocated for this purpose in the 2018 budget on condition that such co-financed AGs will be open to the public. Such activities contribute to improving the image of AGs, which are often perceived by city dwellers as space appropriated by allotment-holders as areas for their individual recreation (Expert PL).

4.3 Spatial arrangement of plots

AG plots in Westphalia and Lippe region and Wielkopolska region differ in terms of the number and size of the plots. The study indicates that the average surface area of a plot in the German allotments analysed is slightly larger than in the Polish ones (DE = 398.5 m^2 and PL = 378.2 m^2). Plot area differs widely and the average area in both regions surpasses the national average (see Tabs. 1 and 5).

Specification	Surface area (m^2)								
	Act		Surveys						
			Germany			Poland			
	Germany	Poland	min	max	mean	min	max	mean
Plots (m^2)	> 400	> 500	250	680	**398.5**	210	650	**378.2**
Huts (m^2)	24	35	10	60*	**22.2**	3	35**	**24.1**

Tab. 5: The surface area of huts and plots in Westphalia and Lippe region (Germany) and Wielkopolska region (Poland). Source: authors' survey
*Notes: *the consistent indications of German respondents showed that the surface of the hut was exceedingly large. During study visits, no huts were identified that exceeded the regulation size; **despite the fact that Polish respondents always gave the surface of their hut as being in accordance with the applicable standards, study visits revealed the existence of oversized huts. In bold – differences for plot size and huts were found by ANOVA to be statistically significant for independent groups: p = 0.0498 and p = 0.0369, respectively (significance level 0.05; for Germany and Poland)*

In both regions, the allotment arrangement includes: a part with a recreational infrastructure (swing, sandpit, barbecue area, etc.), cultivation (edible beds, greenhouses, hothouses, apiaries, etc.), ornamental (beds with ornamental plants, lawn) and a hut, tool shed, fence and paths. German allotment holders have been found to adhere to legal requirements when developing their plot: in addition to being a place for recreation and leisure, a plot is always at least 1/3 part used for food production (fruit, vegetables, herbs) (Figs. 3 and 4). In the case of Polish plots, individual parts are very different in size (Fig. 5) and sometimes do not exist at all. Marginalisation or even disappearance of the cultivation section was observed (Fig. 6). The lack of any obligatory plot cultivation, as is the case in Germany, makes the recreational function more significant, so much so that this is frequently the sole function of plots. Consequently, grass is the main "crop" on the plot (Figs. 5 and 6). The field research indicates that the way plots are arranged is a result of the particular attitudes of allotment holders and the legal framework within which the AGs operate.

In light of the surveys, the basic element of the plot equipment in the AGs surveyed is a brick hut (DE = 84%, PL = 76%). In both regions, huts have a similar surface area (DE = 22.2 m^2 and PL = 24.1 m^2) and are consistent with the existing regulations in both countries (Tab. 5). The terrace (DE = 71%, PL = 54%) and tool shed appears just as often (DE = 64%, PL = 69%). The respondents' plots have diversified technical infrastructure (Tab. 6). Although access

Specification	Germany		Poland	
	Number of cases	%	Number of cases	%
Conventional electricity	103	92	92	76
Solar energy	3	3	0	0
Wind energy	1	1	0	0
Waterworks	95	85	82	68
Well	22	20	25	21
Collective sewage system	22	20	6	5
Cesspool (septic tank)	3	3	35	29
Small water treatment plant	3	3	1	1

Tab. 6: Utilities available on a plot in Germany (N = 112) and Poland (N = 121). Source: authors' survey

Fig. 3: Example of cultivation and recreation plot – note the predominance of cultivation. (Dortmund, Westphalia and Lippe region, 2016). Source: Photos taken by the authors

Fig. 4: Example of recreation and cultivation plot – note the presence of conifers (including tall trees) (Dortmund, Westphalia and Lippe region, 2016). Source: Photos taken by the authors

Fig. 5: Example of a traditional plot development – note the presence of cultivation (Gniezno, Wielkopolska region, 2016). Source: Photos taken by the authors

Fig. 6: Example of a new trend in the development of a plot – note the predominance of lawns and conifers (cypresses) (Gniezno, Wielkopolska region, 2016). Source: Photos taken by the authors

to electricity is not essential for traditional plot gardening, it is standard. The same is true of access to water and the sewage system. The use of unconventional energy sources in some German plots is worth noting.

The majority of huts on plots do not have heating (DE = 56%, PL = 67%), and if they do, the method of heating differs significantly. In German huts, gas (29%) and electric heating (12%) are used, whereas in Polish ones, a fireplace (17%) is more common. Polish plots are more ornamental and recreational, with rockery gardens, hedges, flower beds and swings appearing more often. In Germany, on the other hand, the elements of equipment selected indicate their plant-growing and ecological character (greenhouses, beehives, ponds, birdhouses and bird feeders), as well as recreational equipment (benches and grills) (Fig. 7).

The hut, a basic element of the plot, influences how it is perceived – the perception of the aesthetics of the plot and the landscape cohesion of the whole garden (Tab. 7). Experts from both regions stressed that allotment holders are bound by provisions regulating the size of these buildings and the way it which they are used. However, in German conditions, some cities and towns require specific kinds of huts, e.g. made of wood or stone (Manger DE4). "Every type of hut needs a special construction design; in Dortmund 14 such designs are available" (Expert DE). Additionally, when selling a plot, its vegetation and hut must be restored to a state that meets the rules in force (Manager DE2), which limits the possibility of extending huts and retains the relatively harmonious and coherent landscape of AGs. Despite the fact that the surveys did not reveal the presence of any oversized huts (possibly because some allotment holders were afraid to admit that they were breaking the law), both expert statements and field surveys confirmed this fact. In Poland, despite specific regulations on the size of huts, "(…) they are oversized and in some cases permanently inhabited" (Manager PL1). "Court judgments ordering demolition are issued, but are often not executed due to the costs" (Expert PL). It is worth noting that in older AGs there are no above-standard-size huts (Manager PL3), which is related to the former, more restrictive legislation. The field survey confirmed the existence of huts built during the communist period, when aesthetics were of lesser importance due to shortages of building materials. At that time, huts were built, e.g. from parts of old trucks or other suitable remnants. In Poland, there are no legal regulations or local by-laws regarding the architectural and

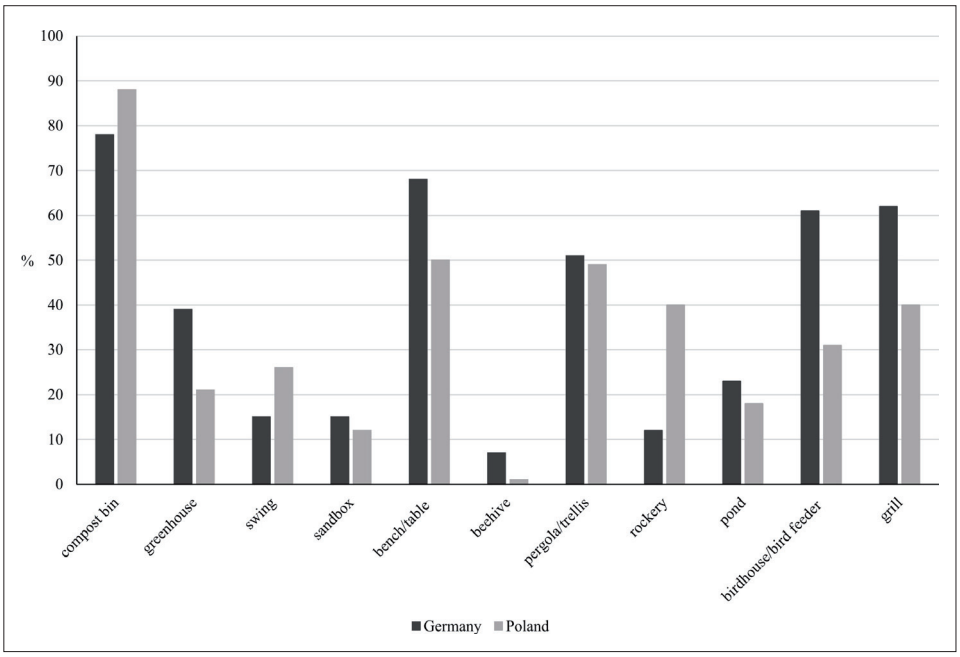

Fig. 7: The equipment of plots in Germany (N = 112) and Poland (N = 121)
Source: authors' survey

aesthetic principles of hut construction. The considerable diversity of these buildings in the survey findings in extreme cases creates an impression of a slum dwelling and prompts discussions on the aesthetics of AGs.

Furthermore, German huts are sometimes equipped with illegal toilets or even bathrooms, while in AGs from Wielkopolska region, mainly in Poznań, permanent residence on AGs is increasingly common (i.e. illegal housing function). This is often influenced by good access to the infrastructure (the standard is a hut with a toilet, bathroom and kitchen) and the convenient location of an AG.

The findings from field research are in line with the opinion of Expert PL, who pointed out that "Regulations in Poland do not impose any specific rules regarding the way of developing a plot. What can exert a considerable influence on the improvement of environmental conditions is proper infrastructure of AGs and their equipment, as well as a tendency to expand biologically active areas" (Expert PL). In German AGs "(…) the reasonable and economical use of water is advisable" (Expert DE). Particular attention is paid to the collection and use of rainwater (Manager DE3) and also to reducing soil sealing – thereby increasing its permeability (Manager DE 4). In Poland, in accordance with the Regulations on family allotments, "(…) every plot-holder is obliged to keep a compost bin. Water management, however, depends on the individual plot-holder, although water charges help encourage reasonable use. Green garden avenues are increasingly popular, while asphalt and concrete are rare" (Manager PL4). However, field research did reveal that on the plots rainwater is recovered occasionally, whereas nesting boxes, beehives and insect hotels rarely appear. Although compost bins are compulsory on Polish plots, they are rarely used properly. Plot-holders often only have mock compost to keep up appearances.

On the basis of the survey results, an attempt was made to determine the links between recreational and productive development and selected social characteristics of the allotment holder. It was assumed that the recreational development of a plot includes a table, bench, barbecue, swing, sandpit, rockery, pergola and pond. The productive development included infrastructure elements used for cultivation and food production: a tool shed, greenhouse, cold frame, polytunnel and beehive. Pearson's coefficient (r) was applied according to the type of data. These results are presented in Table 7.

The highest values of the correlation coefficient were recorded in the case of the development for productive purposes of Polish allotments - with the increase of the level of education, professional activity of the allotment holder, the occurrence of elements of production infrastructure is reduced. In the case of German allotments, the level of correlation coefficient for these variables was very low. An

Variables	Recreational development		Productive development	
	DE	PL	DE	PL
Allotment holder's education	0.179	– 0.016	– 0.165	– 0.212
Allotment holder's economic activity	0.161	0.046	– 0.076	– 0.240
Net monthly income	0.051	– 0.052	– 0.017	0.033
Number of persons in household	0.268	0.098	– 0.017	– 0.152

Tab. 7: Correlations between recreational and productive development and selected social characteristics of the allotment holder (Pearson correlation coefficient; α = 0.05)
Source: authors' survey

analogous situation occurred in the Polish plots in relation to the elements of recreational infrastructure. The recreational management of German allotments was influenced by the number of persons in the household.

Large coniferous trees and shrubs commonly grow on the plots surveyed Wielkopolska region, although this is not in accordance with the garden regulations. Oversized trees sometimes cause conflict between allotment holders. German regulations prohibit the planting of any large coniferous trees and shrubs on the plot. As a result, tall trees (deciduous and coniferous) appear sporadically in the plots in Westphalia and Lippe region. Moreover, evergreen shrubs (e.g. coniferous) ones are rarely found in German plots, which may be related to better enforcement of legal regulations than in Poland.

In addition, field studies in both regions plot fences that are too high and non-transparent are sometimes. However, in Germany, allotment fences are mostly low and openwork. Allotment owners often use useful plants (e.g. raspberries, gooseberries), occasionally evergreens, in the hedges that form the fence. On the other hand, the fences of Polish allotments are often strips of tall, dense evergreen plants (common species used are thujas and junipers).

Various types of plot developments were recorded, resulting from both legal provisions and how they are observed. In Poland, where the standard requirements related to plot development are more lenient, their functional types vary to a much greater extent. The following main categories of plots were identified Wielkopolska region: recreational with a predominance of ornamental plants, recreational with a predominance of horticultural crops, holiday plots, residential plots, and fully-cultivated plots. However, the latter plots appear very rarely. It is worth mentioning that there are also educational-integration plots, although their presence is very limited. In Westphalia and Lippe region, in addition to recreational and edible plant-growing type plots, there are also educational and integration plots. Vacancies and abandoned (unused) plots occur in both countries. In both countries, the concept of model plots also exists, although it is perceived differently. In Germany, model plots are mainly ecology-oriented, while in Poland the ornamental appearance of a plot still seems to be most important. In Wielkopolska region, this approach to developing a plot is supported by the "Zielony Poznań" competition, during which "the most beautiful plot" is selected. Although other competitions are held (e.g. the Model Plot, Family Allotment of the Year, organised by PZD, in which ecology is taken into account, the appearance of an individual plot still plays a major role. Therefore, the look of a single plot is important for the city authorities, PZD and plot-holders themselves, whereas insufficient attention is paid to the aesthetics of the AG as a whole.

5. Discussion

Today's AGs are an integral part of a modern city. The position of AGs is related both to the heritage of sociable city planning and also to the attitudes of gardeners resisting economic pressures. In effect, AGs are community-controlled green enclaves opposed to the pressure of neoliberal urbanism (Bartłomiejski and Kowalewski, 2019). Our research shows that representatives of allotment gardening in both Germany and Poland perceive AGs as an important subject of urban policy. Plot-holders in both regions point to significant changes in allotment gardening due to the changing needs of their users and also to the needs of other urban residents. According to Duś (2011), gradual changes in the way of developing and arranging the plot and using the allotment is the consequence of socio-economic changes in urban centres. This was also noted by Breuste (2010), Duží et al. (2017), Sovová (2015), Spilková and Vágner (2018), Tóth, et al. (2018). Our research indicates that cooperation between AGs and municipalities in both countries is on different levels of development, on a different scale and also takes different forms. In Westphalia and Lippe region, AGs are promoted as open green areas, mainly for recreation and ecological food production. Existing AGs must be redesigned in order to be more open and have attractive spaces, play areas and amenities. AGs' cooperation with the city is also reflected in their presence in the spatial planning of urban units, and new AGs are created in accordance with spatial development plans. The liquidation of AGs due to the construction of housing estates or other investments is very rare. In new residential areas, the need for AGs is recognised and they are designed and equipped accordingly. For AG experts from Germany, the issues of spatial planning in the context of the location and operation of AGs are of key importance.

By contrast, in Wielkopolska region, not all AGs are included in the spatial development plans. In addition, in such plans some AGs are earmarked for other functions.

Criterion	Germany	Poland
Landsape cohesion (external relations)	• huts with a coherent "architectural style"	• variety in the "architectural styles" of huts
	• fencing usually built in compliance with regulations	• fencing often built in contravention of regulationyy
Huts	most huts meet legal requirements	huts are sometimes oversised
Structure of plant species in plot	meet legal requirements, i.e. significant of plot is covered with crops; coniferous shrubs appear sporadically	no legal requirements – major share of trees and coniferous shrubs as well as large (deciduous) trees, ornamental plants and lawns
Environmentally friendly development and elements of plots infrastructure	nesting boxes, beehives, insect hotels, wide use of recovered water, common use of composter	formally composters are obligatory, though these are often merely mock composters; nesting boxes, beehives, insect hotels, tanks for rainwater recovery are rare

Tab. 8: Comparison between the development of plots in Westphalia and Lippe region (Germany) and Wielkopolska region (Poland)
Source: authors' elaboration based on survey, interviews and study visits

Liquidation of AGs carried out by urban authorities results from urban development projects, i.e. the construction of roads and housing. Local authorities are obliged to restore liquidated AGs within the same city, although this is usually in a less favourable location (e.g. in terms of public transport). Moskalonek, Połom and Puzdrakiewicz (2020) emphasise that older plot users are often unable to reach these new locations. Sifting AGs to more outlying locations also deepens the deficit of biologically active areas in the central districts of cities (Borysiak et al., 2017). Furthermore, experts from Polish AGs emphasised supporting how AGs function (e.g. Co-financing of investment in gardens, solving problems related to illegal residence) and directly indicated the need to protect them.

Other studies also confirm this need to protect AGs in the urban space, e.g: planning protection (Poniży and Stachura 2017; Szkup and Pytel, 2016), legal protection (Calvet-Mir and March, 2019; Trembecka and Kwartnik-Pruc, 2018; Weirich, 2007) and historical and cultural protection (Acton, 2011). Studies by Lorbek and Martinsen (2015), Spilková and Vágner (2016), Gibas and Boumová (2020) also raise the issue of AGs protection in a situation of increasing urbanisation and investment pressure. Simon-Rojo et al. (2016) indicate that following the collapse of the communist system in Central and Eastern Europe, the structures of allotment gardens changed dramatically, e.g. in the Czech Republic and Slovakia, some gardens disappeared due to pressure to build new residential or commercial areas. Both German and Polish respondents also stressed the need to cooperate with municipal authorities, as well as to include AGs in urban planning studies and municipal policy. In this way, they show the unique potential AGs have for the functional and spatial structure of the city. That said, it is difficult not to agree with Bartłomiejski and Kowalewski (2019), who claim that Polish urban development policies continue to make little use of their social, spatial and environmental resources. Spilková and Vágner (2016) point out that local authorities easily become disoriented in their conceptualisation of AGs, for AGs intersect with so many topics in urban planning.

AGs provide ecosystem services (Breuste and Artmann, 2015; Borysiak and Mizgajski, 2016) and are an important element of the green infrastructure (Breuste, 2010), which in areas with high urban pressure is becoming particularly important. The comparison of AGs in the two regions shows that they differ in the approach and creation of environmentally friendly development and elements of AG's infrastructure. In Westphalia and Lippe region, as in Germany as a whole, great attention has long been paid to implementing system services by means of allotment gardening (BMVBS, 2008). It should be emphasised that North Rhine-Westphalia is the only state where support for the allotment garden movement is enshrined in the state constitution (Article 29(3)). The funds are used to create new AGs, expand and renovate existing gardens in order to integrate them into urban and regional green systems (MULNV, 2009). In Poland, the ”Open Programme for the Social Development of AGs” was only recently developed and promoted, calling for the construction of modern gardens through different types of activities. It takes into account the community needs of the allotment community as well as other urban residents. It highlights the importance of AGs in the provision of cultural ecosystem services –allotment gardens as the green lungs of cities, a place for rest, recreation, learning, common integration, but also leisure activities for the whole local community (PZD, 2016). The "Open programme for modern management and use of allotments to meet the needs of modern families" was also adopted, which highlights the need to maintain and develop ecosystem-based productive services in Polish AGs (PZD, 2019). In Westphalia and Lippe region, the development of AGs and allotments is more diverse – multifunctional, allowing for the provision of a wider range of ecosystem services. In contrast, in Wielkopolska region, the greater importance of recreational development was observed. Allotment holders emphasised the use of sports grounds and shops, which may indicate that they spend their holidays on the allotment or even live there permanently. Such activities are particularly evident in naturally attractive areas, where it can even be the case that allotments are withdrawn for holiday recreation (Moskalonek et al., 2020). Furthermore, research by Borysiak, Mizgajski and Speak (2017) conducted in Poznan allotment gardens indicates that wresting AGs from city centres results in reduced support and regulation for ecosystem services.

It has been argued that the AGs studies are the “third space” being characterised by strong dichotomies (DeSilvey, 2003; Spilková and Vágner, 2016). German AGs are open to the outside, a conglomerate of private and public space. In contrast, AGs in Poland are mostly closed spaces. It is hardly accessible or even inaccessible to other city dwellers. However, the "opening" of AGs is now somehow "forced" by the municipal authorities offering funds for the modernisation of infrastructure. Our study - especially the in-depth interviews with PL Experts - shows that the limited accessibility of Polish AGs leads to them being perceived as misappropriated space – private/individual recreational space. Orzechowska-Szajda and Podolska (2013) also notice that in Poland the way AGs function as mostly closed areas is one of the reasons for the reluctance to this form of space management. Such a state of affairs makes it difficult to promote and protect AGs operating in the urban tissue subject to pressure from other forms of use.

Similarly, research conducted in the Czech Republic has shown that "(…) allotments also feature relatively large enclosed enclaves, separated from public paths by locked passages that prevent public use (...). The gardeners do wish to keep a certain level of privacy and security, however, which can be interpreted as a sign of the privatisation of these spaces" (Sovová and Krylová, 2019, p. 116). Koopmans et al. (2017) emphasise that "the prospect of the allotments being publicly accessible is perceived as an intrusion that disturbs the appreciated home-like intimacy". Both in Poland, where AGs may be entered only by plot-holders, their families, friends and groups formally invited, and in the Czech Republic "When exploring the nature of social encounters in the allotments, we noticed that most were rather “private” – gardeners would invite their family or friends to their plot, or they would meet in small groups with their garden neighbours” (Sovová and Krylová, 2019, p. 115). Mokras-Grabowska (2020, p. 251) admits that in Poland access to AGs is still very limited but she points out that "they create the identity of local communities" and sees them as "symbolic spaces”, and ”familiar and friendly".

In the regions studied, as in other parts of Germany and Poland, AGs are a traditional element of the urban landscape (Bell et. al., 2016, Pawlikowska-Piechotka, 2010). They are also an integral element of the urban structure and, together with other forms of land use, form a common urban organism (Szkup and Pytel, 2016). However, the way AGs

are inscribed into the urban landscape differs. In Germany, a harmonious fit with the surroundings is fostered by legal requirements. According to the law, when developing AGs and plots of land, environmental, nature conservation and landscape management aspects must be taken into account (Bundeskleingartengesetz, 1983). In Polish cities, although AGs often co-create a larger green area, they are clearly separated in this space. Studying AGs in Warsaw, Bieganski (2015, pp. 10–11) also noticed that many of them are separated from the city by a robust fence. This results in isolation with "an unfriendly curtain separating privileged allotment holders from residents reliant on public green spaces". Research conducted in Wielkopolska region AGs shows that the reason for the isolation of allotment holders is the need to create a safe space. Sulima (1990) describes AGs as a space "between paradise and a rubbish heap", bringing together both positive (paradise is nature) and negative (a rubbish heap is artefacts) elements, which undoubtedly affects the perception of its integration into the urban landscape. It is also common among landscape architects and planners to perceive allotment gardening as an anachronism, a remnant of the communist period, and a relic of an earlier era (Kosmala and Kamińska, 2013). Szkup and Pytel (2016) point out that the creation of AGs in Poland was a spontaneous phenomenon, very often not taking urban plans into account. In addition, the "temporariness" of these plans significantly influenced the location of AGs, which was not always rational and in subsequent decades led to their being liquidated or relocated. Research conducted in AGs in Łódź indicates that although not all huts and plots are well cared for, in urban complexes, especially in industrial districts, gardens often play a shielding and masking role against non-aesthetic urban development (Szkup and Pytel, 2016).

This study indicates that in both countries, the regulations concerning plot development are not fully respected. This is also confirmed by research carried out by Giedych and Poniży (2013), Lorbek and Martinsen (2015), Oldengott (2007), Weirich (2007). In the German region, errors in the implementation of legal regulations are highlighted, which is related to insufficient knowledge of regulations or their overinterpretation (MULNV, 2009). In Poland, the existing legal acts concerning the use of plots have become more flexible compared to previous provisions (Kacprzak et al., 2020). Plot-holders have ever greater liberty in diversity of plot development. On the one hand, this suits their needs much better, but on the other, is conducive to abandoning cultivation, increasing lawn area, uncontrolled expansion of oversized huts and permanent residence on plots (Bellows, 2004; Duś, 2014; Dymek and Bednorz, 2017; Orzechowska-Szajda and Podolska, 2013). The present study also confirms Romanowski's observations (2012, p. 281), who notes that "regulations on AGs determine the rules of their development and use of a plot, but these are only quantitative criteria concerning the size of buildings and are general in terms of functionality and aesthetics". No attention is paid to the spatial layout of a plot and its compatibility with the neighbourhood. This results in a great diversity in plot development, especially regarding the share of land designed for the cultivation of horticultural crops as well as the construction of huts. The unsightly development of some plots was observed, which also reflects previous practices coming from the period when building materials were difficult to obtain. Thus, not incidentally the actual development of Polish AGs and their plots results in AGs being perceived as slums and causes their negative public perception. Orzechowska-Szajda and Podolska (2013) are of a similar opinion and underline that AGs in Poland are sometimes perceived as a space that causes many aesthetic controversies. In the Wielkopolska region AGs, we observed the presence of both neat and tidy plots and plots resulting from accidental collecting and hoarding (so called Diogenes Syndrome). This does not facilitate the protection and promotion of AGs in Poland, as it is difficult to protect an "ugly space", that is used by "selected" city dwellers. Crouch and Wiltshire (2012, p. 128) analysed designs on a plot in Great Britain in terms of the future for allotments in urban landscapes, and see AGs as "Landscape marrying regulation with disorder, an anarchic invention, a never-ending work in progress". This is analogous to Czech studies, where the appearance of allotments is specific. All of our research sites allowed for small houses or garden sheds on the plots, but there were no norms regarding their appearance (other than a size limit). (…) Appearance was a major point of criticism in some recent discussions about the future of Czech allotments (Sovová and Krylová, 2019, p. 113). Kožešník (2018) and Gibas and Boumová (2020) point out that allotments were described as "resembling slums" or "ulcers on the face of the city". No strong relationship was found between recreational and productive development and selected social characteristics of the allotment holder, This is probably due to the fact that (as noted during the field research) the way the plot is developed reflects the personality of the allotment holder and especially their motivations for having one (Maćkiewicz et al., 2021). This is also supported by Crouch's observations (2000), according to whom AGs are neither places of agricultural production within the city, nor places for passive leisure, they are somewhere in between.

The study showed that the standard of development of AGs and plots (materials used, quality of workmanship, and level of investment) varied in the regions surveyed. The Polish plots are highly differentiated in this respect, ranging from the very neglected to the very "fancy", from a very low level of investment to a kind of "splendour", while the standard of those in the German region is more even/uniform. This is probably related to do with different legal regulations concerning the rules for valuing a plot in case of liquidation of AGs or transfer of a plot to another tenant. In Westphalia and Lippe region, as in the entire state, the value of the plot (hut, crops) is not subject to free market mechanisms, which curbs investment impulses in favour of taking over the plot in a socially responsible way (LWLK, 2013). In Poland, when AGs are liquidated, the amount of compensation should reflect the market value. Plot prices are regulated by supply and demand, depending primarily on the level of investment and location (Rostkowska, 2017; Law, 2013). In the last year, due to the restrictions resulting from the Covid-19 pandemic, there has been a boom in demand for plots in AGs, which has fed through into increases in their prices (Kazmierczak, 2020; Karpieszuk, 2020).

Based on the assessment of plot development, it was found that plot types and their functions also differ in the two regions. The increased importance of recreational functions in AGs is noted in both countries. Its intensification is mentioned by scholars such as Bell et al., 2016; Pawlikowska-Piechotka, 2012. Simon-Rojo et al. (2016), who emphasise that in many countries of Northern, Western and Central Europe, although allotment gardens are common and have a long tradition, their functions have changed from self-sufficiency to recreation, despite local legislation or regulations specifying a minimum area allocated to food

production. This was the case in Germany. In Poland, relaxation of regulations on the acceptable size of huts and on plot development has led to cultivation being replaced by recreation, and sometimes even illegal housing. The considerable freedom that Polish plot-holders enjoy gives rise to various types of negative phenomena, such as gradual marginalisation of the edible-plant growing function and the accompanying arbitrariness in plot development, which is particularly reflected in the increasing space devoted to lawns and huts. As a result, plots are becoming more and more mono-functional – only recreational. This process began in the 1990s (Bellows, 2004; Dymek and Bednorz, 2017; Duś, 2014). Klepacki and Kujawska (2018) argue that at present Polish plots and AGs are becoming more akin to pleasure gardens.

On the basis of their spatial-functional analysis of the organisation of individual plots in AGs located in Poznań, Borysiak et al. (2016) distinguished four types of usage: vegetable cultivated, vegetable cultivated-ornamental, ornamental, abandoned with their corresponding plant characteristics. Their study indicates even more diversified ways of using and managing plots, which translates into a greater number of their types. While identifying them, the increasing tendency of Polish plot-holders to focus on recreation was observed. A similar trend was observed in the Czech Republic, where, as Sovová and Krylová (2019) note, the use of gardens is slowly changing. Through their observations they confirmed that gardens now provide recreation beyond cultivating plants and one in four plots is composed solely of greenery. The increasing plot space devoted to lawns and the fact that this often covers the entire plot should be regarded as an extremely worrying trend, as it is evidence of the disappearance of the productive function, which is one of AGs' core functions (see e.g. Sovová, 2015; Sovová and Krylová, 2019). Cultivation of fruit and vegetables has been replaced by the intensive cultivation of lawns. Copious watered, fertilised and 'protected' with pesticides, these lawns are exclusively a non-food crop.

Moreover, as the most common part of open green spaces and urban green infrastructure, lawns are important contributors to the homogenisation of urban landscapes and loss of urban biodiversity (Ignatieva and Stewart, 2009; Ignatieva and Ahrné, 2013; Ignatieva et al., 2020). To describe the low environmental value of modern lawns, the term "green desert" was coined by Allen et al. (2010). For these reasons, it is very important to restrict the excessive expansion of lawns in AGs, and at the same time, to introduce nature-based solutions in their place, such as alternative sustainable lawns e.g. native species lawns, meadow-like lawns, spontaneous lawns or sustainable lawn alternatives e.g. grass-free lawns (see e.g. Ignatieva et al., 2020; Yang et al., 2019). What is more, our research confirms that we should evaluate in positive terms the legal requirement of allocating a minimum one third of the area of German plots to cultivation, as this guarantees that the productive function of the plot is retained. Maintaining food production on at least part of the plot is not only in line with the founding principles of allotment gardens but is also of particular importance at the present time, when many cities all over the world are initiating urban agriculture and food urbanism by developing local food strategies and supporting urban agriculture projects (see e.g. Drescher, 2006; Koopmans et. al., 2017). The growing interest in food production is observed among urbanities (Duží et al., 2017; Scheromm, 2015). Moreover, cultivating food on AGs is also line with the recommendations of the "Milan urban food policy pact" (2015). However, it is obvious that this should be one of AGs' many functions, and not the sole function of an AG.

Our study has some limitations which result from the strong regional focus, as the research is limited to only two regions, one in Germany and one in Poland. In the future, however, it would be advisable to extend the scope of analysis to other regions and countries. Further studies comparing the development and physical arrangement of AGs in Northern and Western Europe with Central Europe, as well as comparisons between the countries of the former Eastern Bloc, seem to be particularly important. Moreover, the study concentrated on urban AGs and did not take into account different types of urban areas and the size of cities. Our study suggests that the type of area (urban, rural) and the size of the centre have an impact on how AGs and plots are developed. It would be worth taking these aspects into account in future studies.

6. Conclusions and recommendations

This research made it possible to identify characteristic features of contemporary AGs and plots in Westphalia and Lippe region (Germany) and Wielkopolska region (Poland), as well as to reveal dissimilarities in their development. Despite the common, pioneering beginnings of the development of allotment gardening in both regions, the development of AGs and plots is different. They functioned in different socio-economic conditions, which had a strong impact on shaping the needs of city dwellers, and thus on the development of AGs and plots' functions. The development and use of AGs differs in both regions in terms of the accessibility and development of common areas of AGs, adjustment to the landscape, the scope of collaboration with local authorities, the types of plots and the way they are developed. This results primarily from existing legal provisions, the approach to their observance and the individual attitudes of plot-holders.

Our research shows that German allotment gardening is more open to the needs of direct and indirect users – city dwellers. The legal regulations reconcile the variety of needs, imposing the principles of management that take leisure and food production into account. AGs offer the city and its inhabitants' space for recreation, food growing, social integration and contact with nature. In effect, in Westphalia and Lippe region, in addition to recreational and edible plant-growing type plots, there are also educational and integration plots.

In turn, in Poland, after the transformation of the socio-economic system begun in 1989, AGs underwent sudden, insufficiently controlled identity changes, the consequences of which threaten the multi-functionality of AGs and their provision of all ecosystem services. AGs in Wielkopolska region are not as accessible, do not prioritise internal users, and do not always blend in with their surroundings. The importance of the recreation function grew markedly, which was particularly evident in the way plots are developed. Although the main categories of plots in Wielkopolska region were more numerous and varied than in Westphalia and Lippe region i.e. from recreational with a predominance of ornamental plants to fully cultivated, the considerable freedom that Polish plot-holders enjoy gives rise to the gradual marginalisation of edible-plant growing and accompanying great arbitrariness in plot development, especially reflected in the growing trend for lawns and

huts. As a result, in the case of Polish cities, ambiguous legal regulations on development related to the production function and problems with respecting legal regulations may lead to the disappearance of food production on plots in the near future.

The recommendation is to amend Polish legislation not only by introducing a provision regarding the mandatory use of a part of the plot for food production, but also the obligation to apply pro-ecological solutions in AGs. AG associations should also take special care to ensure the observance and enforcement of legal provisions by plot-holders. Together with local authorities they should promote AGs as multi-functional, open green areas, suitable for recreation, socialisation and ecological food production. Spatial policy should specify management conditions for new AGs created as a result of changes in land use. In the case of existing gardens, the current management principles should be reviewed and adapted to the needs of their users and city dwellers, and their location in the city's space. Regarding the AGs from Westphalia and Lippe region, it is necessary to maintain and comply with the regulations currently in force, as well as to continue the already adopted directions of action.

This study can be a useful source of information for city authorities, garden organisations and allotment holders in shaping the development of AGs and allotments both for the contemporary allotment user and the whole urban community. The study can also prove helpful in creating a positive image of allotment gardens and raising greater awareness of their importance among users of urban space, in this way, contributing to shaping the perception of AGs as an important element of the recreational, natural and agricultural structure of urban space. The study's results can also be used in promoting and protecting this form of land use and in formulating new strategies and local urban policies. This is particularly important in terms of improving the quality of life of city dwellers and better integration of AGs into green infrastructure and thus providing a wider range of ecosytem services.

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