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URBAN AGRICULTURE OF THE POZNAŃ AGGLOMERATION

Abstract: Urban agriculture is understood as farming conducted within and outside city limits, competing for resources (land, water, energy) that could serve not only a productive function but also environmental, landscape or recreational goals expected by the population living in those areas. An important advance in urban agriculture has been its recognition in spatial policies of agglomerations because of its multifunctionality and landscape values. Since the 1970s, urban agriculture has occupied a prominent place in the physical planning of West European agglomerations. Several measures have been taken to protect farming there, and even to restore it. In Poland, despite the great importance and large area of farmland in suburban zones, there has been little interest in this matter. The rapid pace of urbanisation in the Poznań agglomeration has resulted in the recent years in the advancing marginalisation of the agricultural function in its suburbs and vicinity, as well as along its transport routes. There is a programme in the 2011 Development Strategy of the Poznań Agglomeration, MultiFunctional Rural Economy, which is intended to protect parts of farmland most valuable in terms of production and landscape against urbanisation pressure. This study seeks to identify agricultural land in the Poznań agglomeration that should keep its original character, and to formulate recommendations for a spatial policy accommodating the conception of urban and multifunctional agriculture. The research covered farms, front/backyard gardens, and allotments situated in the Poznań agglomeration.

Key words: urban agriculture, spatial policy, Poznań agglomeration, Poland

JEL codes: Q, R

1. Introduction

Since the 1970s, urban agriculture has occupied an important place in the physical planning of West European agglomerations. Several measures have been taken to protect agriculture there, and even to restore it. Urban agriculture is regularly in-

ventoried and financially supported by the authorities of such cities as Paris, Vienna and Stuttgart, as well as those in the Ruhr Basin (cf. Giecwicz, 2005, Steinbuch, 2012, Krzyk *et al.*, 2013). Agriculture contributes its own abundance of forms and spatial patterns to the image of a city as a whole that add to its diversity.

In Poland, despite the great importance and large area of farmland in suburban zones, there has been little interest in this matter. This is due to the detrimental effect of a city on the development of its agriculture: it reduces the economic profitability of the traditional agricultural activity as one greatly limited by non-farming forms of land use.

With urbanisation processes intensifying in the Poznań agglomeration, in the city suburbs, its surroundings and along its transport routes, one can observe advancing marginalisation of the agricultural function. Unfortunately, this is often due to irrational management of its farmland (agricultural space) that greatly contributes to such adverse developments as a fragmentation of the natural environment, deterioration in the status of individual environmental elements, and the creation or aggravation of man-environment conflicts (Kacprzak, Maćkiewicz, 2013). It is advisable to preserve areas for urban and multifunctional agriculture, important not only in terms of sustainable development, but also fully capable of producing a variety of goods and services.

The goal of the research reported here was to identify agricultural areas in the Poznań agglomeration that should keep their present character, and to formulate recommendations for a spatial policy of the agglomeration that would accommodate the conception of urban and multifunctional agriculture. The research embraced farms, front/backyard gardens, and allotments located in the Poznań agglomeration.

2. Theoretical background

The problem of urban agriculture has been discussed for more than a decade now, and differences in the urban systems of food production are very wide. Studies of urban agriculture are imperfect in both, its definition and delimitation as well as distinguishing and describing this form of activity. In the foreign literature, despite a considerable number of positions in this field, urban agriculture has no generally accepted definition, and often various forms of agricultural production are described with no attention paid to differences in them (Schultz *et al.*, 2013). The definition describes urban agriculture as an activity that involves the production, processing and distribution of food and non-food products, animal husbandry, and forestry conducted in a city and suburban areas (Mougeot, 2000). The most popular definition of urban agriculture describes it as an activity involving a deliberate, intentional steering of biological processes of plants and animals in order to produce food and non-food products for both, commercial purposes and for one's own needs. It takes place in towns and in areas connected with them spatially and functionally (Mougeot, 2006, FAO, 2007, Lohrberg, Timpe, 2011, Fox-Kämper, 2012, Shutz *et al.*, 2013, Sroka, 2014).

Considering agriculture to be a key issue for towns, in the early 1990s the FAO defined urban and peri-urban agriculture as “agricultural practices within and around cities which compete for resources (land, water, energy, labour) that could also serve other purposes to satisfy the requirements of the urban population”. Today it is emphasised that urban agriculture is multifunctional. This means that farming helps to satisfy also other functions (apart from food production) desired by society (OECD, 2001). This conception shows the ability of agriculture to produce a wide range of goods and services useful especially because of the character of public goods. Apart from food production, agriculture performs non-productive functions that influence phenomena and elements of the land-use pattern, like biodiversity, control of soil and water pollution, food safety, agricultural landscape, cultural heritage, and the economic and social activation of areas.

A special form of urban agriculture is horticulture, including allotments, which have a rich tradition and a century-old history. The genesis of the appearance and development of allotment horticulture should be sought in socio-economic changes brought about by the industrialisation period. The Family Allotments Act, 2014) defines them as permanent elements of the infrastructure of communes that should be taken into consideration in the process of their development for the good of the present and future generations, and regards it as necessary to guarantee their further existence and development. However, there are no detailed directives for the implementation of those recommendations in the spatial policies of territorial units. The Poznań city’s *Study of the Conditions and Directions of Spatial Development* (SC&DSD) upholds the current function of allotments, but suggests measures intended to locate new allotments in peripheral areas as elements complementing the city’s system of greenery, and introduce green belts isolating allotments from nearby heavy-traffic transport routes, including motorways, and industrial facilities.

In the present study urban agriculture is understood as a farming activity conducted within and outside city limits, competing for resources (land, water, energy) that could serve other purposes besides production: environmental, landscape-related, recreational, or social, expected by the population living in those areas.

3. Methods

Use was made of land register data (by geodetic districts; as of 1 Jan. 2014) coming from the Poviát Centre for Geodetic and Cartographic Documentation in Poznań and from the Department of Geodesy and City Cadastre in Poznań (GEOPOZ) that allowed establishing the structure of the agricultural land use. Maps of the farmland distribution were prepared on the basis of data from the geodetic land and buildings register in the Database of Topographic Objects. To assess the natural environment in terms of its usefulness for agriculture, use was made of the method of valuation of agricultural production space worked out by the Institute of Crops, Fertilisation and Soil Science in Puławy.

The basic information about the area of front/backyard gardens, area of cropland, and livestock numbers in the agglomeration communes was obtained from the

2010 Census of Agriculture. It was used to establish the intensity of crop and animal production organisation and of the organisation of agriculture on the basis of Kopeć's method (1987) that relies on labour-intensity determinants for individual groups of crops and animals. The intensity of agricultural production organisation is the sum of the intensities of crop and animal production organisation. The intensity of crop production organisation is established on the basis of the proportion of field crops, orchards, meadows and pastures in the structure of farmland and their respective labour-intensity determinants. The intensity of animal production organisation is calculated on the basis of stocking rates of individual groups of animals converted into livestock units and their respective labour-intensity determinants. The following formula is used:

$$I = \sum(p * s_1) + \sum(q * s_2)$$

where:

I – coefficient of the intensity of agricultural production organisation,
 p – proportion of field crops, meadows and pastures in the structure of farmland,
 q – stocking rate of animals per 100 ha of farmland,
 s₁ – labour-intensity determinant for individual groups of crops,
 s₂ – labour-intensity determinants for individual groups of animals.

The level of the intensity of agricultural production organisation is expressed using the following intervals of the coefficient value:

- extensive: under 200 points,
- weakly intensive: 200–250 points,
- moderately intensive: 250–300 points,
- very intensive: 300–350 points, and
- highly intensive: over 350 points.

To determine the intensity of crop and animal production organisation, the same scale was adopted, but the limits of the coefficient were smaller by half. In spite of some methodological reservations, this has so far been the only synthetic measure applicable in this type of research on spatial differences in agriculture.

The material used to determine the preservation of agricultural areas derived from a survey research conducted in offices and from an analysis of Studies of the Conditions and Directions of Spatial Development (SC&DSD), local spatial development plans, and the development strategies of all communes and the Poznań agglomeration in force in 2013. Taken into consideration were less-favoured areas, by geodetic districts, identified on the basis of an appendix to the Ordinance of the Minister of Agriculture and Rural Development of 11 March 2009 concerning the specific conditions and procedure of granting financial assistance within the framework of the measure "Support for agricultural activity in the mountains and other less-favoured areas (LFAs)" under the Rural Development Programme for the years 2007–2013 (Official Gazette No. 40, position 329, with later changes).

Family allotments (FAs) in the Poznań agglomeration were characterised on the basis of data obtained from the Poznań branch of the Polish Association of Allot-

ment Holders. Additionally, an analysis was made of the provisions of the Family Allotments Act of 13 December 2013 and of the SC&DSDs in the city of Poznań.

4. Study area

The research covered the area of the Poznań agglomeration, which consists of the poviats-ranking city of Poznań and 17 local units constituting Poznań powiat: 2 urban communes (Luboń and Puszczykowo), 8 rural-urban communes (Buk, Kostrzyn, Kórnik, Mosina, Murowana Goślina, Pobiedziska, Stęszew and Swarzędz) and 7 rural communes (Czerwonak, Dopiewo, Kleszczewo, Komorniki, Rokietnica, Suchy Las and Tarnowo Podgórne; Fig. 1).



Fig. 1. Administrative division of the Poznań agglomeration
Source: own compilation.

Table 1. Areas of communes of the Poznań agglomeration and their coverage by local spatial development plans in 2013

Territorial units	Total area in ha	Per cent of coverage lsdp ¹	Farmland	
			area in ha	% of total area
Buk	9065	5.2	7663	84.5
Czerwonak	8259	18.9	3617	43.8
Dopiewo	10804	10.5	7668	71.0
Kleszczewo	7428	100.0	6720	90.5
Komorniki	6631	40.4	4388	66.2
Kostrzyn	15340	4.4	12062	78.6
Kórnik	18518	15.0	11761	63.5
Luboń	1351	99.5	532	39.4
Mosina	17107	19.9	8192	47.9
Murowana Goślina	17214	12.6	7691	44.7
Pobiedziska	18952	20.8	11780	62.2
Puszczykowo	209	29.8	152	72.7
Rokietnica	7917	13.5	6426	81.2
Stęszew	17463	6.0	12364	70.8
Suchy Las	11606	75.2	3147	27.1
Swarzędz	11330	10.6	7896	69.7
Tarnowo Podgórne	10156	51.7	7363	72.5
Poznań city	26182	40.1	8251	31.5
Agglomeration	215532	25.9	127673	59.2

¹lsdp – local spatial development plan

Source: own compilation on the basis of data from the geodetic land register and the Central Statistical Office.

In 2013 the agglomeration had an area of 215,532 ha, which accounted for 7.2% of Wielkopolska voivodeship (Table 1). Apart from the city of Poznań, the largest communes were Pobiedziska, Kórnik, Murowana Goślina, Stęszew and Mosina, located in the Promno and Rogalin Landscape Parks, the Zielonka Forest, and the Wielkopolska National Park.

For the Poznań agglomeration, the proportion of area covered by local plans was 25.9% in 2013, but differed widely in the individual communes. Only Kleszczewo commune had full planning coverage. The communes where this index was high are characterised by specific spatial conditions (Suchy Las – the Biedrusko military range covered by a plan, while in Luboń commune the area of its capital town is small). The communes where the area covered by plans did not exceed 10% were Buk, Kostrzyn and Stęszew.

The proportion of farmland in the Poznań agglomeration shows a characteristic longitudinal belt pattern. It is closely connected with the farming-related value of the land, which is also connected with other components of the natural environment (Głębocki, Kacprzak 2012). The highest proportion of farmland could be found in Kleszczewo (90.5%), Buk (84.5%), Rokietnica (81.2%) and Kostrzyn (78.6%), and the lowest, in Suchy Las commune (27.1%) and the towns: Poznań (31.5%) and Luboń (39.4%).

5. The operation of farms in the Poznań agglomeration

The Poznań agglomeration has average natural conditions for agricultural production; its index of the quality of agricultural production space is 65.3 points (Poland – 66.6 points, Wielkopolska voivodeship – 65 points). The index varies widely in individual communes, from 81.1 points in Kleszczewo to 44.4 points in Puszczykowo (Fig. 2).

In the employed method of valuation of agricultural production space, four basic elements of the natural environment are taken into consideration: land relief, agroclimatic conditions, water, and soils. Each of those components is assessed in terms of farming needs, but the greatest importance is attached to the quality of soils. In the Poznań agglomeration very good soils of classes 1 and 2 are of marginal significance (there are no soils of class 1). The best-quality arable land occurs in the communes: Kleszczewo, Kostrzyn, Rokietnica and Stęszew, where more than 80% of soils belong to classes 3a and 3b as well as 4a and 4b.

In 2013 the area of farmland in the Poznań agglomeration amounted to 123,287 ha, or 57% of its total area (Fig. 3). Owing to urban sprawl, there has been a systematic decline in the farmland area in its land-use structure. In 2001 it embraced 126,927 ha (58.7% of the total area). The highest proportion of farmland can be found in the communes: Kleszczewo (90.5%) and Rokietnica (80.2%), and in the rural communes: Buk (85.9%) and Kostrzyn (79.5%), and the smallest, in the towns of Puszczykowo (12.7%) and Swarzędz, 20.5%), and in the rural commune of Suchy Las (27.1%). Those differences follow from the advancement of the urbanisation

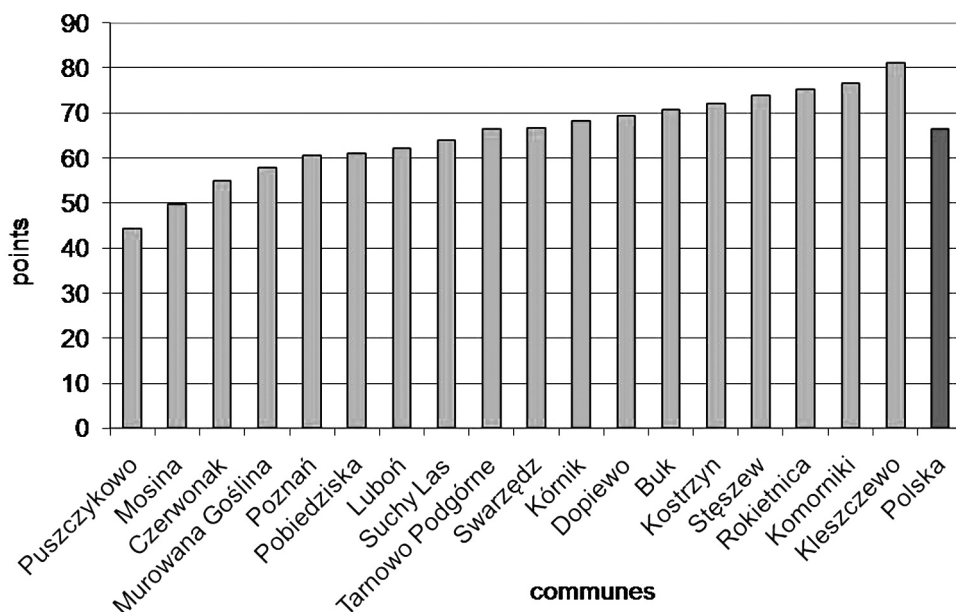


Fig. 2. Index of the quality and agricultural production area in the Poznań agglomeration
Source: E. Kacprzak, prepared on the basis of Waloryzacja ... (2000).

process with its concomitant disappearance of the agricultural function. As in the entire country, arable land predominates in the structure of farmland (87.1%).

The organisation of agriculture predominant in the agglomeration was of an extensive/ low-intensity type (Fig. 4). An extensive type could be found in the north-south belt embracing, apart from Poznań, the communes located in the zone of the Zielonka Forest, Promno and Rogalin Landscape Parks, and the Wielkopolska National Park. The rural areas of Kórnik, Kostrzyn and Buk communes showed a medium-intensive level of agricultural production organisation, primarily owing to their highly intensive crop production organisation. In the Poznań agglomeration there were all levels of crop production organisation (from extensive to very intensive). A highly intensive type was noted in Kleszczewo and Luboń communes, and an extensive one, in the northern communes of the agglomeration: Suchy Las (the Biedrusko military range), Murowana Goślina and Czerwonak (the Zielonka Forest), and Pobiedziska (the Promno Landscape Park), as well as in the south, in Mosina (the Wielkopolska National Park and the Rogalin Landscape Park).

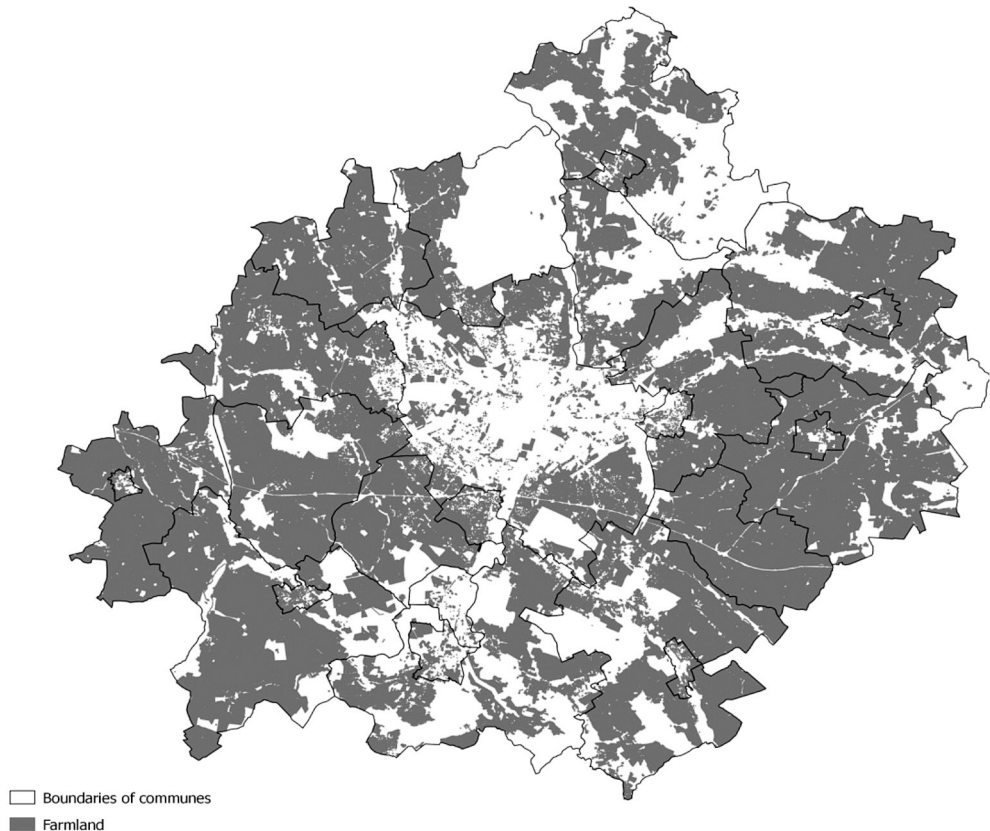


Fig. 3. Farmland in the Poznań agglomeration in 2013

Source: E. Kacprzak, on the basis of data from the Poviát Office and GEOPOZ.

The differences among the communes in the intensity of their animal production organisation were found to be smaller than that of crop production. It was only in the rural communes: Buk, Stęszew and Kostrzyn, and in the town of Mosina that low-intensity animal production organisation occurred.

In 2010 there were 5,187 farms in the agglomeration, their number declining systematically (Fig. 5). In the years 2002–2010 it dropped by 22.6%. The greatest number of farms were located in Poznań (564), and the smallest, in the remaining towns of the agglomeration (under 65).

Gardens are usually a part of farmsteads and the chief source of their subsistence, while sporadic crop surpluses are sold. They are important not only for production, but also for the cultural landscape. The possession of a garden was reported by 678 out of 5,187 farms, or 5.9% (Fig. 6). The greatest incidence of gardens appeared in the central and eastern parts of the agglomeration, with the exception of Murowana Goślina and Kostrzyn communes, and the lowest one (under 5% of all the farms) in the west – Tarnowo Podgórne and Dopiewo communes, in the south – Luboń and Mosina, as well as the towns of Swarzędz and Kostrzyn. In 2010 the area of the gardens of the Poznań agglomeration farms (without recreational areas, lawns, decorative plants, etc.) was 111.63 ha, or 0.05% of the farmland. The crops grown in the gardens were mostly vegetables (69.61 ha), the smallest area going to

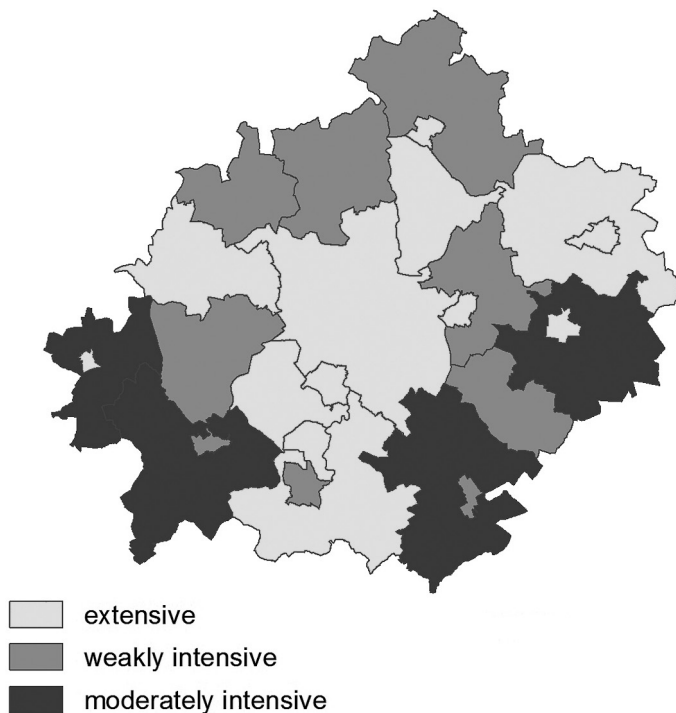


Fig. 4. Intensity of agricultural production organisation in the Poznań agglomeration in 2010
Source: A. Kołodziejczak.

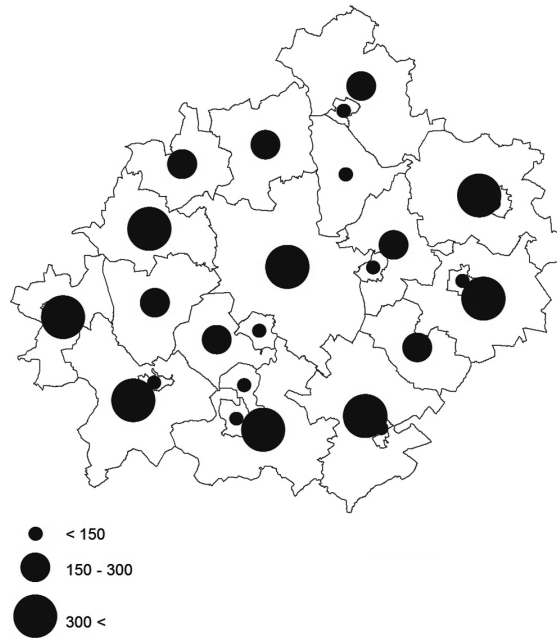


Fig. 5. Farms in the Poznań agglomeration in 2010
Source: A. Kołodziejczak, on the basis of the Census of Agriculture data.

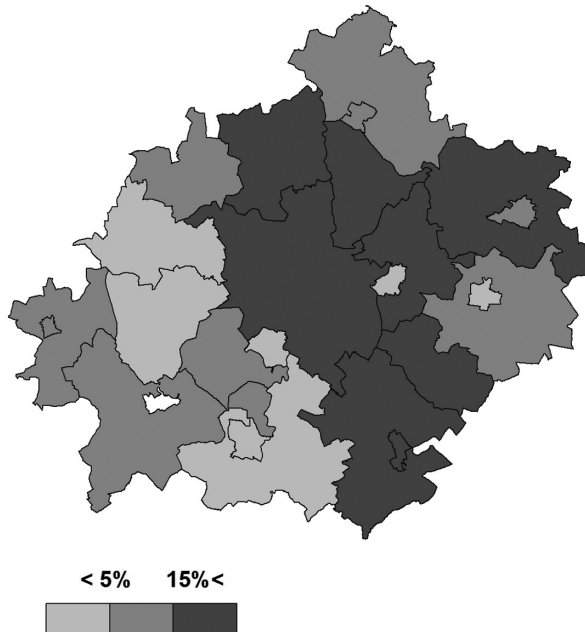


Fig. 6. Farms with gardens in the Poznań agglomeration in 2010
Source: A. Kołodziejczak, on the basis of the Census of Agriculture data.

strawberries (9.84 ha) and potatoes (5.35 ha). The rest was occupied by the remaining plants (26.83 ha).

6. The place of allotments in the urban farming of the Poznań agglomeration

In 2014 there were 148 family allotments (FAs) in the Poznań agglomeration totaling 1,511 ha, which accounted for 0.8% of its area. Over two-thirds of them were located in zones 1 and 2, i.e. 5 and 10 km from the city centre (Fig. 7). The mean FA area in the individual communes ranged from 2.8 to 33.5 ha, the general mean being 10.2 ha. The total number of plots was 31,474 and their mean area ranged from 294 to 476 m², the general mean being 362 m². In the classification proposed, the most numerous allotments were those established immediately after the Sec-

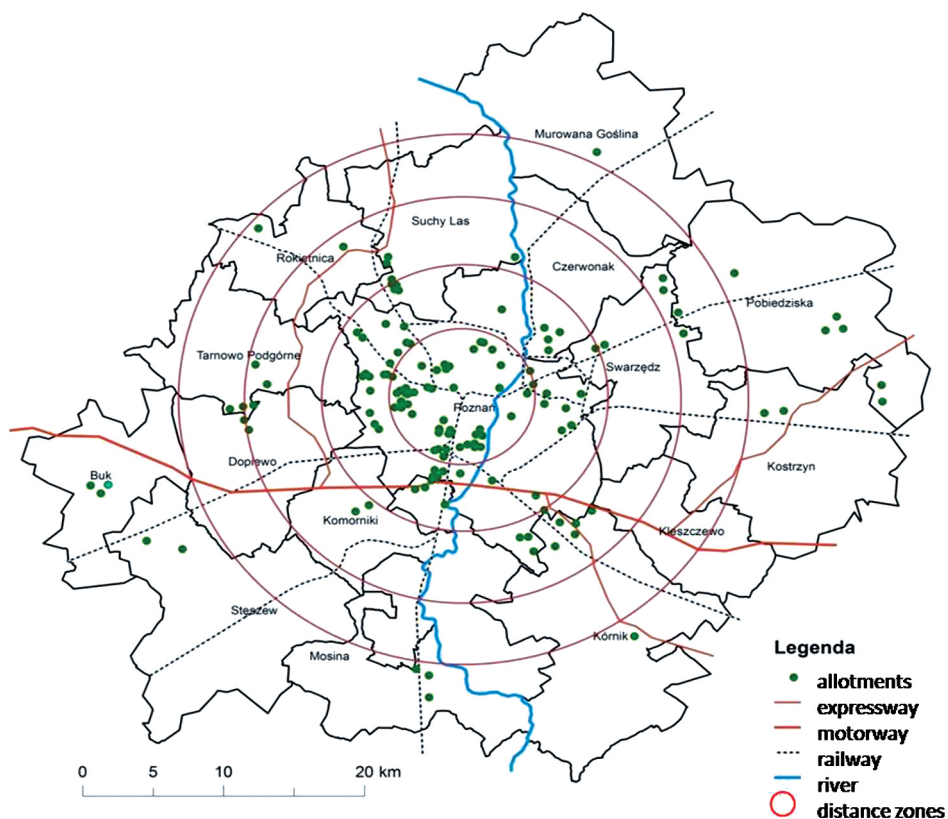


Fig. 7. Location of allotments in the Poznań agglomeration relative to the centre of Poznań in 2014

Source: M. Szczepańska on the basis of the Polish Association of Allotment Holders data.

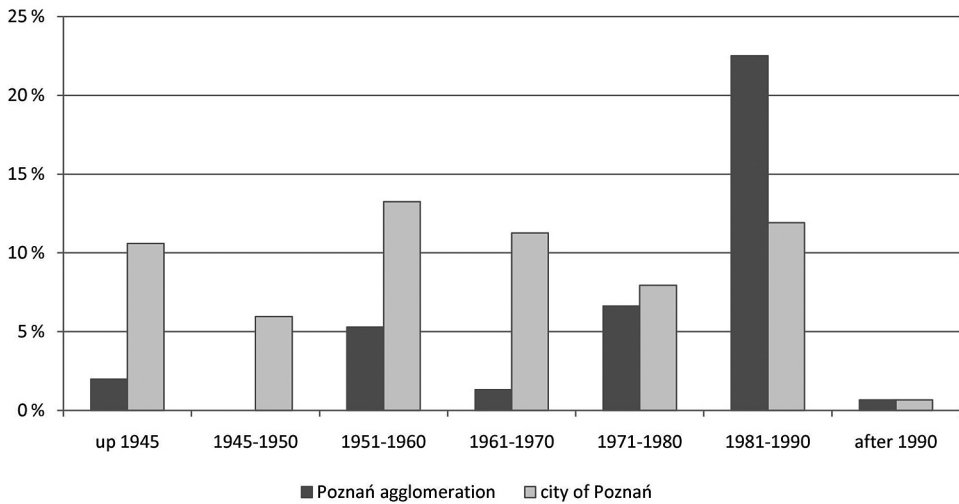


Fig. 8. Allotments in the Poznań agglomeration – the period of establishment.
Source: M. Szczepańska, on the basis of the Polish Association of Allotment Holders data.

ond World War – in the period of an intensive reconstruction of the country, and in the 1980s when allotments started to be located in the city peripheries – the neighbouring communes (Fig. 8).

The current *Study of Conditions and Directions of the Spatial Development of Poznań* assumes maintaining the existing operation of FAs and suggests taking measures intended to: locate new allotments in peripheral areas as elements complementing the city's system of greenery; introduce green belts isolating allotments from nearby heavy-traffic transport routes, including motorways, and from industrial facilities. Moreover, give preference to openwork fencing in order to allow migration of small animals (with the exception of allotments neighbouring on roads of classes G and GP); forbid transforming existing garden houses into buildings for everyday and year-round living or recreation; and limit the height of accompanying facilities (common rooms, technical buildings) to one above-ground storey, and the location of car parks and waste collection points within the allotment area.

A study conducted by the National Council of the Polish Association of Allotment Holders, (2011) shows that most allotments in the Poznań agglomeration are of a recreational-cultivation kind (57.14%), while those of a purely recreational nature make up 27.39%, and those with a cultivation function, a mere 15.47%. The Association carries out a social policy specifically intended to satisfy the needs of elderly and disabled persons as well as children (e.g. occupational therapy workshops, classes, training courses). Today FAs tend to lose their productive function in favour of decorative-recreational ones (e.g. picnics, festivities, competitions).

7. The conception of preserving the agricultural function in the Poznań agglomeration

Agriculture is not always taken into consideration in planning and strategic documents. Farming is not mentioned for various reasons, *e.g.*, there is no place for traditional agriculture, or more weight is attached to the expansion of greenery, *i.e.* forests, parks and recreational areas. Naturally, there are also documents where farming activity appears. For example, the Development Strategy of the Poznań Agglomeration, 2011) includes programme 1.4, *Multifunctional farming*, designed, in

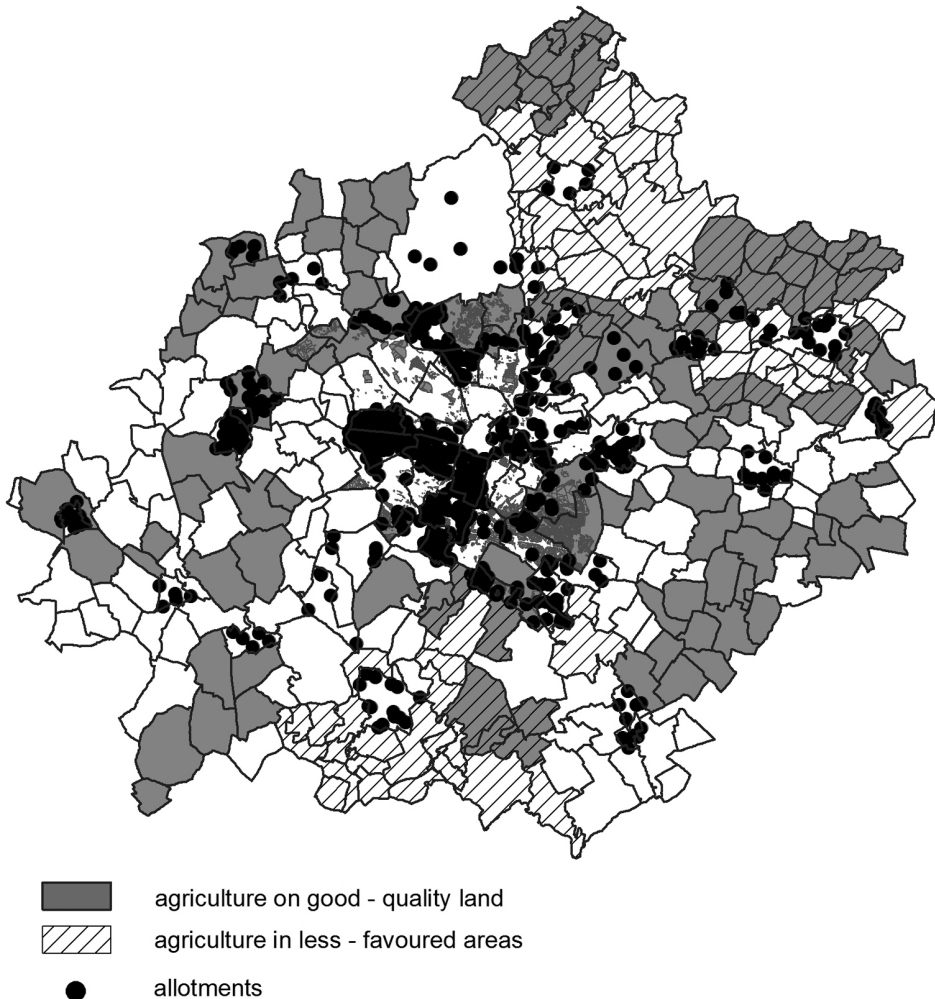


Fig. 9. Areas in the Poznań agglomeration where urban agriculture should be preserved.
Source: A. Kołodziejczak.

the face of urban pressure, to preserve agricultural areas most valuable in productive and landscape terms. In some local spatial development plans in force, there are areas specifically delineated for agricultural purposes in the communes Kleszczewo (6,445 ha), Komorniki (222 ha), Kostrzyn (89 ha), Kórnik (51 ha), Stęszew (395 ha), and Poznań (983 ha). The results of the research conducted in the Poznań agglomeration suggest that agricultural areas which should be preserved here are those with high-quality soils, those that receive LFA payments, and allotments (Fig. 9). The following parts of the agglomeration were identified as suitable for urban agriculture:

- the north-western part (Murowana Goślina, Czerwonak, Rokietnica and Tarnowo Podgórne communes, and the north-western areas of Poznań),
- the western part (Buk and Stęszew communes), and
- the eastern and southern parts (the south-eastern areas of Poznań as well as Pobiedziska, Kostrzyn, Swarzędz, Kleszczewo and Mosina communes).

The areas listed above are not the only ones where urban agriculture is possible, but here its development is a priority task. Apart from its productive function farmland will perform an environmental one. Those are areas receiving LFA payments, located in the north-eastern and southern parts of the agglomeration, in the Zielonka Forest and the Wielkopolska National Park. In this way agricultural activity will not be marginalised in the Poznań agglomeration and pushed out exclusively into its peripheries.

8. Conclusions

Agriculture operates in the Poznań agglomeration under a very strong pressure of intensive urbanisation processes. Although in the recent years much emphasis is put on the multifunctionality of urban agriculture, the farmland area keeps shrinking and agricultural production keeps being pushed out into the peripheries of the agglomeration. The analysis conducted shows that measures should be taken to counteract its marginalisation. Environmental and economic considerations speak for rational management of agricultural areas in the Poznań agglomeration. This calls for the following measures:

1. A farming programme for the Poznań agglomeration should be worked out with recommendations concerning the preservation of its multifunctional agriculture.
2. It is necessary to include multifunctional agriculture among physical planning priorities for the entire Poznań agglomeration.
3. It is necessary to set up a monitoring system of the land resources at the disposal of urban agriculture because of changes in the land-use pattern and as a protection against an unjustified elimination of farmland from agricultural production.
4. Initiatives should be taken to rationalise farming so as to improve the quality of soils and water, and to ensure food safety to the residents of the Poznań agglomeration.

5. Support should be given to the development of organic farming and pro-ecological initiatives with a social impact (social gardens, rooftop gardens, balcony gardening, etc.)
6. Allotments should play a greater role in the spatial policy of the agglomeration because, apart from their significant role in implementing the idea of sustainable development, they perform a variety of socio-economic functions.

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