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pages: 1 - 12

## RELICS OF EXTREME LAND FRAGMENTATION IN BIAŁYSTOK

Aleksandra Bajerska\*, Urszula Boratyńska\*, Halina Łapińska\*\*, Jarosław Szewczyk\*\*\*

\* students at the Białystok University of Technology, Faculty of Architecture, ul. O. Sosnowskiego 11, 15-893 Białystok, Poland  
E-mail: ulabor2@wp.pl, ulaboratynska72@gmail.com, a.bajerska5@gmail.com

\*\*/\*\*Białystok University of Technology, Faculty of Architecture, ul. O. Sosnowskiego 11, 15-893 Białystok, Poland

\*\*E-mail: h.lapinska@pb.edu.pl, ORCID: 0000-0002-5306-9680

\*\*\*E-mail: j.szewczyk@pb.edu.pl, ORCID: 0000-0002-2454-2934

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### RELIKTY SZACHOWNICY GRUNTOWEJ W BIAŁYMSTOKU

#### Abstract

Białystok, the capital of the Podlaskie region, N-E Poland, covers 102 km<sup>2</sup> and has ca. 293 000 inhabitants. In recent centuries the city has been incorporating its suburban villages. In effect, relics of village-like plot structures have been retained and immersed into the whole cadastral structure of the city. In the article, distribution of cadastral relics of extreme land fragmentation have been surveyed, based on two www GIS portals: <http://gispodlasia.wrotapodlasia.pl> and <https://gisbialystok.pl>. We extracted data about areas with extremely narrow and elongated plot structure, i.e. plots which are 1 to 20 m narrow while hundreds of meters long, sometimes of geometric proportions even as extreme as 1:600. About 50 areas with relics of extreme land fragmentation have been recognized, of which 15 areas seem to be essential for the city functional structure. Therefore, Białystok can be seen as an unique city in terms of its rural-derived structure with numerous remnants of extreme land fragmentation.

#### Streszczenie

Białystok to stolica województwa podlaskiego o zaludnieniu (w 2022 roku) 293.028 mieszkańców na obszarze 102 km<sup>2</sup>. W przeszłości Białystok rósł, wchłaniając okoliczne wsie, czego pozostałością jest lokalnie zachowana specyficzna „wiejska” struktura podziałów gruntowych (katastralnych). Korzystając z internetowych portali udostępniających usługi informacji przestrzennej (w tym <http://gispodlasia.wrotapodlasia.pl> oraz <https://gisbialystok.pl>), rozpoznano jej relikty będące pozostałościami szachownicy gruntowej i przedstawiono w artykule ich lokalizację (rozkład przestrzenny) na obszarze miasta. Uwagę skupiono na obszarach pokrytych działkami geodezyjnymi węższymi niż 20 m, a długimi na kilkaset metrów, o proporcjach boków węższego do szerszego niekiedy sięgających nawet 1:600. Rozpoznano około 50 takich obszarów, z których 15 uznano za najbardziej istotne dla funkcjonowania miasta. Zatem Białystok wydaje się przestrzennym unikiem, wyróżniającym się obfitością reliktyw szachownicy gruntowej.

Keywords: Białystok; land fragmentation; cadastral structure

Słowa kluczowe: Białystok; rozdrobnienie gruntów; szachownica gruntowa; struktura podziałów własnościowych

## 1. INTRODUCTION

The intermingling of overly fragmented plots of land belonging to different owners is known as “chequered lands”<sup>1</sup>, with the word “chequered” in reference to a fragmented and mixed land structure having been in use sin-

<sup>1</sup> As early as the 19th century, a checkerboard (land) was defined by the dictionary as “a small piece of land, between similar pieces belonging to other owners: *We will exchange these chequerboards between us for others*, i.e. scattered here and there” [Słownik... 1861, p. 1612].

ce at least the 18th century<sup>2</sup>. The very phenomenon of excessive fragmentation and mixing of the land ownership structure as early as the 16th century<sup>3</sup> affected the landscape of the Polish lands, hampered the agricultural economy and indirectly generated multiple social effects.

In spite of land commassification, there are still quite a few remnants of the former land chequerboard in the eastern part of the country, although they are most often visible not in the landscape, but in the cadastral structure. Some relics of the land chequerboard are even preserved in urban areas. This article presents the issue of urban chequered land on the example of contemporary Białystok: based on cadastral maps, its occurrence was determined, and then an attempt was made to make a preliminary diagnosis of the significance of chequered land on the city landscape and its influence on the development of Białystok.

### 1.1. The concept of chequered land and its causes

Contemporary Polish authors of works on geography, agricultural economics and spatial planning define chequered land in various ways, usually taking as its distinguishing feature the fragmentation of land owned by one succession, often also the reduction of plots resulting from family divisions, their elongation (resulting from the accumulation of longitudinal divisions on the network of three-field divisions), and sometimes their mixing (cf. an outline of the issue in: [M. Dudzińska 2012]). Earlier authors included all of these distinctions together, and also mentioned (as an effect of the checkerboard or a manifestation of it) "the considerable remoteness of some of the fields from the house" [W. Kocent-Zieliński 1907, p. 3].

Land fragmentation was caused by inheritance divisions and ownership mixing by transactions such as sales, inheritance transfers, dowry transfers or dona-

tions. In addition, chequered plots around self-settled villages (such as noble hamlets) had a more chaotic structure and a faster increase in fragmentation than established ones, which was due to the spontaneity of settlement processes. Other reasons for the rapid fragmentation of the land structure were also pointed out, which were, however, more important in countries other than Poland [see: M. Dudzińska 2012, p. 48-49].

### 1.2. Chequered land as an agrarian and social problem

The chequered fragmentation of land was formerly seen as an impediment to rational farming (a view that has persisted to the present day), and as one of the factors, perhaps a key one, in holding back agrarian reform. In 1861 it was written: "*Forty parts (...) are enough for misfortune (...), and there are sometimes several hundred. (...) No progress (...) can take place in such a village. Crop rotation (...) [is] impossible, sowing in fallow fields is impossible, sowing of fodder crops is impossible. (...) The owner of the manor and his landowners have their hands tied and have to follow routine and custom (...) as to the time of sowing, harvesting and the type of seed. (...) Time is lost in moving from place to place in cultivation, and supervision is lost. (...) What I have said about chess in the field occurs [also] in meadows and woods, and in all of them disorder, damage and abuse*". [J. Zawadzki 1861, p. 357].

In addition, land fragmentation remained an unresolved social problem for centuries, the subject of disputes between neighbors, court cases, cases in lower parliament and other legal forums (see footnote 2). Particularly troublesome was the fragmentation and mixing of the land ownership structure in the rural areas inhabited by small homestead nobility (for there it reached record proportions<sup>4</sup>) and in areas of mixed manorial, petty gentry and peasant ownership, where chequered land exacerbated old social problems and created new, so-

<sup>2</sup> Here, for example, among older documents there is information about the establishment in 1775 (probably by the Ordinary Sejm of Warsaw) „Commission for the exchange of chequers between the Kupis starosty (...) and the land estates Ponedel i Wysoki Dwór Wilkomierz County”. Two municipal judges were then sent from Troki and Wilkomierz (today Ukmergė in the central-east Lithuania), „who, having descended on the site, are to measure and inventory the chequered boards on both sides, (...) perpetually swap, (...) decree that the conversion be described and insured” [Volumina... 1860, p. 425].

<sup>3</sup> In the 16th century, chequered land in the royal estates of the Grand Duchy of Lithuania (especially in the area of today's eastern Białystok) was consolidated and re-measured within the agrarian reform „wołoczna pomiera”. The principles of this reform were first set out in the Act *Korolewoje Jej Miłosti na wołoki w imieniach Jeje Miłosti w Wielikom Kniażstwie Litowskom...* of August 12, 1552, and subsequently extended in Act *na wołoki Hospodara Korola Jego Miłosti uwo wsiem Wielikom Kniażstwie Litowskom* of April 1, 1557. The amalgamations and reparcelling were mainly intended to raise income in the royal estates, nevertheless chequered land was perhaps the most important obstacle to this [see: Z. Ludkiewicz 1932, p. 36-37].

<sup>4</sup> The greatest fragmentation of land and its mixing was recorded in the hamlets of Łapy in Podlasie (corresponding to the present town of Łapy), and was described by Bohdan Zaborski [1926, p. 75]: „In the village of Łapy Kolpaki, there is a farmer, one of many Łapińskis, who had his farm of several dozen hectares scattered over as many as 1,221 plots, not only in his village, but also in the other 11 other Łapy villages. In Łapy, farms consisting of 600-800 plots were common”.

metimes unexpected ones<sup>5</sup>. Not surprisingly, the issues of land fragmentation and amalgamation in the context of broader agrarian reform (including the ‘peasant question’ a.k.a. the ‘landlord question’), were being debated as early as the 19th century.

### 1.3. Terminological issues

In the former Polish geographical and agrarian economics literature, the issue of the land checkerboard was most often considered against the background of economic needs and methods of land consolidation, while landscape-visual aspects (shapes of plots, their visual role) were marginalised<sup>6</sup>. Besides, the very term “checkerboard”, although well-established in Polish science, is misleading, because in our country there was a longitudinal (strip) fragmentation, which was a relic of earlier systems inherent in the three-field economy, subject to cyclical family divisions. Actual checkerboard in the geometric sense did not exist in our country.

Depending on the intensity of particular features of a checkerboard, its types were distinguished - e.g. Zdzisław Ludkiewicz [1932, p. 33-34] distinguished between “sprawled checkerboard” and “scattered checkerboard” (according to the morphology criterion), as well as between “internal checkerboard” and “external checkerboard” (the latter in the case of “confusion of land of a given village with manorial land, with land of neighbouring villages, etc.”). Among the typologising terms, the following also appeared: “nuisance checkerboard”, “malicious checkerboard”, “harmful checkerboard”, “high checkerboard” [W. Antoniuk 1983, p. 10], “intricate checkerboard” [B. Zaborski 1926, p. 25].

In international literature, on the other hand, the English-language equivalent of the Polish term “szachownica gruntowa” is rarely used at all, usually only by Slavic authors and then in several variants, while non-Slavic authors describe chequered land

with expressions indicating rather a fragmentation of plots or parcels of land (usually: „land fragmentation”) rather than their chequered alternation. Interestingly, Russian-speaking authors used the word *cherezpolositsa* (*чересполосица*), indicating an alternation of elongated plots, as well as the words *dlinnopolosica* (*длиннополосица*) and *uzkopolosica* (*узкополосица*), indicating the elongation of very narrow plots of land, and occasionally the word *mnogopolosica* (*многopolосица*), indicating the multiplication of plots of land.

### 1.4. Combating chequered land fragmentation

As already mentioned, the fragmentation and mixing of the land ownership structure assumed unprecedented proportions in areas inhabited by petty gentry, such as in western Podlasie, the Podlasie-Mazovia borderland and eastern and northern Mazovia. The greater the degree of fragmentation and mixing of the ownership structure of petty gentry or mixed land, the more difficult it was to attempt consolidation (which, after all, required the consent of all participants); in the Russian partition, however, by 1863 it was possible to consolidate and reparcel some peasant land on the occasion of the transition from serfdom to a rent economy [J. Rosłonec 1928, p. 135]. In this way, 6704 villages and 1,638,235 hectares of land were consolidated and reparcelled there by 1863, while in the years 1863-1899 (after the enfranchisement of peasants) - 1,774 villages and 350,235 hectares of land [ibid., pp. 135-138]. The commassification and reparcelling of the land of the petty gentry, being more difficult, encountering resistance and impossible to carry out without social consensus, was spontaneously initiated by individual landowners, and by 1899 covered only a few dozen villages each in the former mławski, przasnyski and ciechanowski counties, and a few villages each in the szczuczyński and wysokomazowiecki counties; it did not develop in other

<sup>5</sup> The nineteenth-century correspondent of the “Gazeta Rolnicza” and at the same time the owner of the Ryzki manor near Łuków, Józef Zawadzki, described the extent and various consequences of the fragmentation and mixing of manorial land (nevertheless less fragmented than the plots of homesteaded gentry), also pointing out effects such as in the following quote: “The owner of a manor (...), when born in it, knows the location and boundaries of the chequers (...). (...) A new purchaser, on the other hand, often only has a few years to become familiar with them. (...) I give as an example the village of Radomyśl in the Siedlce district, in which the manor consists of a hundred and several dozen pieces, and there is only one servant (...) who knows their location”. [J. Zawadzki 1861, p. 356-357]. Similar observations can also be found in Stanisław Rosłonec’s doctoral dissertation [1928, p. 142]: “The average farm of a petty nobleman (...) lies in dozens, and sometimes a hundred and dozens and more plots very often scattered over the area of several villages; it happens that a nobleman does not know how to count his plots, that he cultivates someone else’s field instead of his own, that he harvests from his neighbour’s field and leaves it on his own”.

<sup>6</sup> In this regard, the position of Władysław Biegajło [1957, p. 557], reducing the assessment of the visual-landscape aspects of land chequers in the then Białystok Province to the economics of agricultural production: “The chequered fields and the three-field system mean that farming does not take account of natural conditions (...) and therefore does not make adequate use of the existing conditions of the geographical environment. (...) The excessive fragmentation of fields results in a significant proportion of arable land (...) not participating in production during the year, (...) the strong dispersion of plots (...) results in a non-productive waste of time (...). The fragmentation of fields prevents the use of agricultural machinery”.

areas populated by the descendants of small homestead gentry [see: M. Suchożebrski 1966].

It was not until the twentieth century that a breakthrough was achieved in terms of the social understanding of the economic necessity of the commutation and reparcelling of highly fragmented land, but at that time a new legal framework was already being created that favoured commutation and reparcelling actions even with the incomplete consent of the participants and regardless of whether the commutation concerned extremely fragmented formerly smallholder, peasant or mixed land. This legal framework was primarily comprised of the *Act of July, 31, 1923 on land consolidation* (Dz. U. nr 92 z 1927, poz. 833 as subsequently amended), and then, after World War II, a Decree of the Council of Ministers of the Republic of Poland of 14 April 1948 *on adapting to the conditions created by the war the principles of the consolidation procedure provided for in the pre-war law* (Dz.U. 1948 nr 21 poz. 144) and the Decree of 16 August 1949 on land exchange (Dz. U. nr 48, poz. 367), and still later, the Act of 24 January 1968 *on land consolidation and exchange* (Dz. U. nr 3, poz. 13) and the Act of 26 March 1982 *on land consolidation and exchange* (Dz.U. 1982 nr 11 poz. 80). During their time in force, the majority of chequered areas were gradually consolidated, but nevertheless, at least in the eastern part of Poland, numerous areas of highly fragmented land still remained even after these actions of consolidation.

### 1.5. Chequerboard land as a scientific issue.

#### Urban chequerboard

In the first half of the 20th century, land fragmentation became the subject of separate guidance studies [W. Kocent-Zieliński 1907], and soon also of scientific studies [Z. Ludkiewicz 1917], although a little earlier the term had already been used by historians of rural settlements (cf. an overview of the issue in: [B. Zaboriski 1926, p. 11-16]). There were also studies published on land fragmentation in relation to selected areas, especially in north-eastern Poland [A. П. Эймонтъ 1909; S. Rosłonec 1928]. This theme was continued in the second half of the 20th century by geographers: Władysław Biegajło [1957] described the struggle against land grading in the then Białystok Province in historical terms up to the middle of the 20th century, while Wiesław Antoniuk [1983] in his doctoral dissertation described the course of land commassification in the same area in 1966-1975 and examined the impact of commassification on the state of agriculture.

On the other hand, the subject of the fragmentation of the urban land structure has not been addressed in depth in the past or in the more recent literature

(other than one- or two-sentence mentions, as in e.g.: [Z. Ludkiewicz 1932, p. 34]), nor has the impact of urban land chequering on urban development been studied. And yet, the causal factors of the checkerboard, such as inheritance allotments, also existed in cities. Furthermore, the development of cities in the 19th and 20th centuries consisted, among other things, of their absorption of surrounding villages with their checkerboard land structure. Despite this, the town as an area of checkerboard land remains in scientific research a *terra incognita*.

Also in the study of the history of commassification and reparcelling (which, like the issue of checkerboard fragmentation as such, also remains within several disciplines and scientific specialities: settlement history, agricultural history, settlement geography, rural studies and rural planning, landscape architecture), the issue of combating checkerboard land in urban areas still remains a challenge.

### 1.6. Aims and methods

The directional aim of the article is therefore to address the issue of the urban land checkerboard and, in doing so, to identify the resulting scientific problems and suggest research needs.

It is not, however, the aim of this work to provide a comprehensive answer to questions about:

- the specificity of the causal factors of land fragmentation in former urban versus rural areas;
- the historical development of land fragmentation in individual towns;
- the impact of this land fragmentation on the development of historic towns;
- the impact of the remnants of the land checkerboard on the current structure of the cities as a whole (comparatively);
- the history of land consolidation activities within cities.

This is because these are broad issues, deserving separate studies, also requiring separate methodological approaches, literature reviews, etc. However, this article suggests the need to address them. On the other hand, complementing the directional objective outlined above is the intention to demonstrate the cultural relevance of the relics of the urban land checkerboard and, consequently, to justify the need for a discussion on the possibilities and needs for the protection of the relics of the land checkerboard.

#### The specific tasks include:

- finding cities with preserved land checkerboard relics in northeastern Poland;
- selecting a city for detailed research on the basis of the number of land checkerboard relics within

the city limits (Białystok was selected after a reconnaissance survey);

- to investigate and describe the location of ground checkerboard relics in the selected city (Białystok);
- to undertake a discussion of the possibilities and needs for protection of ground checkerboard relics in the selected city.

Methods of visual analysis of cadastral maps were used. Searching for cities with preserved remnants of the land checkerboard in northeastern Poland, cadastral maps from Geoportal ([www.geoportal.gov.pl](http://www.geoportal.gov.pl)), and the Podlasie GIS web portal (<http://gispodlasia.wrotapodlasia.pl/>) were used.

The scope of the article has been limited to the size and shapes of parcels of land as features fixed in the cadastral structure and easily recognizable on GIS maps. Analysis of the ownership of parcels was omitted. Checkerboard relics were recognized as areas of strong elongation and density of plots (plots with widths of 1-20 meters and proportions of 1:50 or more elongated lengths were sought).

### 1.7. Research area

The preliminary research covered northeastern Poland as the region with the greatest former land fragmentation. Cadastral maps of towns in Podlaskie Voivodeship and adjacent parts of Mazowieckie and Warmian-Masurian Voivodeships, west of the Sokolow Podlaski - Zambrow - Elk line, and north of the Bug River were reviewed.

## 2. PRELIMINARY RESULTS

In the small towns of the study area, residual remnants of the land checkerboard were generally found, usually preserved along the river valleys cutting through the towns: most numerous and largest in Łapy along the Narew River valley, least numerous in Suwałki along the Black Hancza River valley, in Dąbrowa Białostocka and Drohiczyń, and absent altogether in Augustów, Gołdap, Olecko and Sejny. In Rajgród, chequered areas are few, located in the valley of the Jęgrznia River, with some plots being unusually elongated and narrow: plot No. 923 (200404\_4.0001.923) is 400 m long with a width varying from 1 to 2.5 m; there are also triangular plots in the shape of a very narrow wedge with dimensions of 427/427/3 m (nos. 936, 933, 929). In Goniadz, which lies on the Biebrza River, remnants of checkerboard land are more numerous along the small watercourse Czarna Struga, although examples of the narrowest checkerboard plots are preserved along the Biebrza: plots 130 and 249

(200801\_4.0001.130 and 200801\_4.0001.249) are 110 m long, but only a little over 1 m wide. In Ciechanowiec, there is also more fragmented land along a small tributary of the Nurt named Nitka than along the Nurt itself, but only a few plots are extremely elongated and narrow (plot 201302\_4.0005.1361 is 148 m long with a width of just 2 m).

Not too many remnants of the land checkerboard are visible in the cadastral structure of cities and towns around Białystok (Choroszcz, Knyszyn, Czarna Białostocka, Wasilków, Supraśl, marginally in Gródek, Zabłudów and Sokółka). Sometimes, as in Mońki, the checkerboard structure remains only in the forest located within a given town. The situation is similar in Siemiatycze, but there the relics of the checkerboard remain in several parts of the town.

Slightly more remnants of the land checkerboard have been preserved by cities and towns in the western part of the study area, especially to the west and southwest of the aforementioned Łapy. Some of the plots have unusually elongated proportions: Wysokie Mazowieckie has plots within the municipal boundaries with a length of 744 m and a width of 3 m (no. 201301\_1.0001.365, similarly 201301\_1.0001.373) and with a length of 1283 m and a width of 5 m (no. 201301\_1.0001.314). Sokolow Podlaski has preserved relics of the checkerboard throughout its structure, including some plots of land with exceptional elongation: plot no. 142901\_1.0001.2009 measures 1.2x427 m, while in combination with its extension, i.e. plots 142901\_1.0001.1992 and 142901\_1.0001.1963 (of the same 1.2 m width), it is 695 m long. In turn, Łapy itself is literally surrounded by areas with a checkerboard of land, with land covered by a grid of extremely narrow and long plots preserved especially along the Narew River valley to the east of the built-up areas: some agricultural plots on the Narew River floodplain meadows have dimensions of 0.8x400 m (No. 200206\_5.0009.1394) or 1.2x600 m (several plots), i.e., in the latter case, an area of about 0.07 ha with proportions like 1:500.

However, the greatest number of remnants of a checkerboard land structure have been found in Białystok. Białystok is unique in this regard, as the checkerboard land structure has been preserved in many places in almost all districts of the city, including near the central part of the city. Besides, Białystok is the capital of the Podlaskie Voivodeship and the largest city in the region. (In 2022, the city had a population of 293,028 and an area of 102 square kilometers). In the eastern part of the country, only Białystok and Lublin have more than 200,000 inhabitants, so - by way of comparison - the structure of Lublin's cadastral divisions was also examined (as an exception, since it lies

outside the study area adopted here), finding numerous relics of the checkerboard structure of land around the city with an almost complete lack of them within the main central part of Lublin. There are few exceptions: just over 2 meters long and almost a kilometer wide is plot no. 066301\_1.0006.AR\_3.24/10 measured together with its extensions 066301\_1.0006.AR\_3.24/9, 066301\_1.0006.AR\_3.24/8, 066301\_1.0006.AR\_3.24/20 and 066301\_1.0006.AR\_3.24/21 (parallel bordered by a similarly narrow and not much shorter plot 066301\_1.0006.AR\_3.25/16 with extensions (066301\_1.0006.AR\_3.25/15, 066301\_1.0006.AR\_3.25/14 and 066301\_1.0006.AR\_3.25/18). The above confirms the uniqueness of Białystok (also in comparison with Lublin), as there is no other equally large city with such numerous and clear (in ownership divisions, but not necessarily in the visual landscape) remnants of extreme land fragmentation, where the narrowest plot is (as further described) only 20-30 cm wide with a length of several tens of meters, and many others are about a meter wide with a simultaneous length of several hundred meters (even over 700 meters).

### 2.1. Location of the relics of the land checkerboard in Białystok

In the area of Białystok within its administrative boundaries of 2021, there remain about 50 relics of the former land checkerboard, understood as areas where divisions of registered plots reveal the existence of many extremely elongated and narrow plots, with a width of 1-20 meters and proportions of the shorter to the longer side as 1:50 or more elongated (in extreme cases as 1:600). Of these areas, about 15 are large enough (some consist of several hundred elongated evidentiary plots) to affect the functioning of the city; these occur mainly in the western, northwestern and eastern parts of the city.

Fig. 1 shows the location of checkerboard land relics on a map of Białystok. Fifteen main locations of checkerboard relics are marked, while a total of about 50 locations within the administrative boundaries of the city have been identified. The closest to the central part of the city (which is actually free of ground checkerboard) relics of the checkerboard are in the vicinity of Ks. M. Sopoćki Street (No. 4 in Fig. 1), Gen. W. Anders Street (No. 11) and Piastowska Street (No. 14). Closest to the historic center - about a kilometer to the southeast - are the extensive checkerboard areas on Piastowska Street.

Analyzing the occurrence of land checkerboard relics against the background of administrative division, the following areas abounding in checkerboard remains can be identified:

- A. Several areas in the Skorupy settlement and the eastern part of the Wygoda settlement.
- B. Several extensive areas in the northern and central parts of the Zawady settlement.
- C. Several areas in the Lesna Dolina settlement.
- D. Several areas at the junction of the Jaroszkówka and Białostoczek settlements.

### 2.2. Sizes and shapes of plots of land checkerboard in Białystok

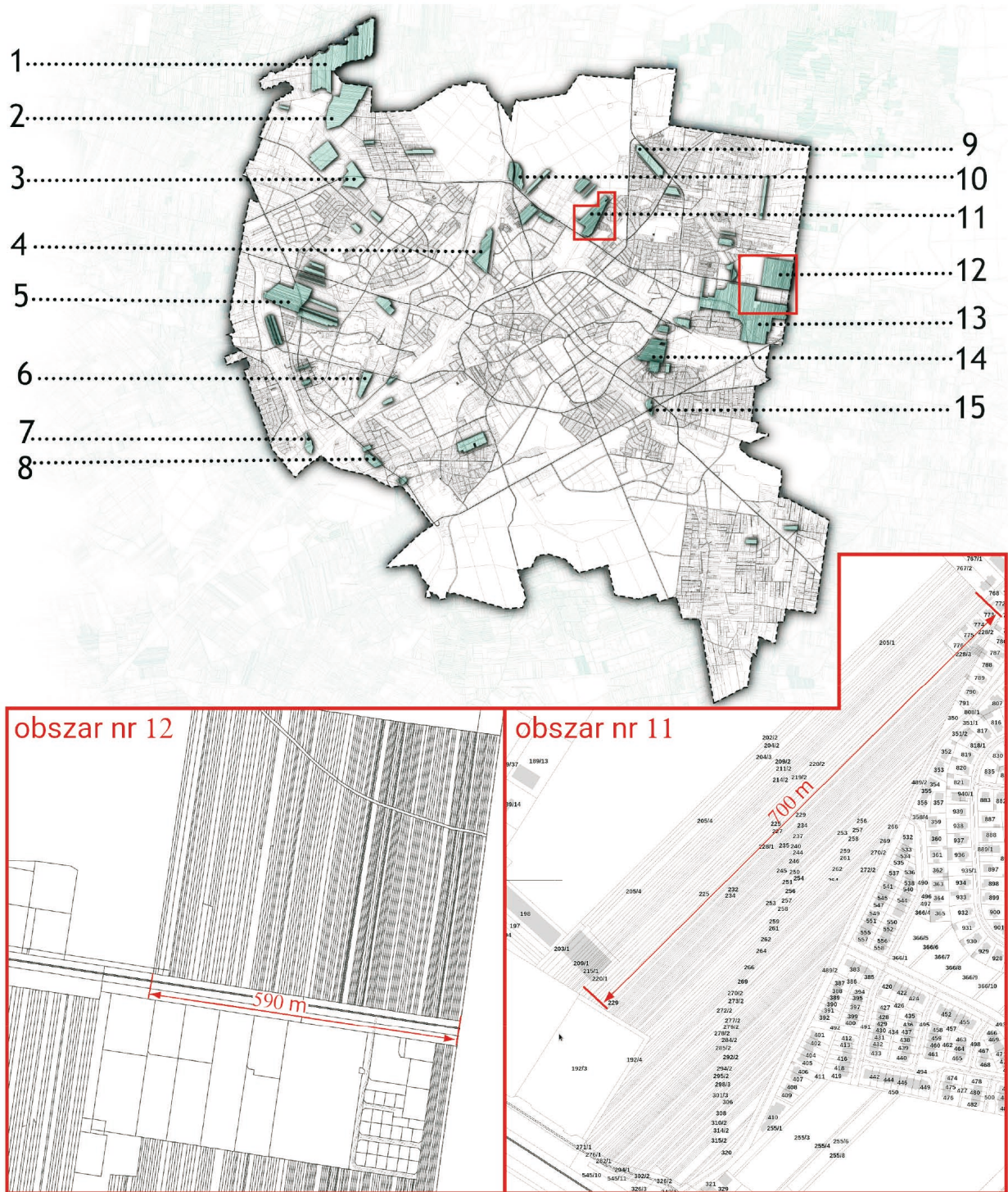
The recognized very narrow plots were divided into the following groups: (a) plots up to 50 cm (sic!) wide; (b) plots 51-100 cm wide; (c) plots 101-300 cm wide; (d) plots 3-10 m wide; (e) plots 10-20 m wide.

The first categorization group is questionable: few plots have, for example, one end with a width of less than 50 cm, measurable within the limits of error, and only in the case of a few plots the measurement with the maximum accuracy available from the GIS service in the above-mentioned portals confirmed a width of no more than half a meter: for example, a variable width of 22 to 36 cm (sic!) and a cadastral area of 0.0051 hectares has plot number 2049/3 of the Starosielce P precinct, sheet number 25. This group was considered irrelevant for further consideration of the impact of land fragmentation on the structure and functioning of the city, but worthy of note as a curiosity. The second group, i.e. plots with a width of half to one meter, includes several cases, e.g. plot No. 372 within Pieczurki at 42 Pułku Piechoty Street with a cadastral area of 0.0378 ha., which according to publicly available measurement data, has a width of 0.9 m.

The third group is already very well represented, e.g. plot No. 228 of the Białostoczek Pen. concession. has a variable width of 1.3 to 1.9 meters with a length of more than 710 meters; neighboring parcel No. 229 has a fixed width of 1.33 meters and a length of 701 meters; parcels No. 234 and 235 of the Starosielce Psn. precinct, sheet No. 7, have dimensions of (1.2 to 1.3m) x 540 meters, and so on. Adjacent plots of land No. 176/132, 176/130, 176/128, 176/126, 176/124, 176/146, 176/144 and 176/142 of the Białostoczek Psd. area. (Sheet 3), that is, a total of eight contiguous parcels, have a total width of 13.6 meters, which gives an average width of each parcel of land 1.7 meters and in the case of the Białostoczek P/n. concession. (sheet 6) an average width of no more than three meters was measured for as many as 26 adjacent narrow plots (plots 228 to 254).

The third and fourth groups also occur within compact areas of checkerboard land, often intermingled with narrower plots of land.

## RELICS OF EXTREME LAND FRAGMENTATION IN BIALYSTOK

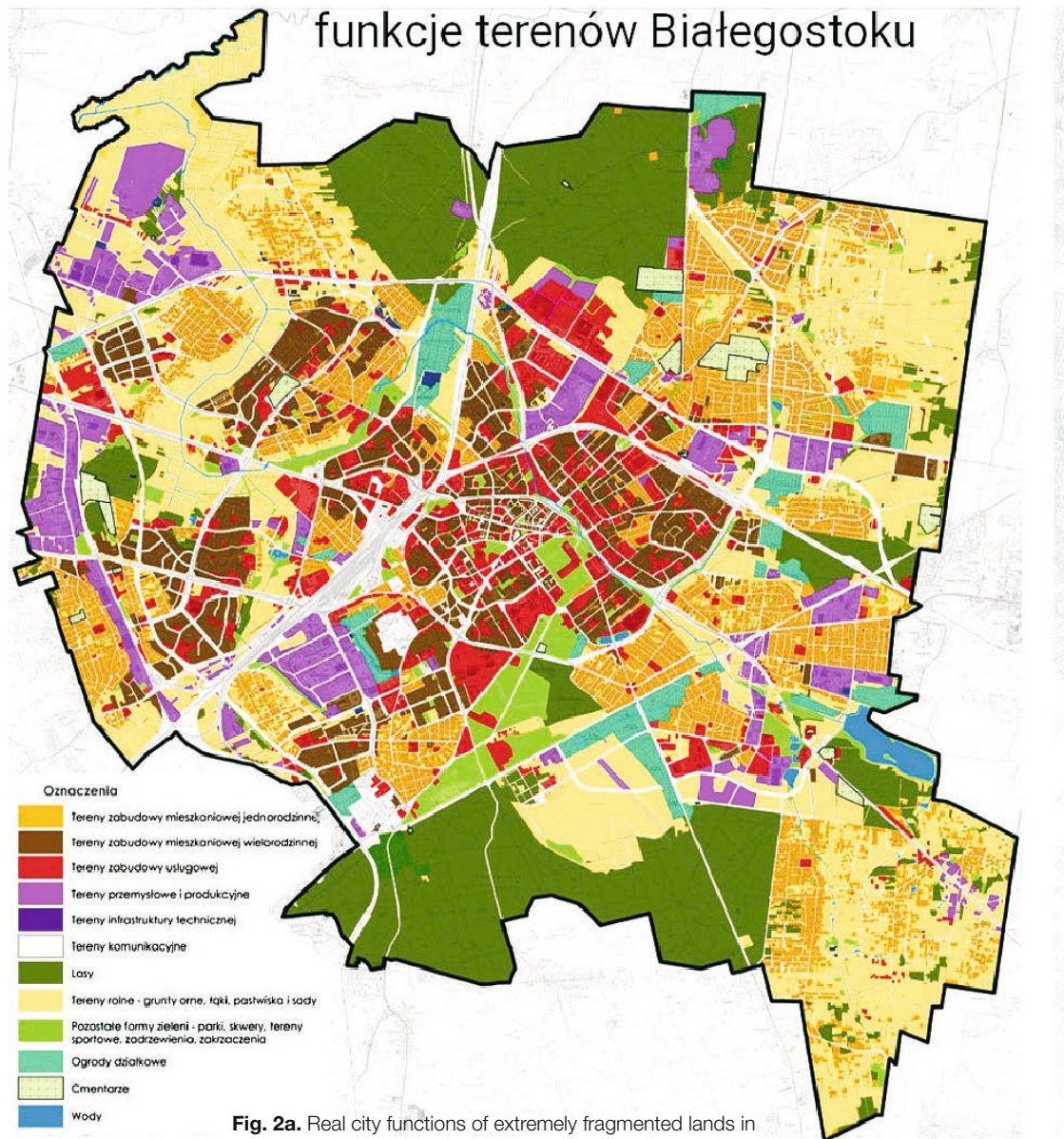


**Fig. 1.** Relics of extreme land fragmentation in Białystok (enlarged exemplary areas 11 and 12); source: <http://bialystok.geoportal2.pl>, the authors

### 2.3. Functions of the areas covered by the land checkerboard

Fig. 2 shows the current functional use of land checkerboard relics in Białystok. Most of these areas are natural areas: former meadows that are now wastelands (they are often post-agricultural wastelands,

as in the case of area No. 14 on Piastowska Street) or currently function as riverside meadows (areas in the Zawady estate on the northwestern outskirts of Białystok, adjacent to the Supraśl River), or even forests (area No. 5 on the Leśna Dolina estate).



Some of the areas covered by the land check are barriers to the city's development, acting as obstacles to investment. However, in some cases, buy-outs or expropriations have allowed investment use of such land (e.g. for multifamily housing).

### 3. INTERPRETATION AND DISCUSSION

If we look at the land chequerboard and its relics not from the old geographic-economic perspective, nor from the perspective of agrarian economics, but taking into account its multifaceted nature, i.e. also as a product of culture, an element of the landscape,

a souvenir of the past, depending on the approach, the perception of this phenomenon changes to a positive one. Białystok's elongated and very narrow land parcels, which are relics of the fragmentation of fields, and formerly absorbed by the growing city along with suburban villages, deserve a discussion about their cultural significance, perhaps even about the need and possibilities for their protection.

#### 3.1. Białystok's land chequerboard as a testimony to the rural past of the city's districts

Białystok has a peculiar agglutinative spatial structure, for it received its modern shape as a result





**Fig. 2b.** Real city functions of extremely fragmented lands in Białystok; source: <http://bialystok.geoportal2.pl>, the authors

of the addition of numerous small villages. As a former private city and the residence of the Branicki family, Białystok has grown over the centuries, absorbing neighboring villages, so that its current structure reflects the rural past of its neighborhoods. The annexations occurred successively in 1749, 1845 (parts of the villages of Białostoczek, Bojary and Piaski were annexed), 1877 (the remaining part of the village of Piaski was annexed), 1919 (the villages of Antoniuk, Białostoczek, Dojlidy, Dziesięciny, Marczuk were annexed, Ogrodniczki, Pieczurki, Skorupy, Starosielce, Słoboda, Wygoda, Wysoki Stoczek and Zacisze), 1954 (annexed were the villages of Bacieczki, Bacieczki-Kolonia, Korycin and

parts of the land of the villages of Fasty, Ignatki, Klepacze, Krupniki, Zaścianki and Zawady), 1973 (among others the village of Bagnówka was annexed), 1980-1981, 2002 (the village of Zawady was annexed) and 2006 (Dojlidy Górne, Dojlidy Kolonia, Kolonia Halickie and Zagórki were annexed). Most of today's districts of Białystok retained their characteristic structure even after incorporation into the city. In particular, in 1919 the villages were annexed without urban integration with the city, without changing their structure, without preparation - only to increase the percentage of Polish population within the city's administrative boundaries under the banner of the concept of creating a "Greater

Białystok”, and reduce the percentage of its Jewish population, which was then dominant<sup>7</sup>. Thus, villages with typically checkerboard layouts of accompanying fields and gardens, as well as fragmented structures of habitat plots, were incorporated into the city without change.

Relics of Białystok’s rural past are also fairly dense land divisions that are not remnants of the fragmentation of former farmland, but are left over from the structure of rural homesteads. They are visible in many neighborhoods in areas still built up with old single-family houses (and even barns in some places) – e.g., in Skorupy, Pieczurki, along English Street (until 2020), along Starosielce Street and others. In these areas, the fragmentation of plots is evident in the streetscape (narrow built-up plots are added to the streets) and the street-side width of the plots, rather than in their area, as the plots are generally not small. Smaller plots were found in the former Jewish neighborhoods of Chanajki and Shulchojt, but there the structure was almost completely rebuilt. Only here and there in the downtown area are relics of the former fragmentation preserved – e.g., plot number 1258/13 of the downtown area (on J. Pilsudski Avenue at the extension of Przejazd Street) has dimensions of 2x24 m; triangular plot 1258/5 has a length and width of about 5 m and an area of 14 m<sup>2</sup>, etc. Fragmentation was also observed in the small-scale forms of old buildings, where in the past various extensions, sheds, porches and sheds were simply added sequentially.

### 3.2. Ground checkerboard as a visual component of the landscape of Białystok

In none of the checkerboard-covered post-agricultural areas (former fields and meadows) is cadastral fragmentation any longer visible in the landscape, but exists only in the formal structure of the geodetic divisions, so it remains an administrative-geodetic abstraction.

On the other hand, cadastral divisions left over from the rural homestead structure are still visible in some areas built up with old houses with accompanying post-agricultural buildings. Locally they are very legible in the city landscape, easily discernible in the landscape of many city streets (e.g. Starosielce Street, Mohylowska Street, Nowowarszawska Street, Zaścianańska Street, Pieczurki Street, Zawady Street).

A relic of the past and a scenic rarity is also the chequered structure of the plots and the remnants of the old buildings in the areas once inhabited by the Jewish poor - but not only in the former Jewish districts of Chanajki and Shulchojt, for Jews made up more than 70 per cent of the city’s population at the turn of the 20th century and lived in all the districts of Białystok. According to W. Wróbel [1989, p. 186] - at the beginning of the 20th century in Białystok “there were several dozen synagogues, several yeshivot and synagogues” and often the buildings were densest around them. The peculiar structure and aesthetics of the narrow plots and old houses, sheds and extensions are disappearing today, but in many places they are still discernible and are also sometimes a topic of discussion among urban planners and architects: “Whole parts and quarters of the historic centre have disappeared, but many fragments of the pre-war urban fabric have survived in the structure of the entire inner city. (...) This fragmentary heritage, resembling pieces from a broken vessel, is still a difficult issue for urban planners today. A new urban layout has been created on top of the old one, still with elements of the old one, today already puzzling to the uninformed viewer of urban space.” [M. Chodowski, 201, p. 14].

### 3.3. Białystok’s land chequerboard as a rarity

Regarding the cultural value of the Białystok land chequer relics, the elongation of the plots seems to be important. As already mentioned, a plot about 20 cm wide and at least a few plots 1.3 m wide with a length of more than 700 m were found in Białystok, thus with proportions such as 1:500 and larger. Few relics of a land chequerboard with plots with proportions of shorter to longer side such as 1:500 and larger can still be found in the south-western part of the study area, especially in the western part of the Białystok district and in the Wysokie Mazowieckie district. The city of Białystok with equally elongated plots is unique in that it has no similar counterpart. For although plots with proportions such as 1:500 and larger have been found in three cities: Białystok, Łapy and Sokołów Podlaski, only Białystok has them, as it were, built into its structure (in Łapy and Sokołów Podlaski the land chequerboard is located peripherally to urban development; moreover, these cities are small and have 15,283 and 19,231 inhabitants respectively as of 2021).

<sup>7</sup> In 1808, Jews made up 60% of Białystok’s population, while in 1895 - 76% (of the 62,996 residents of Białystok, 47,783 were Jewish) [P. Wróbel 1989, p. 167]. Some (such as the portal *Wirtualny Sztetl* (<https://sztetl.org.pl>)) even cite that over 82% of Białystok’s population was Jewish in the late nineteenth and early twentieth centuries (1895 and 1911), although this is disputed.

### 3.4. Conservation prospects

As mentioned, it is worth having a discussion about the needs and possibilities of protecting the relics of the land chequerboard, particularly in Białystok. Most of these relics are actually unmanaged green areas, formally listed as wastelands and forests. This state of affairs suggests the possibility of leaving them as elements of urban greenery, with possible use as walking or allotment areas. However, in order for areas of chequered land to become actual evidence of former chequered fragmentation, visible in the visual landscape of the city, the visual markers of chequered fragmentation need to be restored. In the past, these were baulks, or unploughed ridges of farmland. The question of what will become of the contemporary visual traces of these dense chequered subdivisions is left open.

Architectural and urban planning literature includes descriptions of the use of landscape relics as 'identifying features of new areas' of urbanity. For example Lucyna Nyka [2012, p. 52] writes: "The drive to bring out the identifying features of new areas that result from the co-option of natural conditions is evident in Dutch cities such as Ypenburg, Dordrecht, Alkmaar or Hoogeveen, where suburban residential districts shaped on polders deliberately flooded with water are being developed. Natural ecological sequences in the form of green areas, waterways or topographical formations are used in strategies to merge new areas with existing ones. (...) Landscape is beginning to play the role of a glue connecting disconnected fragments of the city, allowing them to be perceived and composed as a whole".

### CONCLUSIONS

The occurrence of the land chequerboard in Białystok appears to be unique, perhaps even on a global scale. Formerly seen as a spatial problem, it deserves to be re-evaluated and assessed in terms of a memento of the past. Nowadays, relics of the checkerboard are only visible on cadastral layers on GIS maps, while the visual urban landscape completely masks the cadastral fragmentation and the density of divisions, as most areas of the checkerboard land are wastelands, some are forests and some have been bought up or taken over for major construction projects. So are not at least some of its urban relics worth preserving and protecting? Answering this question is beyond the scope of this article, but the question itself seems legitimate. Certainly a description of this phenomenon should find its place in the planning documents being developed, such as the city development strategy, the study of conditions and directions for spatial development, local

development plans or the landscape study of the area with panoramic views, in agreement with the Provincial Conservator of Monuments.

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