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## Analysis of relationships between distribution of population and spatial economy of communes in the Kraków Metropolitan Area

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## **ANALYSIS OF RELATIONSHIPS BETWEEN DISTRIBUTION OF POPULATION AND SPATIAL ECONOMY OF COMMUNES IN THE KRAKÓW METROPOLITAN AREA**

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**ABSTRACT.** The expansion of developed areas is one of the factors that influence the distribution of population. Spatial policy implemented by communes reflects the existing tendencies but is also a factor that moulds the occurring processes. The aim of this article is to present the planned development of areas designated for investing, depending on the existing density of population. The article presents relationships between location and present distribution of population, and planned degree of expansion of development of communes located within the Kraków Metropolitan Area (the “KMA”). The range of areas designated for investing was analysed based on valid commune planning documents, which means that the article took into account 52 land use plans concerning all the communes that form the Kraków Metropolitan Area. The object of analysis is the spatial policy of communes related to the expansion of development, as well as demographic conditions of the Kraków Metropolitan Area.

**KEY WORDS:** metropolitan area, spatial economy, spatial planning, expansion of development.

### **INTRODUCTION**

The specific nature of metropolitan areas requires cooperation of a large city with other regional centres, so spatial economy in such an area should be conducted in a specific way. One of the key elements of a correct spatial development of metropolitan areas is correct management of land designated for investment projects. When conducting proper spatial policy the commune authorities should mould the occurring processes of territorial development depending on the demographic and economic development of the commune, while preserving, at

the same time, green areas and land of great natural value. Another problem of spatial planning of metropolitan areas is the existence of conflicts between spatial policy conducted by the central city and that conducted by communes, which are peripheral in relation to that city. In practice, it often happens that suburban communes designate disproportionately large amounts of land for investment projects in relation to the actual population in those communes and potential for infrastructural development of that land, which also is connected with the issue of a low-density development. Often building and service land areas are extended at the expense of other areas of high natural value or even of protected areas. On the contrary, spatial planning clearly emphasizes the significance of control over a spontaneous expansion of land designated for development, and preservation of open areas and areas of high natural value within the suburban zone of a metropolitan area (Drzazga, 2005).

The aim of this paper is to present the planned development of areas designated for investment projects depending on the number of residents in a given commune within the Kraków Metropolitan Area and to present the main tendencies in the spatial economy of the metropolitan area in a central city-outskirts relationship. The paper has also raised the problem of preparation of planning documents from the point of view of demography, i.e. how area load rates are applied in practice when planning documents are drafted.

Spatial planning of metropolitan areas is an exceptionally difficult task, since it should consider the main objectives of national policy, as well as the interests of local communities. An attempt at solving the problem of planning on the level of a large city has been made in the form of statutory provisions regarding the development of a national settlement network, with the isolation of metropolitan areas listed in the Conception of the Spatial Development of Poland. Spatial planning in the area of large cities has to be defined in plans of spatial development of metropolitan areas, taking into account guidelines established in regional plans (Act of 23 March 2003 Concerning Spatial Planning and Development).

## MATERIALS AND METHODS

The range of areas designated for investment was analysed on the basis of valid planning documents of communes. The study took into account 52 land use plans prepared by communes that are parts of the Kraków Metropolitan Area. A simplification was assumed in relation to the analysed documents, namely all areas in which plans provide for a possibility of designating land for investment projects were, irrespective of any additional provisions, classified under the group of areas designated for investing.

The resources of land designated for investment projects within the Kraków Metropolitan Area are distributed unevenly, not only due to the concentration of areas already invested in and those designated for investments within the city of Kraków and other smaller urban centres, but also due to the existing, diversified level of spatial urbanization of remaining areas and separate spatial policy of communes as regards designation of development areas.

In order to enable a more precise analysis of that process, three indexes were specified: the index of investment land per 1 resident of the commune, and the index of investment and residential and service investment land per 1 resident of the commune and index of share of residential and service land per 1 resident of working age. Those three indexes describe use of land in the Kraków Metropolitan Area. The first one shows general tendency of the distribution of the build-up areas in the metropolitan region. Whilst two other show effective use of land and present actual relationship between areas designated for investment purposes and the potential possibilities of the demographic development.

### **SPATIAL AND DEMOGRAPHIC DETERMINANTS OF DEVELOPMENT IN KRAKÓW METROPOLITAN AREA**

The article presents the problem of relationships between present distribution of population and the planned degree of development expansion within the Kraków Metropolitan Area. According to the provisions of the Spatial Development Plan of Małopolskie Region (Spatial Development Plan of Małopolskie Region, 2003), there are 52 communes which make up the Kraków Metropolitan Area, including 2 urban communes of Kraków and Bochnia, 14 rural and urban communes, and 36 rural communes. The main functional criterion of the metropolitan area delimitation included oscillatory migrations related to commuting to work in a central city (Zborowski, 2005).

The whole Kraków Metropolitan Area occupies 4,134 km<sup>2</sup> and is inhabited by 1,448,687 residents, so the average population density in the whole area is 350 people per km<sup>2</sup>. The communes with the highest population number include Kraków, Wieliczka, Myślenice, Skawina, Wadowice, and Krzeszowice, whereas areas with the highest population density include the city of Kraków and the town of Bochnia, as well as the neighbouring communes near Kraków, i.e. Wieliczka, Skawina, and Zielonki. In those communes, clearly noticeable is the process of housing development and the moving of population out of Kraków precisely to those communes. The lowest population density figures concern communes located to the north-west of Kraków, i.e. Gołcza, Trzyciąż, Koszyce, Koniusza, and Drwinia (Fig. 1).

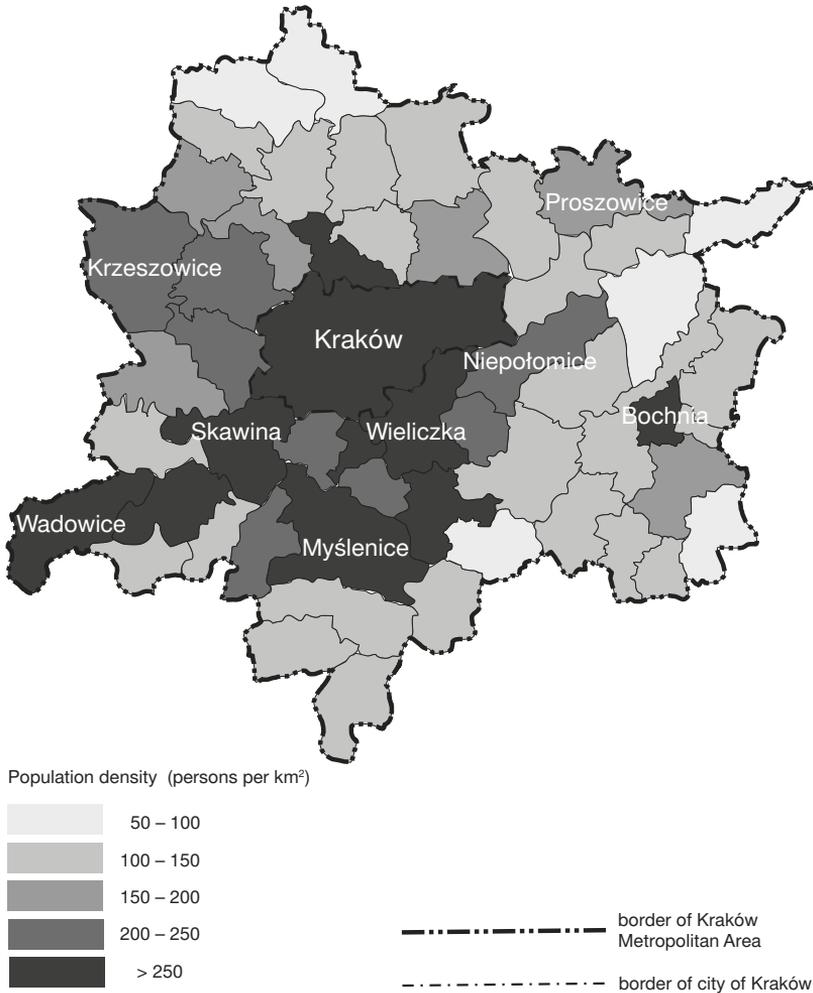


Fig. 1. Population density in the Kraków Metropolitan Area in 2003

Source: own study, prepared on the basis of GUS (Central Statistical Office) data, 2003.

These are communes with a prevailing rural type development, where no processes of the urban population moving out of Kraków to them have been felt yet. This may be due both to a worse accessibility of the central city, and to the spatial management conducted in those communes. High population density in communes located in the close neighbourhood of Kraków, especially in those located close to the north and south borders of the city (Zielonki, Michałowice, Wielka Wieś) results, first of all, from intensified migration processes and moving of residents from Kraków to its suburban areas.

## SPATIAL DEVELOPMENT OF COMMUNES IN THE KRAKÓW METROPOLITAN AREA

The share of land designated for investment projects is ca. 24% in the whole KMA. Forests and land designed to be afforested constitute ca. 21%. The remaining areas include arable land, greenery, and waters. Out of 99,223.4 ha (24%) of land designated for investment projects within the KMA, 16,785.9 ha, or ca. 17% are areas for investment projects located in Kraków itself, while the surface area of Kraków constitutes only ca. 8% of the total KMA surface area, and the population of Kraków is ca. 52% of the whole KMA population. This shows that determination of areas designated for development is dictated mainly by the economic and demographic potential of the given centre, and not by the city's size. In addition to Kraków, a substantial potential of areas designated for investment projects is concentrated in the remaining towns, with the highest number of them located in Myślenice (4.6%), Wieliczka and Krzeszowice (3.8%), as well as in Gdów (3.4%) and in Wadowice (3.1%). Considerable number of areas for investment projects were also determined in some rural communes, that is in Zabierzów (3.1%), Bochnia (2.9%), Liszki (2.4%), and Brzeźnica (2.3%). The communes of Zabierzów and Liszki have strong links with the central city, being located in the direct neighbourhood of Kraków, in the areas of an intense spatial development related to the extension of Balice airport and A4 motorway (Fig. 2).

Also the distribution of land designated for surface use influences the size of areas designated for investment projects. Especially large areas of the former type of land can be found in Krzeszowice, Czernichów, Myślenice, Kłaj, and Niepołomice.

The planned level of spatial urbanisation, expressed in terms of ratio of land designated for development and surface area of a particular commune within the Kraków Metropolitan Area is highly diversified. In Kraków itself, 51.3% of the whole city area was designated for investment purposes. Considering the share of areas designated for investment projects in the commune's total surface area, the second largest centre is the town of Bochnia, where ca. 44.9% of the town area was designated for investment projects. In addition to towns, the highest percentages of land designated for investment projects were in the communes located within the Kraków suburban zone, namely in Świątniki (ca. 40%), Mogilany (34%), Wieliczka (38.3%), and Zielonki (35.5%). These are communes of a residential function, with a high share of areas designated for housing projects. The lowest index of areas designated for investment projects is that in the commune of Drwinia (6.2%). Low shares of land for investment projects in total surface area of communes can be found in the communes of Gołcza, Tokarnia Sułoszowa,

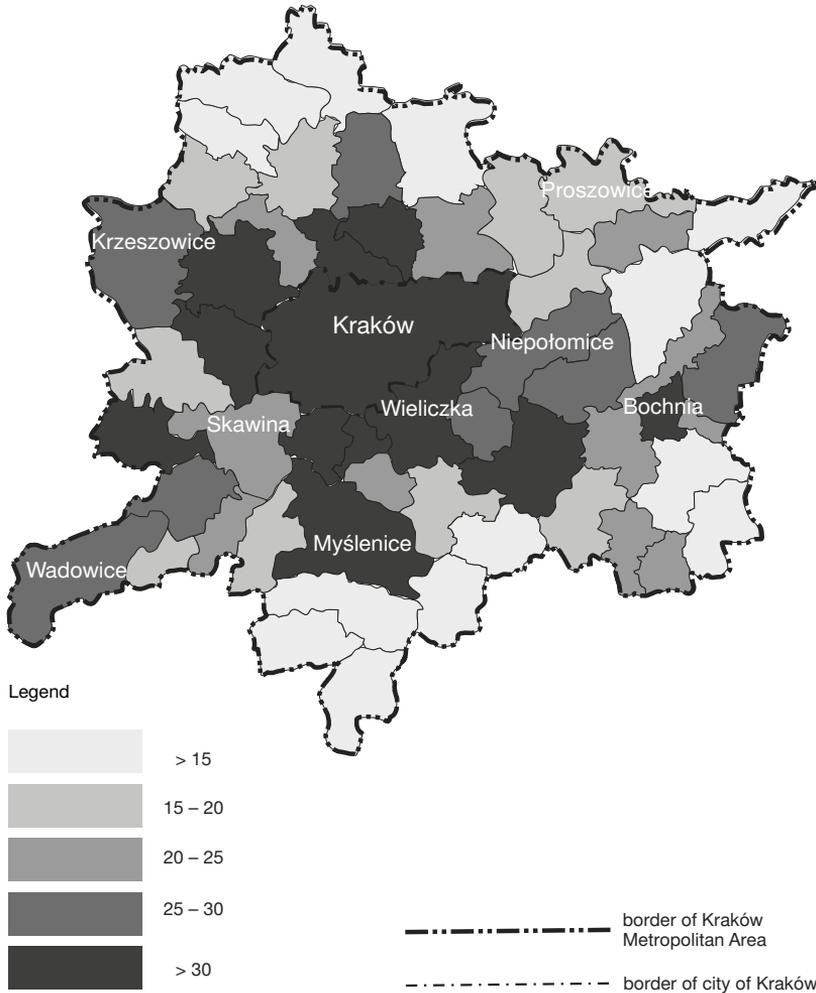


Fig. 2. Share of land (as %) designated for investment projects in the total surface area of the KMA communes in 2006

Source: own study, prepared on the basis of BDR (Regional Data Bank) and GUS (Central Statistical Office) data, as well as those included in *Krakowski Obszar Metropolitalny. Analiza polityki przestrzennej gmin*, 2006.

Nowy Wiśnicz, Trzyciąż, Pcim, Lubień, Słomniki, Wiśniowa, Raciechowice, and Lipnica Murowana.

In addition to urban centres, communes with a higher share of land designated for development within the KMA under discussion are located in the neighbourhood of Kraków, whereas the planned level of urbanisation is considerably lower in the

north and south parts of the Kraków Metropolitan Area. Also the influence of the contemplated A4 motorway upon designation of land for development can be felt. Those communes in which the index of surface area of land designated for development projects is the lowest include Sułoszowa and Koszyce (the index amounts to 0.5% of the whole KMA area potential). Not much higher (ca. 1%) is the share of surface area of land designated for investments in the communes of Drwinia, Lipnica, Lanckorona, Siepraw, Stryszów, Świątniki, Tokarnia, Trzciana, Wiśniowa, and Żegocina. This shows that the lowest share of areas designated for investment exists in communes located in the south and east parts of the KMA, which can be a proof of the economic weakness of those areas, their weaker functional links with the central city, and a more agricultural character of communes located in the peripheral KMA part.

Such a share of areas designated for investment projects does not raise any objections from the viewpoint of spatial distribution, taking into account that areas with the highest share are located around the central city, while areas with the a lowest share are grouped in the metropolitan area's external zone. However, a more thorough analysis of designating land for investment purposes highlights high diversification between particular communes in respect of determining the amounts of land reserves. Paradoxically, such a situation does not always result from the location or demographic or economic diversification of given communities, but has rather been dictated by the spatial management conducted by them and consisting in too generous a designation of land for development purposes.

### **RELATIONSHIPS BETWEEN DISTRIBUTION OF POPULATION AND SPATIAL DEVELOPMENT OF COMMUNES IN THE KRAKÓW METROPOLITAN AREA**

The area covered by the analysis has a considerable degree of diversification in the amount of land designated for investment per 1 resident. That diversification is more than tenfold and ranges from 222 m<sup>2</sup> per 1 resident in Kraków to 2,308 m<sup>2</sup> per 1 resident at Rzezawa (Fig. 3). Communes with the highest index of land designated for investment per 1 resident (exceeding 2,000 m<sup>2</sup>) include: Rzezawa, Brzeźnica, Iwanowice, Gdów, Michałowice, and Nowe Brzesko. Out of them, only the commune of Michałowice is located directly in the suburban zone of Kraków. From among other communes bordering on Kraków, the communes of Liszki and Igołomia-Wawrzeńczyce can be classified as areas of a relatively high index of areas designated for investment projects per 1 resident. That index for the commune of Niepołomice is lower, and a significant share in that group of areas designated for investment projects concerns not only housing, but also surface use and industrial areas. A none too high share of areas designated for

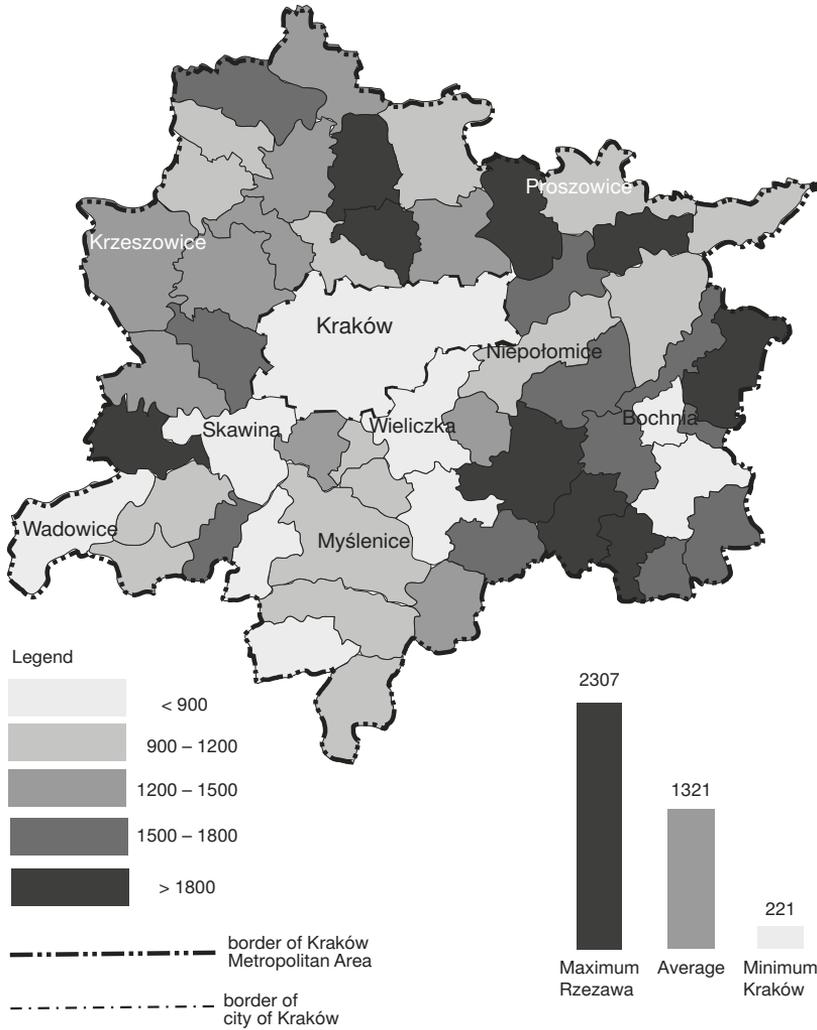


Fig. 3. Invested areas and land designated for investment in  $m^2$  per 1 resident of the KMA communes in 2006

Source: own study, prepared on the basis of BDR (Regional Data Bank) and GUS (Central Statistical Office) data, as well as those included in *Krakowski Obszar Metropolitalny. Analiza polityki przestrzennej gmin, 2006*.

investment is a common feature of the communes of Skawina, Bochnia, as well as Wieliczka and Świątniki Górne. In the case of Skawina and Wieliczka this results from an urban, more intense type of housing development. In the group of rural communities, relatively low indexes of investment land per 1 resident

can be found in the communes of Sułoszowa, Siepraw, Tokarnia, and Pcim. This may be due to the type of spatial policy implemented by those communes, and the necessity to maintain a considerable amount of open land and preservation of green areas. Some of those communes are distinguished by low population density values, e.g. Gdów, Brzeźnica and Rzezawa, Trzciana, Michałowice, Iwanowice, Koniusza, Nowe Brzesko and they designated much land for investment projects. No doubt that it is the dispersed character of development that generates a high value of index of land designated for investment per 1 resident. However, this can also be a proof that too big reserves of investment land have been made in relation to the actual demand of communes. In contrast, limited urbanisation processes will be taking place in the communes of Sułoszowa, Pcim and Tokarnia, in which, at their present, low population density indexes, low indexes of land designated for development continue to be maintained.

One can notice that in certain communes designation of land for investment purposes is not caused by actual demand, but may result, perhaps, from the spatial management conducted in too prodigal a way. In order to determine more accurately relationships between demand for investment land and its actual use, the analysis of the ratio of residential land and residential and service land to the number of residents in an economically productive age in the given commune was performed. That ratio was determined on the basis of analysis of real demand for residential land in that age group, which actually purchases flats most often. Based on the analysis of the share of residential and residential and service land per 1 resident of working age (Fig. 4), a high diversification between particular communes in designating land for building projects was found. In communes of the Kraków Metropolitan Area there is a ca. fifteenfold value differential between the maximum and the minimum values, i.e. in the commune of Brzeźnica there are 3,454 m<sup>2</sup> of residential land and residential and service land per 1 resident, whereas in the commune of Kraków that ratio is 232 m<sup>2</sup> per 1 resident. The smallest amount of residential land in relation to the number of population in the economically age was designated in the communes of Kraków and Skawina, and in the town of Bochnia. The highest level of planned investments is in the rural communes of Brzeźnica, Iwanowice, Michałowice, Koniusza, Nowe Brzesko, Rzezawa, Gdów, Łapanów, and Trzciana. Based on the analysis of maps of areas designated for investment projects per 1 resident (Fig. 3.) and residential land per 1 resident of working age (Fig. 4) one can state that in the majority of communes of the Kraków Metropolitan Area too much land has been designated for investment purposes in relation to the number of population in that area. This concerns in particular rural communities located beyond the zone of direct commuting to Kraków and not having direct links with the central city. Those communes, which are in the highest class of housing land designation, are typical

rural communes of a dispersed development, poor infrastructural level, where no distinct tendencies in moving of the urban population to those localities have been noticeable yet.

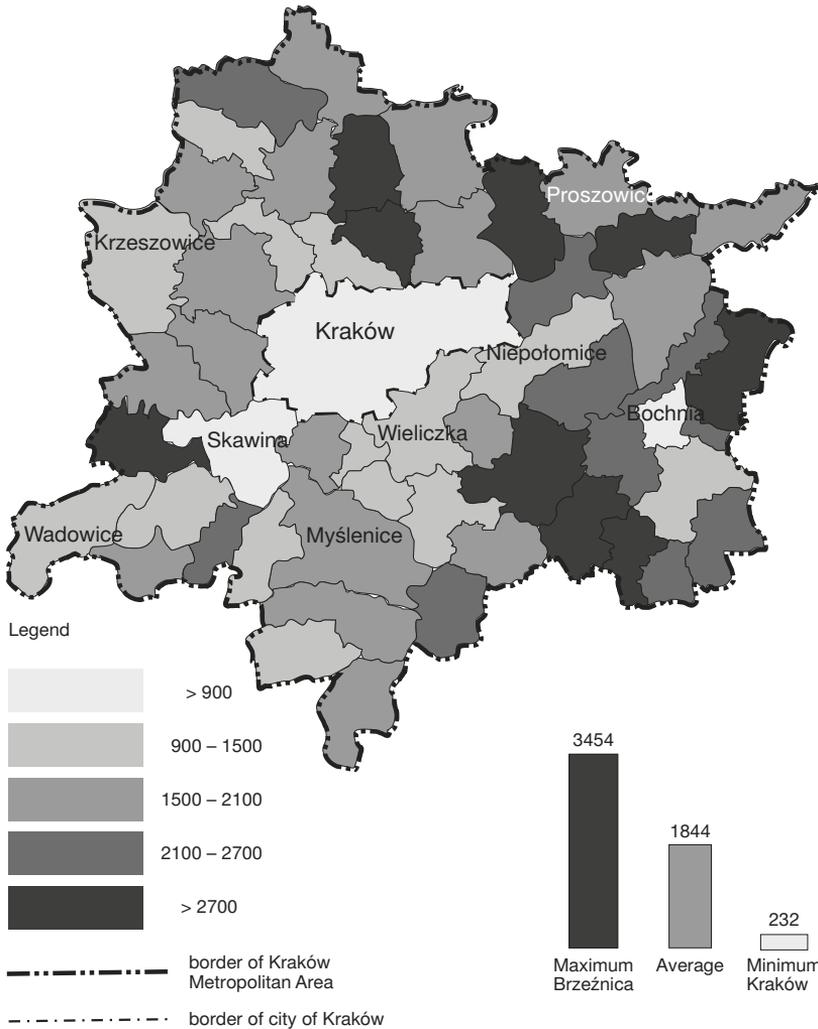


Fig. 4. Share of residential and residential and service land per 1 resident of working age in the KMA in 2006

Source: own study, prepared on the basis of BDR (Regional Data Bank) and GUS (Central Statistical Office) data, as well as those included in *Krakowski Obszar Metropolitalny. Analiza polityki przestrzennej gmin, 2006*.

## CONCLUSIONS

Such a high index of land designated for investment projects results rather from the way in which spatial management is conducted and from designating too much land for housing projects, not taking into consideration demographic conditions of the given commune.

Based on the analysis of data pertaining to the spatial development of the Kraków Metropolitan Area, a non-justified and a non-controlled expansion of investment land in communes has been noted. In 28 communes (more than half of the whole KMA), the index of m<sup>2</sup> of investment land per 1 resident exceeded 1,200, and in 18 communes mainly in the peripheral, i.e. south-eastern part, that index exceeded 1,500, whilst the average for Kraków Metropolitan Area is 1,300. High index of investment land/1 resident beyond the suburban zone requires a deep analysis from the viewpoint of the effectiveness of the use of space designated for development, and should be adjusted to the commune's policy. One can also say that in the majority of communes areas for investment purposes were designated without a detailed analysis of them and of their social and economic conditions. In those communes, in which the index of investment land exceeds 1,200 m<sup>2</sup>/1 resident, probably demographic conditions for the commune development have not been analysed in details.

In some cases, the surface area diversification of land designated for investments results from the diversification of provisions in land use plans of communes. It is necessary to standardise them and to make them cohesive with regional policy as regards the purposefulness of maintaining planning reserves of areas to be developed or covered with investment projects.

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