

## THE DYNAMICS OF HUMAN-INDUCED TRANSFORMATIONS OF LANDSCAPE IN THE SUB-MOUNTAINOUS /PODGÓRZE/ REGION ON THE EXAMPLE OF METROPOLITAN AREAS IN SOUTH-EAST POLAND

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**Anthropogenic impact as one of the factors influencing transformations of the current spatial structure is a feature characterizing the post-urbanization and globalization period. Two urban centres of interregional – national character have been selected for the purposes of the presented analysis and research, both of them situated in the area of the Sub-mountainous /Podgórze/ Region together with their neighbouring areas marked out by the conventional limits of the metropolitan centres.**

**Key words: anthropogenic impact, transformation of landscape.**

**Антропогенний вплив як один з факторів зміни сучасного простору, є рисою, що характеризує пост-урбанізаційний та глобалізаційний періоди. Два міські центри міжрегіонального – національного характеру були обрані для представленого дослідження та аналізу, обидва з них разом з суміжними територіями розташовані в передгірному регіоні /Podgórze/ Польщі.**

**Ключові слова: антропогенний вплив, трансформація ландшафту.**

### Introduction

Anthropogenic impact as one of the factors influencing transformations of the current spatial structure is a feature characterizing the post-urbanization and globalization period. A dynamic reconstruction of structures of development in the countries of the former socialist bloc is especially visible – a relatively short period of change together with intense pressure for development stemming from the desire to raise the living standard is a valuable study field. The last 30 years in Poland have witnessed a change in the character of cities as well as suburban and rural areas; cities aspire to the status of metropolitan area centres, frequently at the cost of the surrounding landscape degradation. It is especially important in the areas of high natural and landscape value, and such is undoubtedly the cultural Sub-mountainous /Podgórze/ Region (the reach of regional architectural forms)<sup>1</sup> situated in the south-eastern part of Poland.

Within the selected region there are numerous settlement units of diverse character. Two urban centres of interregional – national character have been selected for the purposes of the presented analysis and research, both of them situated in the area of the Sub-mountainous /Podgórze/ Region together with their neighbouring areas marked out by the conventional limits of the metropolitan centres.

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<sup>1</sup> The cultural Sub-mountainous /Podgórze/ Region has been delimited by Chmielewski (based on Kondracki J., *Geografia regionalna Polski*, PWN Scientific Press, Warsaw 2011 [in:] Chmielewski T.J., *Systemu krajobrazowe. Struktura – funkcjonowanie – planowanie*, PWN Scientific Press, Warsaw 2013, p. 100.



Fig. 1. Site analysis of the region (elaboration Sikora A.)

### Preliminary characteristics of the selected centres, their metropolitan areas and landscape

The area of voivodeship capitals (in the discussed region, they are Cracow and Rzeszów) has been adopted for research, together with their existing and potential metropolitan areas, as anthropogenic impact occurs predominantly in the vicinity of large cities.<sup>2</sup> Metropolitan areas are particularly exposed to the pressure for development and distorted crystallization of the urban-rural continuum, which in turn irreversibly degrades the landscape (this phenomenon is one of characteristic elements accompanying the sprawl of urban development in the era of post-socialist suburbanization<sup>3</sup>).

The Country Spatial Development Concept 2030 /Koncepcja Przestrzennego Zagospodarowania Kraju 2030/ lists the above-mentioned regional centers as: a metropolitan centre – Kraków (i.e. having the defined metropolitan area) and a national centre performing certain metropolitan functions (Rzeszów), both obliged to prepare a land use plan and a development strategy for the metropolitan area.<sup>4</sup> Analysis of those hubs' metropolitan areas may help to define the problem of anthropogenic impact influencing landscape degradation and to establish the directions of remedial actions.

<sup>2</sup> The issue of city classification according to size stirs a lot of controversy; particularly the question of determining the differences between a medium and a large city raises doubts. The division of cities according to size (in a somewhat simplified version) has been adopted after Szymańska D., *Urbanizacja na świecie*, PWN Press, Warsaw 2007. The questions of pressure for development in the area of large cities are discussed in many publications, inter alia: Lorens P., (ed.), *Problem suburbanizacji*, Urbanista Press, Warsaw 2005, Kozłowski S., (ed.), *Żywiotowe rozprzestrzenianie się miast. Studia nad zrównoważonym rozwojem*. Vol. II, Białystok – Lublin – Warsaw 2006, as well as expert studies, inter alia: Lisowski A., Grochowski M., *Procesy suburbanizacji, uwarunkowania, formy i konsekwencje /Processes of suburbanization, conditions, forms and consequences/*. An expert study prepared by the Institute of Socio-Economic Geography and Spatial Management of Warsaw University on commission from the Ministry of Regional Development.

<sup>3</sup> According to Z.K. Zuziak, urban sprawl is a phenomenon characterized by: chaotic progress and irrational spatial arrangements, disproportions between development expansion and technical infrastructure, deficient local services, landscape devastation and ugly development. *Strefa podmiejska w architekturze miasta. W stronę nowej urbanistyki regionu miejskiego*. [in:] Lorens P., (ed.), *Problem suburbanizacji*, Urban Planner's Library 7, Urbanista, Warsaw 2005, pp. 17 – 32. The question of suburbanization as the contemporary problem of post-socialist cities is discussed in Liszewski S., *Geografia urbanistyczna*, PWN Scientific Press, Warsaw 2012.

<sup>4</sup> The Country Spatial Development Concept 2030. A document adopted by the Council of Ministers on the 13<sup>th</sup> December 2011. The Objective, pp. 76 – 85.

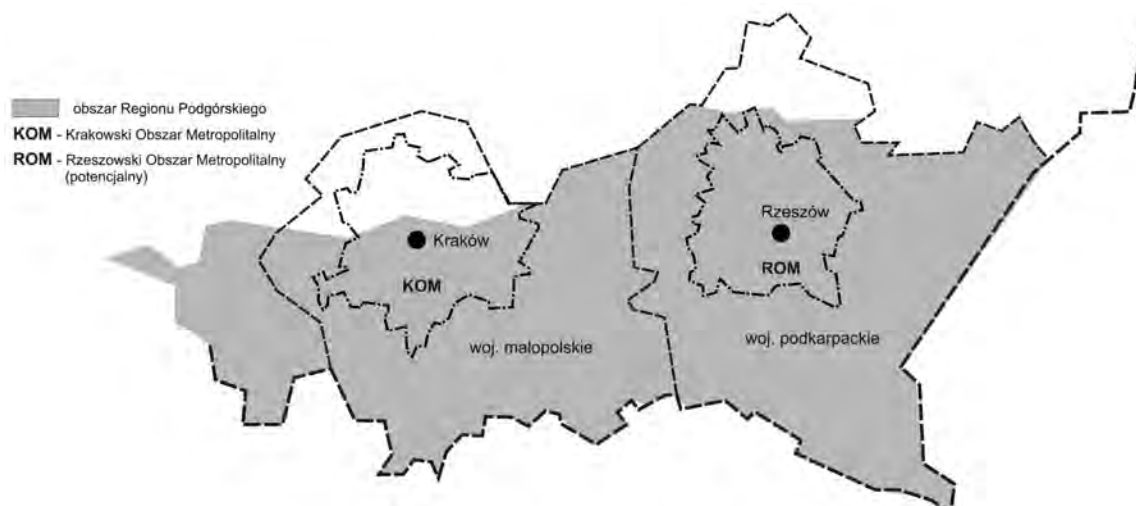


Fig. 2. Małopolskie and Podkarpackie Voivodeship with CMA (KOM) and RUA (ROM) regions (elaboration Sikora A.)

### Human-induced transformations in the metropolitan area of a large city (800,000 inhabitants)

The Cracow Metropolitan Area (CMA) is a specific functional region comprising a large city, i.e. the Cracow metropolis, and the neighbouring complex of settlement units linked by diverse interactive connections. The area comprising the city of Cracow together with the Cracow country district (*powiat ziemski*) and the neighbouring districts meets the general criteria established for Polish metropolises. The Spatial Development Plan for the Małopolskie Voivodeship,<sup>5</sup> adopted by resolution No XV/174/03 of the Małopolskie Voivodeship Assembly of the 22<sup>nd</sup> December 2003, delimited the boundaries of the metropolitan area, which is comprised of: 1 urban centre – Cracow – a municipality with district rights; 15 urban-rural communes and 36 rural communes.<sup>6</sup> In order to establish the degree of anthropogenic impact on the suburban area of Cracow's sub-mountainous region, a stock of data has been accumulated, taken from the Central Statistical Office as well as collected in the course of the authors' research. Owing to Cracow's size, functions and significance in the settlement network of southern Poland, the territorial reach of its influence frequently exceeds the boundaries of the Małopolskie Voivodeship.

Structural indicators, such as demographics, economics, infrastructure and the social factor, all suggest that up to 2012 the CMA was getting denser as far as urbanization processes are concerned, and the Cracow's suburbia on its southern side, where the expansion is the greatest, started to merge into one cramped organism. The world crisis, which slowed down the economy after 2011, stopped the construction boom and halted the growth of the suburban areas.

Nevertheless, owing to their social dimension, the changes will be re-activated at a more economically convenient time. However, the primary indicator of a city's influence over its surrounding region, the one that is most frequently used to delimit a metropolitan area, are journeys to work and services and transportation accessibility of all connections on offer. The mobility factors are the ones that indicate social and economic links. Hence, within the CMA, the external zone reaching far beyond the direct impact is called the commuting zone.<sup>7</sup>

The territorial reach of Cracow's impact has grown significantly in the recent 10 years towards the north and north-east of the city; in the area that had not been previously perceived as an attractive place to live. Natural assets of the southern direction did not balance, however, the transportation difficulties and the ever longer isochrones of commuting to work or school.

<sup>5</sup> A new Spatial Development Plan for the Małopolskie Voivodeship is now undergoing the process of crystallization, and preliminary versions have already been made public.

<sup>6</sup> An excerpt from the Spatial Development Plan for the Małopolskie Voivodeship. The Małopolskie Voivodeship Marshall Office – <http://www.malopolskie.pl/Planowanie/Kom/>

<sup>7</sup> It is assumed that the boundaries of the commuting zone run across the communes where 15% of population commute to and work in Cracow.

Settlement pressure in the southern area eased off, yet it increased dangerously in the northern suburban zone, which brought about the sprawl of development and seizing larger and larger areas of open land hitherto used for agricultural purposes. The northern side of the CMA does not have as clearly defined natural barriers as the southern one, and the land form allows for creation of relatively scattered development complexes, and sometimes compact housing estates – often closed and fenced off from the surrounding space – emerge at a considerable distance from the city centre.



*Fig. 3. A drawing of the CMA: communes with the greatest urban fabric growth in the last 20/10 years (elaboration Hrehorowicz-Gaber H.)*

The Cracow Metropolitan Area is now facing an important question: whether to accept further degradation of landscape through its fragmentation or whether to take the vestigial natural forms – still surviving (mostly due to the land configuration) under absolute protection.

It would seem that protection is the best option. Yet the pressure for development is so great around Cracow that excluding the sub-mountainous area situated at the south from development expansion will result in development sprawl in the areas to the north of Cracow, where the land configuration does not impose any limitations. As far as the economic factor is concerned in the form of property prices, at present the highest prices in the Cracow area (in the sub-mountainous zone, which is a commuting zone) are in: the commune of Myślenice, the commune of Dobczyce and the southern parts of the Wieliczka commune. Those are also the areas where there the natural landscape is shrinking rapidly. As a protective measure against building up areas of high natural value, the communes situated in the basin of the Raba river have developed a programme of protection for open areas in the Raba valley but at the same time it is a programme for the CAM inhabitants activation.

The project starts in the Dobczyce water reservoir, which is to be made partly accessible for boats. Further areas are situated in the environs of the river, and the idea is to focus natural activities in the vicinity of the towns thus drawing them away from the less urbanized areas. The project developed in cooperation with the ecological Association of Friends of the Raba even provides for partial re-naturalization of several minor tributaries. On the other hand, the project objectives include a whole range of leisure activities for the CMA inhabitants, such as various sports, areas for cross-country riding and paintball, and even an airstrip for sports aircraft. All of this activating programme is to take place in the degraded areas as an element of the land reclamation.

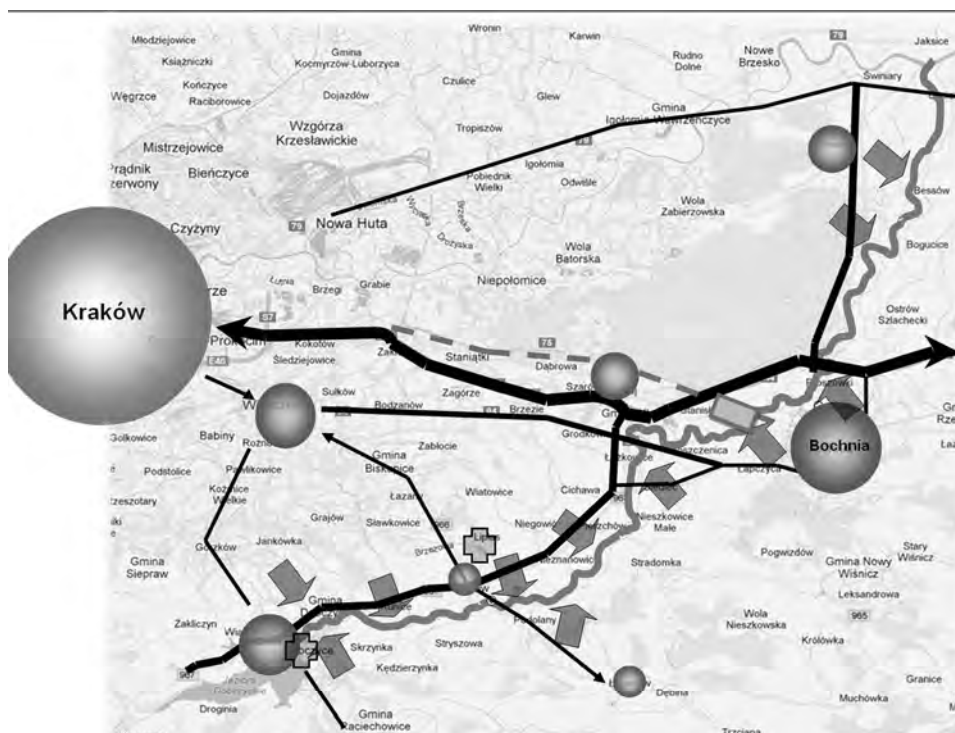


Fig. 4. The areas covered by the Raba project in 5 communes (elaboration Hrehorowicz-Gaber H.)

The standpoint presented by the commune association for the Raba seems very reasonable and important in the discussion on landscape protection against the destructive activities of man. In the case of the area of Pogórze Wiśnickie /the Wiśnickie Foothills/ and the area neighbouring with the Beskid Wyspowy /the Island Beskids/ the only solution is to indicate places for activation; absence of such indicated spots will not stop the anthropogenic impact, it will only turn it into uncontrolled destructive power ruining the landscape.

#### **Anthropogenic impact in the potential metropolitan area of a city aspiring to the status of a metropolis (180,000 inhabitants).**

The city of Rzeszów has not been included in the Country Spatial Development Concept as a metropolitan city, it has received the status of a centre performing certain metropolitan functions obliged to prepare a Land Use Plan for the Metropolitan Area. The works on the plan had been initiated but subsequently suspended after the conditions analysis as neither the size of the city (understood as the number of inhabitants) nor the size of the potential metropolitan area is sufficient for performing the metropolitan function.

According to preliminary plans, the Rzeszów Metropolitan Area (RMA) is to cover 24% of the voivodeship area and be inhabited by a population of 730,000 people,<sup>8</sup> which meets the quantitative criteria of the metropolitan area population size adopted in Europe.<sup>9</sup> The potential RMA will include the following communes: Rzeszów, Głogów Małopolski, Trzebownisko, Czarna, the Łańcut municipality, the Łańcut commune, Krasne, Chmielnik, Tyczyn, Boguchwała and Świlcza.<sup>10</sup> They are all areas of high cultural, natural and landscape value, which additionally increases the pressure for development.

<sup>8</sup> Data taken from the website of the Podkarpackie Spatial Planning Office (2007).

<sup>9</sup> 500,000 inhabitants, after: Szymańska D., *Geografia osadnictwa*, PWN Scientific Press, Warsaw 2009.

<sup>10</sup> The final decision on the territorial reach of the metropolitan area within the boundaries of the Podkarpackie Voivodeship has not been taken. It has been concluded that analytical works pertaining to the metropolitan area will be carried out for six country districts and the township of Rzeszów (i.e. the area covered by the Partnership Agreement).



Fig. 5. Expansion of Rzeszów area from 2005 to 2012 and proceeded enlargement in 2013 (elaboration Sikora A.)

The city of Rzeszów has extended its boundaries several times in recent years,<sup>11</sup> which has in a way legitimized the anthropogenic impact or even stimulated it in a certain fashion. It is worth noting that the number of inhabitants has risen by 23.5 thousand people during that time (13%) while the simultaneous territorial growth has equaled 100%. The main direction of extending the city boundaries is the north – the mountainous area of the Carpathians of high ecological and landscape value. At present (2013) there are plans to extend the city boundaries to cover still some more area.<sup>12</sup>

Extending the city boundaries sanctions the uncontrolled growth of the urban fabric or, indeed, promotes it,<sup>13</sup> which is evidenced by the number of the issued planning permissions.<sup>14</sup> Reviewing the dynamics of the issued planning permissions in the period of 5 years (2005 – 2010), it could be stated that there was a systematic increase in the number of issued permissions up to 2010, when 13,711 decisions

<sup>11</sup> The city of Rzeszów has extended its boundaries as follows: in 2006 (a part of the Krasne commune, + 4.5 thousand inhabitants), in 2007 ( a part of the Świlcza commune, + 4.5 thousand inhabitants), in 2008 (parts of the Świlcza and Boguchwała communes, + 4.5 thousand inhabitants), in 2009 (the village of Biała, + 2 thousand inhabitants), in 2010 ( a part of the Głogów Małopolski commune and the Tyczyn commune, + 8 thousand inhabitants).

<sup>12</sup> The areas in question are parts of the Trzebownisko and Krasne communes, which, as is estimated, may extend the area of Rzeszów by another 100%.

<sup>13</sup> For example by abolishing the obligation to obtain a permission for changing the use of arable and forested land for the non-agricultural and non-forest use and thus facilitating the process of obtaining the planning permission.

<sup>14</sup> In the case of the Podkarpackie Voivodeship it is a relatively credible indicator due to the fact that a very small part of the voivodeship area is covered by valid Local Land Use Plans (7%). The data are presented on the basis of the document prepared for the Department of Spatial Development and Construction of the Ministry of Transport, Construction and Maritime Economy “Analiza stanu i uwarunkowań prac planistycznych w gminach na koniec 2010 r”. /*Analysis of the status and conditions of planning works in communes at the end of 2010*/. Warsaw, February 2012. Due to the time required for data processing, this is the most up-to-date document of this type. Earlier analysis documents have also been studied for the purpose of this article.

were issued, i.e. 6.5 per 1,000 inhabitants, which places Podkarpacie at the 2<sup>nd</sup> position in the country (behind the Wielkopolskie Voivodeship – 6.9 per 1,000). The anthropogenic impact is the greatest in the vicinity of large urban centres,<sup>15</sup> so most of those decisions were issued in the potential Metropolitan Area. The fact that construction projects are so scattered is of particularly adverse character. Ecosystems and landscape are irreversibly destroyed in consequence of the chaotic pressure for development. The necessity of preserving balance in the space (from the perspective of urban planning) is an indispensable element of sustainable development as well as spatial order and cohesion. It is worth noting that human-induced transformation of the landscape are undesirable not only in the areas protected under various nature conservation programmes, but also in open green areas – animal and plant habitats.

### Conclusions

City metropolitan areas are particularly exposed to the anthropogenic impact. It is not necessarily undesirable on the condition, however, that the compact development fabric of cities and other settlement forms will remain coherent. It is essential that the urban-rural continuum should be preserved and in consequence the balance between developed and open green areas. The integrated and sustainable development of urbanized regions and ecosystems, correctly functioning legal, administrative and planning apparatus as well as solutions making maximum use of the already human-transformed areas seem to be the sole desirable direction of development for the sub-mountainous region of metropolitan areas in south-eastern Poland.

1. Chmielewski T.J.: *Systemy krajobrazowe. Struktura-funkcjonowanie-planowanie*, PWN Scientific Press, Warsaw 2013. 2. Department of Spatial Development and Construction of the Ministry of Transport, Construction and Maritime Economy "Analiza stanu i uwarunkowań prac planistycznych w gminach na koniec 2010 r". /Analysis of the status and conditions of planning works in communes at the end of 2010/. Warsaw, February 2012 (as well as earlier analyses). 3. German., Wójcik A.: *Wpływ renaturyzacji i antropopresji w zachodniej części Krakowa i jego strefy podmiejskiej. Człowiek i rolnictwo*, Institute of Geography and Spatial Management of Jagiellonian University, Górka Z., Zborowski A. (ed.), Cracow 2009. 4. Hrehorowicz-Gaber, H.: *Effects of transformations in the urban structure on the quality of life of city residents in the context of recreation*, *Bulletin of Geography. Socio-economic Series*, No 14/2013, Nicolaus Copernicus University Press, Toruń 2013. 5. *Koncepcja Przestrzennego Zagospodarowania Kraju 2030 /The Country Spatial Development Concept 2030/, a document adopted by the Council of Ministers on the 13th December 2011*. 6. Kondracki J.: *Geografia regionalna Polski*, PWN Scientific Press, Warsaw 2011. 7. Kozłowski S. (ed.): *Żywiotowe rozprzestrzenianie się miast. Studia nad zrównoważonym rozwojem*, Białystok-Lublin-Warsaw 2006. 8. Lisowski A., Grochowski M.: *Procesy suburbanizacji. Uwarunkowania, formy i konsekwencje*, /Processes of suburbanization. Conditions, forms and consequences/. An expert study prepared by the Institute of Socio-Economic Geography and Spatial Management of Warsaw University on commission from the Ministry of Regional Development. 9. Liszewski S. (ed.): *Geografia urbanistyczna*, PWN Scientific Press, Warsaw 2012. 10. Lorens P. (ed.): *Problem suburbanizacji*, Urbanista Press, Warsaw 2005. 11. Malisz B. *Zarys teorii kształtowania układów osadniczych*, Arkady Press, Warsaw 1981. 12. OECD (2011) *OECD Urban Policy Reviews: Poland 2011*, OECD Publishing. 13. Sikora A., Walicka-Góral B.: *Urban and architectural aspects of the prevention of noise emissions and reduction of their negative effects*, (published in the conference proceedings) *Advanced Construction 2012, Proceedings of the 3rd International Conference, 18–19 October 2012, Kaunas, Lithuania, Kaunas University Of Technology*. 14. Szymańska D.: *Geografia osadnictwa*, PWN Scientific Press, Warsaw 2009. 15. Szymańska D.: *Urbanizacja na świecie*, PWN Scientific Press, Warsaw 2007. 16. *Act on Spatial Planning and Management of the 27th March 2003*, (Journal of Laws 2003.80.717 with subsequent changes). 17. Węclawowicz-Bilska E. and Zuziak Z.K. (ed.): *Problemy planowania rozwoju Krakowskiego Obszaru Metropolitalnego w powiązaniu z Katowickim Obszarem Metropolitalnym*, Cracow 2008. 18. Zuziak Z.K.: *Strefa podmiejska w architekturze miasta. W stronę nowej urbanistyki regionu miejskiego* [in:] Lorens P. (ed.), *Problem suburbanizacji*, *Urban Planner's Library* 7, Urbanista, Warsaw 2005.

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<sup>15</sup> One of the elements contributing to the special appeal of a large city functional areas is convenient transportation service, small distance to the leading centre: proximity of workplaces, schools and services. The issue has been discussed in Sikora A., Walicka-Góral B., *Urban and architectural aspects of the prevention of noise emissions and reduction of their negative effects*, (published in the conference proceedings) *Advanced Construction 2012, Proceedings of the 3<sup>rd</sup> International Conference, 18 – 19 October, 2012, Kaunas, Lithuania, Kaunas University of Technology*.