

BULLETIN OF GEOGRAPHY. SOCIO-ECONOMIC SERIES

journal homepages:
<https://content.sciendo.com/view/journals/bog/bog-overview.xml>
<http://apcz.umk.pl/czasopisma/index.php/BGSS/index>

A conceptual database model for the identification of degraded areas and areas proposed for planned revitalisation

Tomasz Stanisław Podciborski^{1, DFMR}, Aleksandra Zienkiewicz^{2, DFMR}

¹University of Warmia and Mazury in Olsztyn, Institute of Geospatial Engineering and Real Estate, e-mail: tomasz.podciborski@uwm.edu.pl (corresponding author), <http://orcid.org/0000-0002-8778-1879>; ²Pomeranian Academy in Słupsk, Department of Socio-Economic Geography and Tourism, e-mail: aleksandra.zienkiewicz@apsl.edu.pl, <http://orcid.org/0000-0003-2323-913X>

How to cite:

Podciborski, T.S. and Zienkiewicz, A. (2021). A conceptual database model for the identification of degraded areas and areas proposed for planned revitalisation. *Bulletin of Geography. Socio-economic Series*, 51(51): 85-94. DOI: <http://doi.org/10.2478/bog-2021-0007>

Abstract. For revitalisation programmes to be effective, territorial governments have to introduce consolidated measures that support the planning, organisation and implementation of revitalisation measures to benefit local communities and economies, and to alleviate crisis situations in degraded areas. Such measures require unlimited access to data that accurately describe social, economic and environmental conditions. In view of the above, the main aim of this study was to propose a conceptual database model for the identification of degraded areas and areas proposed for planned revitalisation under revitalisation programmes implemented in urbanised rural areas. The detailed objectives of the presented research were to describe the components of the proposed database and the sources of data for developing municipal revitalisation programmes. A diagram of the database model supporting the initial stages of revitalisation was also presented. The research methodology involved analyses, inference and deduction. A questionnaire survey conducted among geography, spatial planning, urban development and environmental experts was used as a research tool in the study. The results of the questionnaire confirmed the validity of the components of the proposed database model.

Article details:

Received: 7 February 2020
 Revised: 26 November 2020
 Accepted: 2 February 2021

Key words:

revitalisation,
 database,
 degraded area,
 area proposed for revitalisation

Contents:

1. Introduction	86
2. The rationale behind building a database for revitalisation projects.....	86
3. Selection of database components that support the identification of degraded areas and areas proposed for planned revitalisation.....	87

4. Presentation of a database model supporting the delimitation of degraded areas and areas proposed for planned revitalisation.....	90
5. Conclusions.....	92
References	93

1. Introduction

The term “revitalisation” was coined at the turn of the 20th century. In the 20th century, revitalisation was broadly defined as a set of reconstruction, conservation and renovation measures aiming to revive the architecture and economy of urban areas in crisis. Revitalisation programmes were undertaken to replace outdated and ill-adapted planning solutions with new urban space patterns. In this sense, revitalisation projects were detailed programmes aiming to revive degraded cities and suburbs that had lost their original function. A similar approach was postulated by Spandou et al. (2010), who argued that revitalisation combines various measures to revive problem areas as part of large, medium-sized and small projects that are implemented to recreate, rehabilitate and/or reinstate urban environments. Past experiences indicate that in the spatial dimension, revitalisation should be defined as a set of comprehensive activities that are initiated in existing degraded urban areas, and that the concept of revitalisation should be clearly separated from measures that involve planning and construction in undeveloped areas (Bryx, 2003). According to Markowski (1999), revitalisation should be considered in the context of marginalisation, where the main focus should be placed on areas that are excluded from innovative planning. For such areas to attract investment, not only their technical infrastructure but also their social capital should be reformed with the involvement of the local potential.

Couch et al. (2011) observed that the definition of revitalisation was initially confined to slum clearance in urban areas, and that this urban renewal strategy was limited to planning solutions, whereas the needs of local communities inhabiting problem areas were largely disregarded. Based on the observations of completed revitalisation projects, Litman (2009) concluded that for such programmes to succeed, social equality has to be introduced to

problem urban areas through social integration and community building. Social exclusion, marginalisation, spatial segregation and the growing concentration of marginalised social groups will always breed other problems, such as unemployment, crime and decreasing quality of public space (Andersen and van Kempen, 2003). Gehl (2017) argued that spatial planning that fails to account for the human dimension and community needs produces space that is aesthetically appealing, but unfriendly and rarely used. A different situation occurs during regeneration works carried out in Poland under the auspices of the Act of October 9, 2015 on revitalisation (i.e. Journal of Laws of 2020, item 802). The provisions of this act state that social participation, understood as the active participation of citizens in decision-making, is an integral part of revitalisation works. In this case, the task of the local community is to consciously and actively participate in co-deciding on matters that concern them and to participate in the creation of the revitalisation project and expressing their own opinions and needs, assuming that the final decision rests with the self-government (Podciborski, 2017).

Revitalisation is a dynamic, rather than static phenomenon (Roberts and Sykes, 2008), and the search for elements that have a negative impact on the condition of space, which can be changed as a result of designing and carrying out revitalisation works, is an extremely difficult task. Nonetheless, attempts should be made to create databases that support revitalisation measures in developed rural areas.

2. The rationale behind building a database for revitalisation projects

The analysis and assessment of spatial elements having a significant impact on the state of development of rural areas requires knowledge

of a number of spatial and descriptive data. Unfortunately, the dispersion of the necessary data across many separate sources (cartographic studies and public registers, which separately are not able to meet all the needs related to information about the area) makes accessing them time-consuming and sometimes difficult. Modern databases should combine technical solutions from various disciplines, including geodesy, cartography, geography and administration, to offer comprehensive solutions to spatial management in both urban and rural areas. Such tools should also support timely, accurate and fully automatic interpretation of spatial phenomena and changes in space (Podciborski, Trystuła, 2010).

According to Kwietniewski (2008), the main purpose of modern geographic information systems is to gather, process and present spatial data. A progressive geographic information system that supports revitalisation was developed pursuant to the provisions of the Polish Revitalisation Law of 9 October 2015 (Journal of Laws, 2015, item 1777). Article 4 of the above law called for the introduction of diagnostic measures prior to revitalisation by obliging the governors of rural and urban municipalities and city mayors to conduct the relevant analyses with the use of objectively verifiable indicators and research methods.

Provisions of Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing the infrastructure for spatial information in the European Community (INSPIRE) and articles of the Act of 4 March 2010 on the infrastructure for spatial information (i.e. the Journal of Laws of 2020, Item 177) have been implemented in Poland, and introduce the obligation of municipalities to create and develop spatial information; however, they do not provide adequate access to integrated databases and the information contained therein in order to enable the area of revitalisation to be reliably delimited as required by the above-mentioned Act on Revitalisation.

According to the legislator, diagnostic measures should be undertaken at least every three years before the initiation of revitalisation programmes based on the monitoring and evaluation guidelines

set forth by the municipal revitalisation programme. According to the commentary to the Revitalisation Law, the introduced solutions offer practical tools that support the preparation, management and implementation of revitalisation projects, without prescribing a rigid framework for the completion of such tasks. The Revitalisation Law does not stipulate the manner in which spatial analyses should be carried out, and it does not lay down the appropriate rules or indicators. The discussed law merely establishes a general framework for implementing revitalisation programmes (Podciborski, 2017).

3. Selection of database components that support the identification of degraded areas and areas proposed for planned revitalisation

The reliability, accuracy and scope of the analyses of adverse social, economic, environmental and technical phenomena that are conducted for the needs of revitalisation programmes significantly influence the effectiveness of revitalisation measures and the sustainable development of rural areas in the future. The delimitation of both the degraded area and the revitalisation area should be carried out as a multi-criterion analysis. Correct delimitation of the degraded area and the revitalisation area enables the maximum use of statutory tools and possibilities. Assuming that the area of revitalisation cannot exceed 20% of the commune's area and is inhabited by more than 30% of the commune's inhabitants, the revitalisation area may be divided into sub-areas, including sub-areas that do not have common borders.

The identification of degraded areas and areas proposed for revitalisation requires comprehensive access to descriptive and spatial data that in the initial stages of revitalisation are dispersed across numerous sources of information – mostly public registers and cartographic documents (Podciborski, 2017). As a result, the identification of degraded areas and areas proposed for planned revitalisation can be difficult and time consuming. A database supporting the acquisition of data in the initial

stages of revitalisation would significantly alleviate these problems.

The concept of a database proposed in this study, integrating information from dispersed sources, could speed up and automate analyses of adverse social, economic and environmental factors in the analysed fragments of rural areas by promoting rapid access to the necessary high-quality data for a given location. For the proposed database to deliver the required functionalities, it has to contain comprehensive information that is relevant to the diagnostic surveys prescribed by the Revitalisation Act. Therefore, the main objective of the first stage of the present research was to determine:

- the type of administrative unit (type of settlement) to be analysed (municipality, county, village, cadastral district),
- the indicators for identifying degraded areas and areas proposed for planned revitalisation,
- the sources of data for evaluation and analysis,
- the types of maps and cartographic resources for visualising the boundaries of degraded areas and areas proposed for planned revitalisation.

In the first stage of the study, the village was selected as the primary sampling unit. In the following stage, a list of forty (40) adverse social, economic, environmental, spatio-functional, and technical factors was compiled based on the results of a survey.

The research was conducted at the beginning of January 2017 and involved five groups of experts in sociology, economy, environmental management, spatial and urban planning, and civil engineering. A total of 100 experts were surveyed.

The research was conducted with the use of a questionnaire listing two hundred and fifty (250) adverse phenomena, including social (50), economic (50), environmental (50), spatio-functional (50) and technical (50) factors. The respondents were asked to indicate the extent to which each factor contributed to a crisis situation in the developed segments of rural areas. The results were analysed to select twenty (20) adverse social factors and twenty (20) adverse economic, environmental, spatio-functional and technical factors. The selected factors were referred to as indicators in subsequent parts of the study.

The selected indicators and the existing sources of information about the severity of the evaluated phenomena are presented below:

– social phenomena:

1. unemployment rate – county employment centre;
2. long-term youth unemployment rate – county employment centre;
3. unemployment rate among people with primary and lower secondary education – county employment centre;
4. permanent recipients of welfare benefits – municipal welfare centre;
5. temporary recipients of welfare benefits – municipal welfare centre;
6. recipients of targeted welfare benefits – municipal welfare centre;
7. recipients of housing benefits – municipal welfare centre;
8. households in arrears on rent payments in municipal housing – housing department of the municipal office;
9. number of foreigners with a registered address in the village – address registration department of the municipal office;
10. number of persons struggling with drug addiction – social affairs department of the municipal office / addiction treatment centre / outpatient clinic;
11. number of persons struggling with alcohol addiction – social affairs department of the municipal office / addiction treatment centre / outpatient clinic;
12. number of offenses perpetrated by juvenile delinquents – police department / family and juvenile department of the district court;
13. number of domestic violence victims – police department / district court;
14. number of families with domestic violence records – police department;
15. number of families under police supervision – police department;
16. number of persons under the supervision of a probation officer (adults) – district court;
17. number of persons under the supervision of a probation officer (under 18) – family probation officer of the district court;
18. number of burglaries – police department;
19. acts of vandalism – police department;



Fig. 1. Map of the administrative division of Poland

Source: https://upload.wikimedia.org/wikipedia/commons/b/b3/POLSKA_woj_pow_gminy.png

20. grade retention rate in primary and lower secondary schools (percentage of students repeating a grade in the last 12 months) – primary school / lower secondary school / local examination committee.
 - economic, environmental, spatio-functional and technical phenomena:
 1. number of businesses that were wound up or declared bankrupt in the last 5 years – county employment centre;
 2. number of businesses in arrears on property tax – revenue department of the municipal office;
 3. number of businesses in arrears on agricultural and forest tax – revenue department of the municipal office;
 4. number of businesses in arrears on other local taxes – revenue department of the municipal office;
 5. number of businesses in arrears on water and sewage payments – municipal services department of the municipal office;
 6. number of landfills in need of recultivation, including hazardous waste landfills – municipal environmental protection department;
 7. number of households that do not recycle waste – municipal services department of the municipal office;
 8. roof area with asbestos sheeting (in m²) – municipal services department of the municipal office;
 9. number of illegal landfills detected in the last 5 years – city guard / municipal environmental protection department;
 10. developed areas affected by floods in the last 10 years (in km²) – municipal environmental protection department;
 11. distance from the village centre to the nearest healthcare facility – municipal services department of the municipal office;
 12. distance from the village centre to the nearest police department (in km) – municipal services department of the municipal office;
 13. number of public utility buildings without disabled access – municipal services department of the municipal office;
 14. public areas that require revitalisation (in km²) – municipal services department of the municipal office;
 15. hard-top municipal roads that require immediate repair (in km) – municipal services department of the municipal office;
 16. area of buildings vacated due to structural issues – municipal services department of the municipal office;

17. number of buildings that require demolition – municipal services department of the municipal office;
18. number of municipal buildings that require thermal insulation – municipal services department of the municipal office;
19. number of buildings that cannot be effectively used due to technical issues – technical supervision authority;
20. number of households without access to a public sewer – municipal services department of the municipal office.

The data acquired during initial analyses were presented in tabular form to determine the boundaries of degraded areas and areas proposed for planned revitalisation. Exemplary data are presented in Tables 1 and 2. Table 1 aggregates data (cumulative results of surveys analysing negative social phenomena), and it supports an analysis of the severity of adverse social factors. The results can be used to develop a hierarchy of settlements in Table 2 and conduct a further analysis of negative economic, environmental, spatio-functional and technical phenomena in the evaluated area. The analysis consists of the following steps:

- the highest values of the 20 analysed indicators are selected in Table 1. The total number of selected fields is input in the last column. The higher the number of the fields in column 21, the higher the evaluated area's rank in the hierarchy in Table 2;
- the hierarchical list of the evaluated areas is input in Table 2, and the values of 20 indicators are calculated for each area based on source data. The highest values of the 20 analysed indicators are selected. The cumulative data presented in Table 2 are used to determine the areas that require revitalisation, degraded areas and areas not in need of revitalisation.

Based on the analyses of a topographic map, a base map and a cadastral map, the boundaries of degraded areas were presented on a 1:25,000 topographic map, and the boundaries of the areas proposed for revitalisation were presented on a 1:500 or 1:1,000 base map.

4. Presentation of a database model supporting the delimitation of degraded areas and areas proposed for planned revitalisation

The proposed database brings together the gathered data and constitutes the basis for the analysis of adverse social, economic, environmental, spatio-functional and technical phenomena that have to be taken into account during revitalisation programmes pursuant to the provisions of the Revitalisation Law of 9 October 2015 (Journal of Laws, 2020, item 802). The structure of the proposed database for delimiting degraded areas and areas proposed for revitalisation is presented in Fig. 1. The database consists of descriptive data and spatial data layers. The graphical part of the database contains mostly thematic vector layers that are supplemented with attribute data. This model was selected because it supports various types of spatial analyses (for example, by combining thematic layers, creating queries and preparing different types of thematic maps). Spatial analyses involving data with a layered architecture are the main goal of GIS systems because they support the conversion of source data into information about the surrounding space. The resulting data are highly useful for supported decision-making (Gotlib et al., 2007).

The reliability of the results of spatial analyses is affected mainly by the quality of the accumulated data, including their completeness, logical cohesion and validity. The procedure of developing maps of degraded areas and areas proposed for revitalisation involves the following steps:

1. Data are acquired from external databases and municipal databases (municipal welfare centre, county employment centre, primary school, lower secondary school, local examination committee, outpatient clinic, addiction treatment centre, police department, district court, family probation officer of the district court, family and juvenile department of the district court, technical supervision authority, regional inspectorate for environmental protection, city guard, social affairs department of the municipal office, address registration department of the municipal office, housing department of the municipal office, municipal environmental protection department, municipal services de-

Table 1. Cumulative results of surveys assessing social problems

Name of re- search field (village)	Social problems																				21 [Σ 1-20]
	Indicator and the relevant criteria																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A			■																■		2
B	■						■								■						3
C					■				■			■						■			4
D		■	■						■			■				■					4
E						■					■			■			■			■	5
F				■	■			■													2
G																■					1

Source: Podciborski T. 2017. Methods for evaluating the spatial structure and potential of rural areas in the management and revitalisation of agricultural land. Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie.

Table 2. Cumulative results of surveys assessing economic, environmental, spatio-functional and technical problems

Hierarchy of research fields (villages)		Problem																				Σ 1-20
		Economic					Environmental					Spatio-functional					Technical					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Village E		■				■			■					■		■				■	6	
Village C	Analysed				■	■			■				■		■				■		5	
Village D	research fields							■			■		■					■			4	
Village B			■	■		■				■								■		■	5	
Village A	Research fields excluded																				-	
Village F																					-	
Village G	from analysis																				-	

Source: Podciborski T. 2017. Methods for evaluating the spatial structure and potential of rural areas in the management and revitalisation of agricultural land. Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie.

1. department of the municipal office, revenue department of the municipal office);
2. Tables 1 and 2 are automatically filled with data from external databases and municipal databases, and the relevant analyses are carried out;
3. The contents of digital topographic and base maps are integrated with the database;
4. The intersection of the layer presenting the boundaries of degraded areas and areas proposed for revitalisation and the layer presenting the spatial characteristics of the indicators that significantly influence the delimitation of degraded areas and areas proposed for revitalisation is identified;
5. The map is edited, and full and simplified reports are generated.

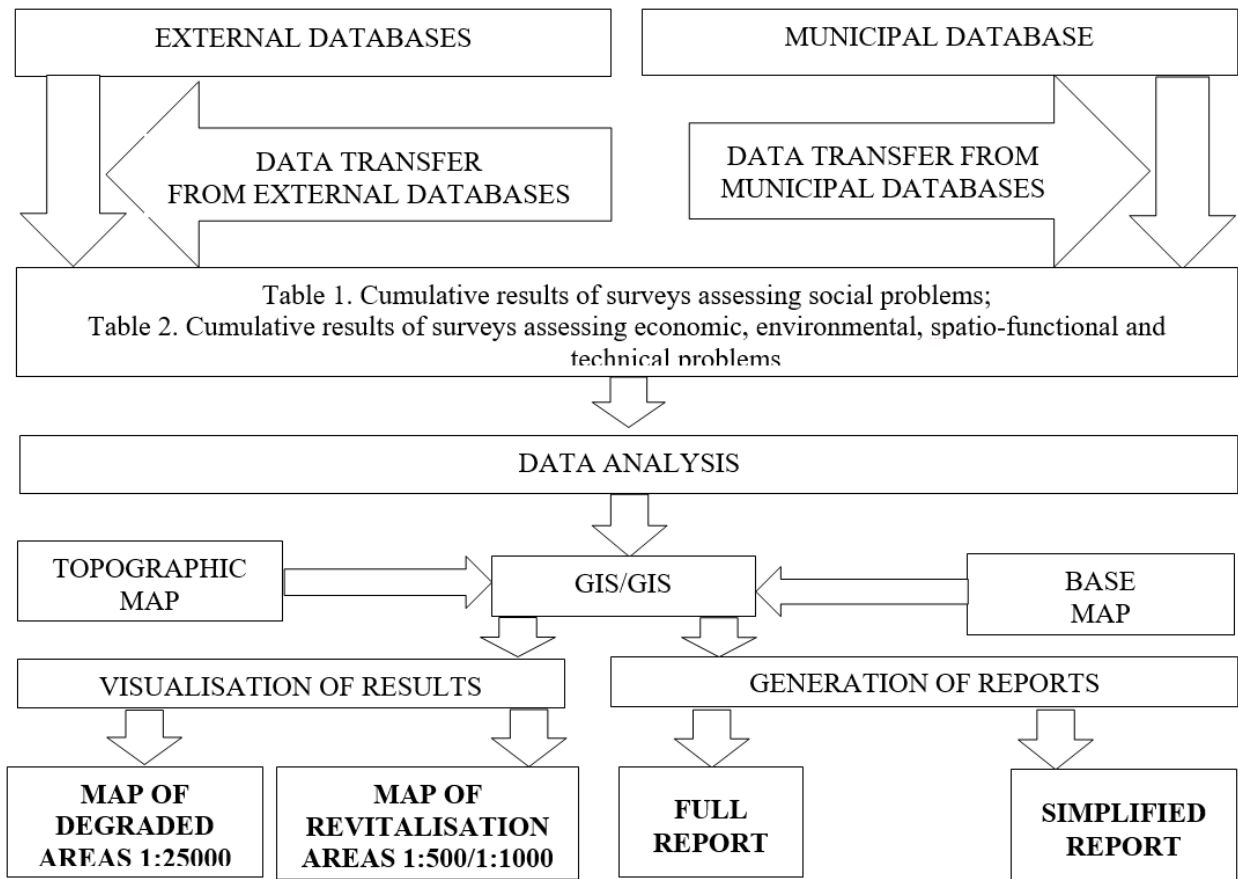


Fig. 2. A schematic diagram of the database supporting the implementation of revitalisation measures
Source: own study

5. Conclusions

The Revitalisation Law establishes a general framework for preparing and conducting territorially cohesive processes in comprehensive projects aiming to revitalise degraded areas. When municipal authorities adopt a decision to initiate revitalisation measures pursuant to the provisions of the Revitalisation Law, degraded areas and areas proposed for revitalisation are delimited by way of a resolution of the municipal council or upon the request of a governor of a rural or urban municipality or a city mayor. The aim of this procedure is to ensure the territorial cohesion of the revitalisation measures stipulated by the Revitalisation Law. A degraded area can be delimited only in parts of municipal territory that are experiencing a crisis and the accumulation of negative social phenomena – in particular unemployment, poverty, crime, low educational attainment and low levels of social capital,

as well as low levels of civic participation in public and cultural life. The delimited area should also be characterised by at least one adverse economic, environmental, spatio-functional or technical phenomenon.

The proposed database supports the preparation and implementation of revitalisation measures as well as the monitoring of the relevant progress to determine the effectiveness of the introduced revitalisation measures. This task requires quick access to valid and reliable data. The proposed database supports the delimitation of degraded areas and areas proposed for planned revitalisation based on descriptive and graphical data from various sources. The database provides access to information about the analysed rural area from a single location, which eliminates the time-consuming process of searching for information in numerous and dispersed sources of data, and enables the authorities to focus on decision-making. The search for the required information in the proposed database is largely automated,

which minimises the risk of chaotic management that usually accompanies multi-stage projects.

References

- Andersen H. T. and van Kempen R.** (2003). New trends in urban policies in Europe: evidence from the Netherlands and Denmark, *Cities*, Volume 20, Issue 2. DOI: [https://doi.org/10.1016/S0264-2751\(02\)00116-6](https://doi.org/10.1016/S0264-2751(02)00116-6)
- Bryx M.** (2003). Podręcznik rewitalizacji. Zasady, procedury i metody działania współczesnych procesów rewitalizacji. Urząd Mieszkalnictwa i Rozwoju Miast, Warszawa. http://www.mielec.pl/data/documents/podrecznik_rewitalizacji.pdf
- Couch C., Sykes O., Börstinghaus W.** (2011). Thirty years of urban regeneration in Britain, Germany and France. The importance of context and path dependence. *Progress in Planning*, 75: 1–52. DOI: <https://doi.org/10.1016/j.progress.201012.001>
- Dyrektywa 2007/2/WE Parlamentu Europejskiego i Rady z dnia 14 marca 2007 r. ustanawiająca infrastrukturę informacji przestrzennej we Wspólnocie Europejskiej (INSPIRE)
- Gehl J.** (2017). Miasta dla ludzi, Wydawnictwo RAM, Kraków.
- Gotlib D., et al.** (2007). GIS. Obszary zastosowań. Wydawnictwo PWN. Warszawa.
- Kwietniewski M.,** (2008). GIS w wodociągach i kanalizacji. Wydawnictwo PWN. Warszawa. DOI:
- Litman T.** (2009). Evaluating Transportation Land Use Impacts Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns, Working Paper, Victoria Transport Policy Institute, www.vtpi.org/landuse.pdf
- Markowski T.** (1999). Zarządzanie rozwojem miast. Państwowe Wydawnictwo Naukowe, Warszawa. DOI:
- Podciborski T.** (2017). Metody oceny struktury przestrzennej i potencjału obszarów wiejskich wspomagające prace urządzeniowo-rolne i rewitalizacyjne. Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie. ISSN 1509-3018. ISBN 978-83-8100-086-4.
- Podciborski T. and Trystuła A.** (2010). Wykorzystanie systemu GIS do oceny stanu ładunku przestrzennego obszarów wiejskich. *Infrastruktura i Ekologia Terenów Wiejskich*, 13/2010. s. 5-18. ISSN 1732-5587.
- Roberts P. and Sykes H.** (2008). Urban regeneration. A hand book. Sage Publ. Ltd., London. ISBN-13: 978-0761967170
- Spandou, M. Garcia, C. and Macario, R.** (2010). Urban Revitalization and transport: local factors and driving forces from a stakeholders' view. Retrieved July 3, 2019, https://www.academia.edu/2591047/Urban_revitalization_and_Transport_local_factors_and_driving_forces_from_a_stakeholders_view
- Revitalisation Law of 9 October 2015 (Journal of Laws, 2015, item 1777).
- Revitalisation Law of 9 October 2015 (Journal of Laws, 2020, item 802).
- Ustawa z dnia 4 marca 2010 r. o infrastrukturze informacji przestrzennej (t.j. U. z 2020 r. Poz. 177).

