Urban Development Issues ▪ volume 54 ▪ p. 35–41 ▪ DOI: 10.1515/udi-2017-0010

The Role of an Integrated Transport System in the Comprehensive, Polycentric Development of Gdańsk Bay Metropolitan Area

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Abstract: *In this paper the role of an integrated transport system and mobility in the development of Gdańsk Bay Metropolitan Area is discussed, with special emphasis on how it influences the development of comprehensive, polycentric urban structures. The paper consists of an analysis of how the changes, which occurred after the socio-economic transformation shaped the transport system, and as a consequence the spatial structure, of Gdańsk Bay Metropolitan Area. At the beginning of the paper historic, present and future development of integrated transport systems and the urban structure of the metropolis are described and then strategies and proposed solutions are introduced. The last chapter includes conclusions and recommendations for the future role of the integrated transport system in shaping the development of the Gdańsk Bay Metropolitan Area.*

Keywords: *urban studies, polycentric development, integrated transport system, mobility*

submitted: April 2017 **reviewed**: September 2017 **accepted**: October 2017

Introduction

In the last thirty years Poland has progressed a long way towards a free market economy but also at the same time towards fiscal and institutional decentralisation and empowerment of its citizens. These changes have strongly influenced the spatial planning system and as a consequence the spatial structure of the main metropolitan areas in Poland including Gdańsk Bay Metropolitan Area.

There are two essential factors that have a major influence on shaping the metro – the process of globalisation and metropolisation (Hall & Pain 2006) and the political and socio-economic specifics common to post-socialist countries (Andrusz et al. 1996). This chapter focuses on the present and projected spatial phenomena of the Gdańsk conurbation resulting from the main polycentric and comprehensive development strategies.

The aim of the paper is to discuss the role of the integrated transport system and mobility in the development of the Gdańsk Bay Metropolitan Area with special emphasis on how it influences the development of comprehensive, polycentric urban structures. It includes analyses of how the changes, which occurred after the socio-economic transformation shaped the integrated transport system and as a consequence the spatial structure of the Gdańsk Bay Metropolitan Area.

The study is preceded by a literature review of documents and analyses used to assess the role of the integrated transport system in shaping urban structures. During the preparation of this study, analyses of existing data and policies were carried out in the context of an integrated transport system. Descriptive and comparative methods were utilised as useful tools for compiling the results of the abovementioned analysis.

Description of the past and present situations, trends and projections

The Gdańsk conurbation, or the so-called 'Tri-City' conurbation, consists of the three main coastal cities of Gdańsk, Sopot and Gdynia and five other towns (Wejherowo, Rumia, Reda, Pruszcz Gdański, Tczew). Situated along the southern coast of the Baltic Sea, it hosts Poland's two main shipyards and docks which, considered as a whole, form the second biggest port on the Baltic after St. Petersburg in volume of container freight.

It is a developing metropolitan area with an international airport and is an important academic, scientific and tourist centre. Currently, 54 local governments operate within the Metropolitan area, which covers a total area of nearly 6,700 km^2, and is inhabited by 1.55 million people (Fig. 1 and Tab. 1).

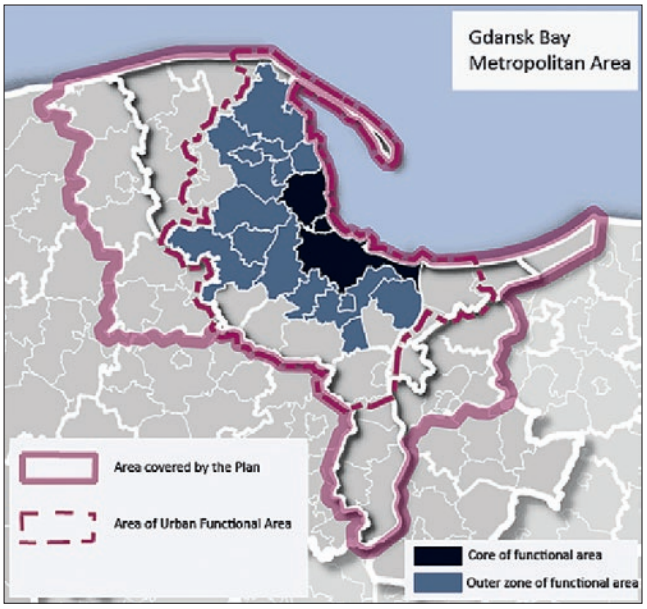

Figure 1 Gdańsk Bay Metropolitan Area

Source: Urząd Marszałkowski Województwa Pomorskiego (2016: 10)

The spatial structure of the conurbation is determined by the specific eco-physiographic conditions as it is situated between the Baltic Sea shore and a protected landscape forestry park. The urbanised area extends for nearly 80 km between the towns of Wejherowo and Tczew forming a polycentric, linear structure with knots of activities, each of which has a different functional specialisation (Pankau 2009). Urban structures have evolved from the Middle Ages to the twenty first century in a narrow, long strip of land located between the sea coast and the edge of the plateau surrounding the Bay of Gdańsk. Along this strip there is a transport corridor including light train and road systems.

Gdańsk is a thousand-year-old city with a Hanseatic tradition which, from medieval times onwards, has developed as an important port on the Baltic Sea. After the First World War Poland had limited access to the Port of Gdańsk and made a decision to build another – Polish – port nearby. It was the beginning of the white modern city of Gdynia with modern port facilities (Lorens et al. 2014). From this moment on Gdynia began developing into a dynamic city with great entrepreneurial spirit.

Gdańsk is also the location of more recent events connected with the Solidarity movement.

Table 1 Population of Gdańsk Bay Metropolitan Area

Municipality	Population in 2016
1. Core of functional area	747,594
Gdańsk	463754
Gdynia	246991
Sopot	36849
2. Outer zone of functional area	383782
Puck (town+gmina)	37015
Reda	24630
Rumia	48095
Wejherowo (town+gmina)	74734
Kosakowo	13364
Szemud	17060
Żukowo	35671
Przodkowo	8969
Kartuzy	33619
Kolbudy	16359
Pruszcz Gdański (town+gmina)	58107
Pszczółki	9235
Cedry Wielkie	6924
3. Area of functional Area (+1.+2.)	1278148
Władysławowo (town+gmina)	15451
Luzino	15608
Somonino	10409
Przywidz	5836
Trąbki Wielkie	11006
Tczew (town+gmina)	74427
Suchy Dąb	4208
Stegna	9827
4. Area covered by Plan (+1.+2.+3.)	1,504,444
Łeba	3734
Wicko	6003
Choczewo	5577
Gniewino	7455
Krokowa	10696
Nowa Wieś Lęborska	13540
Lębork	35378
Łęczyce	12043
Cewice	7522
Linia	6253
Sierakowice	19258
Sulęczyno	5401
Chmielno	7505
Stężyca	10239
Gniew (town+gmina)	15717
Morzeszczyn	3689
Pelplin (town+gmina)	16482
Subkowy	5521
Miłoradz	3385
Lichnowy	4707
Ostaszewo	3233
Nowy Dwór Gdański (town+gmina)	17951
Sztutowo	3684
Krynica Morska	1323

Source: own analysis based on Central Statistical Office of Poland BDL.

Port and shipyard industry had a leading economic role in Gdańsk in the last century however, after the socio-economic transition started in 1989, and due to technological changes, the shipyard industry has ceased to play the role of the most important economic sector. Former port and shipyard areas, situated on the edge of the city centres of Gdańsk and Gdynia, are strategic areas for current urban transformations. Still in the last decade one can observe the rebirth of the broadly defined maritime economy. Rapid development of production technologies and the introduction of new types of services are the reasons why the inner-city port areas are no longer disruptive industrial zones. It is also vital to emphasise the intense, unprecedented development of the seaports, including the development of container terminals in particular. 'In 2010–2014 transhipments in the Ports of Gdańsk and Gdynia increased from 41.9 to 51.7 million tons per year, and in container transhipments from 0.99 to 2.06 million TEU (an increase of more than 100%). Forecasts, especially for bulk cargoes and container shipments, are positive. It is estimated that the container terminal turnover of the Tri-City terminals in 2025 will be about 5 million TEU' (Board of Pomorskie Voivodeship 2016: 45)

These changes, together with maritime tourism and leisure infrastructure, enable the mixing of city and maritime functions (Lorens et al. 2014). Also, just recently the connection between the port and inland areas was improved by the building of the A1 highway and the modernisation of railway lines, which are part of the TEN-T (Transeuropean Transport Network). Still, additional investments are vital to improve accessibility, both internal (within the Metropolitan Area) and external (from other parts of Poland and Europe.

In the last twenty years the dynamic development of metropolitan area structures that has been observed was based on the increasing importance of transport connections especially of the above mentioned main transport corridor and a ring road built in the seventies (Lorens 2009), which is currently used as main communication route for the new districts of both Gdańsk and Gdynia, which have developed in the fringe of the metropolitan area.

The priorities and Challenges of polycentric development in the context of the development of an integrated transport system

There are several phenomena characteristic of modern cities, which can be observed in the Gdańsk Bay Metropolitan Area (author's study based on Lorens 2013):

- Suburbanisation – though this process in Gdańsk Bay Metropolitan Area predominantly refers to residential structures and industrial/business activities;
- The degradation of inner-city historic neighbourhoods typical of post socialist countries (due to nationalisation and prolonged lack of investment);
- Urban transformation through both large scale urban regeneration projects as well as small scale interventions connected with the process of bringing activities and new urban functions to degraded areas and those which have lost their previous functionality;
- Densification of urban structures based on market demand and the pressure of the real-estate market resulting in the development of these urban structures.

All the above mentioned phenomena often occur simultaneously in neighbouring areas (such as in Wrzeszcz). Their intensity and overlap result from, *inter alia*, the tendencies typical of development in a post-socialist city which for many decades proceeded differently from that in Western European cities (Lorens 2009). We can observe various models of suburbanisation in different parts of the Metropolitan Area. In many places it is concentrated along the main transport corridors, but in others it is chaotic and very widely spread. This issue cannot be resolved by a single municipality, and not even by the cities of Gdańsk and Gdynia alone. In Poland there are no authorities at the metropolitan level and the possibility of influencing this uncontrolled spread of development by regional authorities is limited as planning powers stay within municipalities. Even though for the last ten years there has been a tendency to create voluntary metropolitan structures (in 2011 the ambitions of particular cities and towns led to the situation where two separate metropolitan forums which bring together municipalities and counties came into existence (Kamrowska-Załuska 2017)). Fortunately, just recently, in May 2015 in the context of Integrated Territorial Investments (ITI)[1] Gdynia joined Gdańsk in a common metropolitan forum (Kamrowska-Załuska & Obracht-Prondzyńska 2017). This is a very important symbol and at the same time is a big, but still initial, step on the way towards stronger metropolitan cooperation. However, even before this there were some positive examples of cooperation, such as the Metropolitan Transport Association responsible for the integration of public transport, which managed to introduce joint metropolitan ticketing. Also the Metropolitan Council of Gdańsk Bay, which includes all the presidents and mayors, operates in the region.

Figure 2 The 'Young City' seen in Gdańsk's post-shipyard transformation

Source: D. Kamrowska-Załuska

[1] New instrument of EU Cohesion Policy for strengthening inter-communal cooperation and metropolitan management

At the same time, the process of urban regeneration is taking place on a large scale. Some projects include entire districts (such as Nowy Port, Dolne Miasto or Biskupia Górka), some are large post-industrial areas, post-port or military areas (such as Garnizon and Młode Miasto (Fig. 2)) while others are small projects including bottom-up and co-design initiatives (urban quarters in Wrzeszcz, Gdańsk Główny or the first one of the initiatives of this kind in Orunia). Urban regeneration projects for entire districts are municipality-led projects co-financed by the instruments of the European Union Cohesion Policy instruments. At the same time there are some private sector-driven or PPP large scale projects such as the mixed-use project in the area of an old garrison in Gdańsk (with a strong focus on civic space and cultural activities) or the urban regeneration of the central station in Sopot in the PPP model (with both commercial and community uses such as "Mediateka" which also serves as community centre). Probably the most significant are the post-shipyard and waterfront areas located in the city cores of both Gdańsk and Gdynia.

In this context of urban regeneration one cannot forget the spurring role of local communities and the scope of public participation. We can observe the evolution of the role of urban movements engaged in the transformation of urban areas. During the last year they went a long way from protesting against unwanted development, to a period of proposing alternative solutions and civic strategies, to the situation where they complement the role of the municipalities in the area which need an on-the-ground approach close to people.

As far as the linking of the development of urban structures to mobility, the new Spatial Development Plan of the Metropolitan Area (Urząd Marszałkowski Województwa Pomorskiego 2016) indicates three factors which are significant for mobility and the functioning of transport systems there:

1) "processes associated with metropolisation, typical for many metropolitan areas, where one of the negative consequences is suburbanisation; this process causes a great increase in the demand for mobility, especially to the centre of the metropolitan area, on such a scale as to exceed the technical, financial and organisational abilities of the individual transport system,
2) the location of sea ports and related services within the urban structures, especially in the face of the forecast significant growth of shipments in both ports, requires the construction of accessible infrastructure and development logistics,
3) the development of the tourism and recreational sector which requires an efficient transport service based on consensus between the natural and landscape values, and economic benefits" (Urząd Marszałkowski Województwa Pomorskiego 2016).

Many of the inhabitants of the Metropolitan Area commute to the Tri-City every day to work and most of them to Gdańsk. The best accessibility to core of the Metropolitan Area is seen in the case of the territories which are in range of the stops of two railway lines in the conurbation: the long existing SKM and recently opened (2015) Metropolitan Railway (PKM). The completion of the new line and the modernization of the SKM stations, its control systems and rolling stock are closely aligned with the policy of the development of the railway network in response to the transport needs of conurbations. The deepening process of suburbanisation around the Tri-City indicates that the development of PKM and the modernization of the other railway lines (e.g. line 229 on the Pruszcz Gdański-Glińcz section) and nodes integrating rail transport with the local bus, trolleybus and tram transport networks can be a way to alleviate problems related to the capacity deficit of the road system (Guzik 2015). In the rest of the area road transport is the dominant mode of transport for both freight and passenger transport.

At the same time Poland is still a country where the number of motor vehicles per 1,000 inhabitants is growing. In

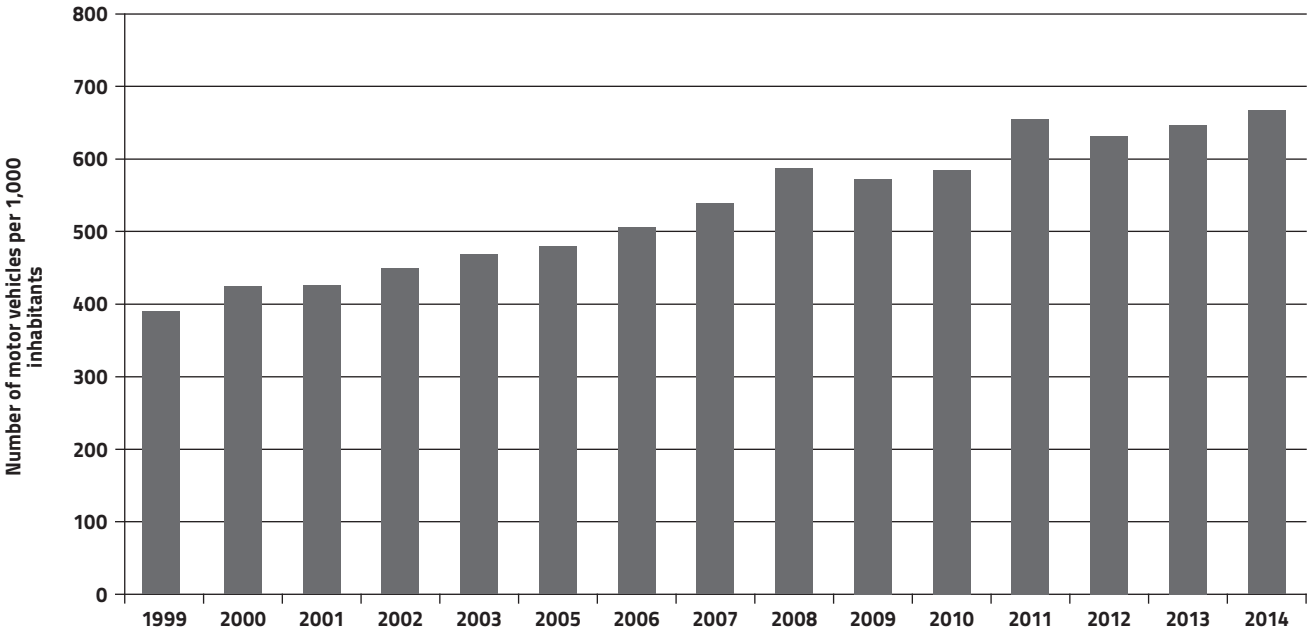

Figure 3 Number of motor vehicles per 1,000 inhabitants in Gdańsk (no data for 2004)

Source: own analysis based on the *System Analiz Samorządowych database*

Gdańsk we have observed an increase in the number of motor vehicles per thousand inhabitants during the last 15 years from 389 in 1999 to 542 in 2014. This growth, however, has been slowing down in recent years (Fig. 3). This phenomenon, combined with the need to remedy the deficiencies in the transport infrastructure – typical for post-socialist cities (Parteka 2008) – and with the considerable financial resources earmarked in the European Union Cohesion Policy instruments for the purpose of improving accessibility and connectivity, lead to significant investments in the development of the road system promoting individual transport.

Nevertheless, the approach to mobility in the Metropolitan Area is gradually changing – priorities and directions are more compatible with the concept of sustainable development. Therefore, one of the most important objectives of transport policy is to promote the development of rail transport as a safe and environmentally friendly solution. Great emphasis is placed on strengthening the role of bicycles not only as a leisure activity, but also as a mode of transport.

The *Pomeranian Regional Development Strategy 2020* (Sejmik Województwa Pomorskiego 2012) highlights not only the inclusion of the region in the trans-European transport networks but also the increase in the attractiveness of public transport and the importance of active mobility. As for freight transport, the increase in the share of intermodal transport is emphasised. These kinds of strategies, supported by European Union Cohesion Policy instruments, are implemented by large scale infrastructural projects.

Implemented and proposed solutions

The *Spatial Development Plan of the Metropolitan Area* (Urząd Marszałkowski Województwa Pomorskiego 2016: 145), indicates the following guidelines for determining the rational spatial structure of the transport network: '(1) improvement of transport accessibility in the metropolitan area, (2) strengthening the internal transport links of the metropolitan area and improving its spatial coherence, (3) creating conditions for the development of efficient and effective collective transport and (4) streamlining the links between multimodal nodes and the external accessibility infrastructure as a determinant of the development of the transport and logistics hub in the metropolitan area'.

Also large urban development projects such as the above mentioned urban regeneration programmes are important instruments of polycentric, comprehensive development in the Gdańsk Bay Metropolitan Area. Three different approaches can be observed:

1) projects initiated and led by the public sector; this is mostly the case of urban regeneration of entire historic districts where there is a need for comprehensive physical, social and economic regeneration; all municipally-led projects are co-financed by European Union Cohesion Policy instruments; an example of this approach is the regeneration of Letnica – a historic neighbourhood near the football stadium, regenerated before the European Football Championship in 2012; there were several infrastructure investments carried out before Euro 2012 such as the extension of Słowackiego Street (leading from the stadium to the airport) or the new air terminal, others such as the Metropolitan railway or tunnel under Martwa Wisła even though not finished before the championship, got an additional stimulus so that they could be undertaken;
2) projects based on public-private partnerships of different size and under different programmes from transport infrastructure through public facilities such as a new train station with a 'Mediateka' and shopping centre up to large scale mixed-use projects such as the one on Granary Island in Gdańsk; all of these are initiated and programmed by the public sector and then planned in detail and implemented by the private sector;
3) finally private developer-driven large scale development schemes; in these projects the role of the municipalities is mostly regulatory; two major such projects which are being realised are the post-shipyard regeneration projects designed to extend the downtowns of both major cities of Gdańsk and Gdynia (in each case the land is owned by several development companies due to which the timeframes for various parts of the projects differ); a different situation is taking place on the area of the old garrison in Gdańsk where a complete mixed-use project including public open spaces and cultural facilities is being implemented by a single development company; in most cases the development companies use infrastructure which is existing or planned by the city, although there are examples where the private sector have financed the construction of roads (such as for e.g. Nowa Wałowa Street in the Mlode Miasto (Young City) on the post-shipyard area in Gdańsk), in other cases the private sector have also financed the costs of technical projects.

Large scale urban development projects, in particular infrastructural ones, are often connected with transport and mobility. There are numerous examples of implementation of the above mentioned investments which implicate a more sustainable approach to transport systems and mobility planning. It was only in December 2015 that a smart traffic control system called Tristar was introduced for the core of the Metropolitan Area and in future this is going to be extended. There is already a common ticket and the introduction of an electronic ticketing system is planned.

In the lower parts of the Metropolitan Area, a network of bicycle lanes is being developed, intended both as a leisure and everyday transport facility. One can't overestimate the role of a local NGO in this process. Gdańsk was for a long time called the bicycle capital of Poland, but in recent years much effort has been made to integrate bicycle infrastructure planning into the whole Metropolitan Area (Fig. 4 and Fig. 5). One of the priorities of the new Integrated Territorial Investments Association is the construction of dedicated bicycle paths and the designation of bicycle lanes in the road, designing safe public spaces for all types of users and ensuring the construction of bicycle parking facilities integrated into public transport nodes. This initiative aims to increase the role of the bicycle in urban transport and its share in the number of trips to transit stops.

Just recently the Gdańsk Bicycle Officer announced the closing of the design phase of a bold project to introduce a metropolitan bicycle system, which would be accessible for all the Metropolitan Area from Wejherowo to Tczew. Its imple-

Figure 4 Bicycle infrastructure in Gdańsk

Source: D. Kamrowska-Załuska

mentation is expected in 2018 as the source of finance is already secured.

The most significant project in terms of mobility and also inter-communal cooperation is the Metropolitan Railway project (Fig. 6). To improve the transport accessibility of rapidly expanding suburban residential districts and other municipalities in the Metropolitan Area, a new light train was introduced connecting its core with newly developing parts of the conurbation. This new and much needed means of public transport is connecting the downtowns of Gdańsk and Gdynia with the international Lech Walesa Airport. Recently it was extended to other sub-regional centres outside the Metropolitan Area such as Kartuzy. This Metropolitan Railway, together with other planned public transport investments, will significantly strengthen the process of integration of the spatial and socio-economic cohesion of the core of the metropolitan area with the surrounding region (Koźlak 2013).

The new railway was built using the pre-war route that connected Gdańsk with interior of the region as a base. The railway embankments which still exist to today are currently being reconstructed and regenerated to adapt the old railway route to the demands of modern urban mobility (Lorens et al. 2014). Now the main challenge and still ongoing process lies in the crystallisation of urban structures around the stops.

Conclusions and recommendations

The essential large-scale investments currently being carried out will improve accessibility to answer the needs caused by deficits in the transport infrastructure inherited from the former system. This approach is juxtaposed with new concepts of mobility and sustainability. Only by balancing the present and future needs can a coherent strategy of polycentric development of the city-region be proposed.

Figure 5 Bicycle infrastructure in Gdańsk

Source: D. Kamrowska-Załuska

Figure 6 Metropolitan Railway Station – innercity intermodal junction

Source: D. Kamrowska-Załuska

A shift in the manner in which local and regional authorities are thinking about mobility is starting to be seen not only with coherent visions in strategic documents to introduce a more sustainable concept of mobility, but also with numerous large scale projects which are being implemented (such as metropolitan rail).

In this context, the importance of an integrated strategy for development should be stressed. R. Guzik (2016) in his study about functional-spatial relationships in Pomorskie Voivodeship shows the following groups of actions, which need to be taken to improve accessibility in the region:

– 'Improving road accessibility.
– Improving accessibility via the public transport system.
– Constructing intermodal public transport systems.
– Developing and managing the public service network with respect to communication congestion.
– Building and guiding a polycentric, sustainable settlement system.
– Actively managing suburbanisation processes' (Guzik 2016: 14).

A great deal of effort is made to integrate different modes of transport – including non-motorised transport. Still, the most important challenge is the integration of transport systems into an urban structure. Transport systems need to be integrated with planned urban development to crystallise the suburban structures of metropolitan areas, to provide planning conditions to create a polycentric structure of nodes of activities around public transport stops and to increase the walkability of suburban residential districts. This is an area where the intervention of the public sector is needed, even if only as a regulator and facilitator, as regulation and facilitation won't be achieved if we only depend on market forces.

There is an increasing role of partnerships with all parties involved in development processes, starting from an inter-communal cooperation up to the involvement of NGO's and local communities, as they have a crucial role in the process of acceptance of all new large scale projects both infrastructural ones and mixed-use schemes.

There are socio-economic features and a planning heritage common to post-socialist countries. These include large areas from which industry has withdrawn and the degradation of valuable historic inner-city structures. The circumstances mentioned are the reason why urban regeneration based on an integrated approach is still a priority for the Gdańsk Bay Metropolitan Area.

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Ministry of Science and Higher Education
Republic of Poland

Project of the internationalization of the *Urban Development Issues* journal is financed by the Ministry of Science and Higher Education of the Republic of Poland (grant No. 841/P-DUN/2016).