

# Regeneration of urban and post-industrial areas within the context of adaptation to climate change – the Polish perspective

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**Abstract:** *Adaptation to climate change has become an important element of urban policy development in the member states of the European Union. These issues are dealt with in EU documents, as well as in national and local strategies and city adaptation plans. In Poland, the challenge of preparing for climate change has been presented in the Strategic Adaptation Plan for Sectors and Areas Sensitive to Climate Change in Poland within the Perspective of 2030 referring to sectors and areas sensitive to the impact of climate change. Adaptation to climate change is a key element in creating spatial policy for cities and urbanised areas at different levels. One of the most important issues of this policy is the quality of the renovated urban areas and its role in connecting-up and strengthening adaptation capacity. Among the strategic areas indicated in the above-mentioned document, there is also urban policy taking climate change into consideration. One of the selected problem areas relating to the development of urban policy is the renewal and strengthening of the development potential of towns and cities via the regeneration of degraded urban areas and post-industrial land in cities. Both local authorities, entities whose professional role is to deal with urban issues, and the inhabitants of urbanised areas face a twofold challenge. This consists of enhancing the quality of urban areas via regeneration and strengthening the city's potential for adaptation. That is why it is extremely important to notice the interconnections and opportunities provided by urban renewal and regeneration programmes and projects in the context of adaptation to climate change. Synergy of activities in those two areas of urban policy may bring about very measurable benefits and may enable a cohesive solution to be adopted with regard to many crucial environmental, social, and economic problems.*

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## Introduction

The topic of responsible urban development comprises a wide spectrum of problems, instruments, and methods of implementation/execution. The increasing importance of urban problems results from the dominating role that cities play at a global scale, as well as in the development of individual countries. More than half of the world's population currently lives in towns and cities, in Europe the inhabitants of towns and cities account for 75% of the population (European Environment Agency [EEA] 2017). Cities are the main centres of economic and cultural activities, centres of innovation and development, as well as places of employment for the majority of European citizens. Also, more than 60% of the inhabitants of Poland live in towns and cities (Central Statistical Office 2014). That is why the quality of the urban environment, and the living conditions enjoyed by city dwellers have become important issues in relation to the development of urban space. Among the important urban policy issues there are those which are connected with the restoration of degraded urban areas, also including (post-)industrial areas in cities, as well as problems related to increased

resistance to environmental threats resulting from climate change and the adaptation of towns and cities to that change.

The aim of this paper is to analyse and present the connections and interdependence between the process of regeneration of urban areas and brownfield sites, and the activities related to the adaptation of those areas to climate change. Both regeneration and adaptation of urbanised areas to climate change are important components of urban policy. That is why it is extremely important to not only note the mutual connections between them, but also the challenges posed by the context of adaptation to climate change in the light of regeneration programmes and projects implemented or planned. It is worth pointing out the fact that the present level of degradation of the urban environment, which boosts the negative consequences of climate change, is to a large degree the result of intense urbanisation and the industrialisation that had taken place at the turn of the 19<sup>th</sup> and 20<sup>th</sup> century. It was then that most of the areas now in need of regeneration were developed. The present renewal efforts should thus have a multi-dimensional character, which would allow the inclusion of environmental issues, thus enabling the processes of regenera-

tion of urban areas to contribute to an enhanced resistance of towns and cities to climate change.

The examples of solutions presented in this paper have the purpose of indicating potential chances and opportunities resulting from the necessity of considering climate issues in the planning and implementation of regeneration programmes and projects, as well as raising the awareness of authors and those carrying out such undertakings regarding the consequences of failure to consider and respect climate conditions in the regeneration process. The issues of adapting urban areas to climate change have become important elements of urban policies implemented in many countries. Extreme weather phenomena and their consequences, from serious to catastrophic, force city authorities to adopt a wider perspective in the management of urban areas. That perspective comprises the whole spectrum of urban functional issues, the development of its spatial structure, as well as security and quality of life for its inhabitants. This also applies to the processes of transforming urban structure and the restoration of areas in crisis.

The considerations taken into account are intended to lead to conclusions identifying the mutual relations between the processes of urban regeneration and adaptation to climate change. For that purpose, an analysis has been carried out of basic strategic documents pertaining to urban policy on regeneration and adaptation to climate change at a national level. The achievements and conclusions of the following European projects were analysed: *Circular Flow Land Use Management* (CircUse 2013), *Climate Neutral Urban Districts in Europe* (CLUE 2015), *Bottom-up climate adaptation strategies towards a sustainable Europe* (BasE 2016), *Integrated Spatial planning, Land use and Soil management Research action* (INSPIRATION 2016). In addition, a review has been carried out of literature and strategic documents prepared in selected European states. Those materials have been used as a reference to the projects and activities carried out in Poland. One of the most important documents is the *EU Strategy on adaptation to climate change*, which outlines policies strengthening Europe's resilience to the impacts of climate change (European Commission [EC] 2013). Other important documents are: European Environmental Agency reports: *Urban adaptation to climate change in Europe* (EEA 2012, 2016), as well as the document: *Europe 2020 Strategy* (EC 2010).

### The environmental context of the processes of transformation and regeneration of degraded urban areas

Regeneration projects for cities and degraded areas have been carried out in Poland for over twenty years. Many of them were aimed at the urban (post-industrial) areas, which emerged due to political and economic changes to the system, and the processes of restructuring the monoculture based on heavy industry. In Poland, the number of derelict sites identified in the Silesia Voivodeship alone exceeds 500, covering areas totalling 105 sq. km (Starzewska-Sikorska et al. 2008). In the 1990s the partners involved in the regeneration process developed the methodological basis and instruments

required, in addition to calling for regulations that would allow one to properly manage the problem. The very process of regeneration and transformation of degraded urban and industrial areas has always comprised four basic types of activity (Gorgoń 2016: 23). These are: improving the quality of the urban environment, developing new urban functions, stimulating social and economic activity, as well as the protection of urban land and eco-systems. In each of these types of activity there are environmental issues, to be more precise: issues concerning environmental threats in towns/cities and ways of reducing them. They are not always perceived, however, as an integral component of regeneration programmes and projects.

Long-awaited regulations on urban policy have appeared in recent years. In October 2015, the *National Urban Policy 2023 (Krajowa Polityka Miejska 2023 [KPM])* document was approved by the Council of Ministers. In the same month and the same year, the Polish Parliament approved the *Regeneration Act (Ustawa o Rewitalizacji [UoR])*. On the other hand, issues concerning climate have been included in the document approved by the Council of Ministers in 2013, entitled *Strategic Adaptation Plan for Sectors and Areas Sensitive to Climate Change in Poland within the Perspective to 2030* ([SPA] 2013). According to this document, the main objectives relating to urban areas have been focused on ensuring sustainable local and regional development taking account of climate change. Selected areas of the development strategy that contain adaptation issues include: promotion of sustainable development of the urban structure including preventing the negative phenomenon of suburbanisation, as well as strengthening urban development capacity through the regeneration of socially, economically and physically degraded urban areas (SPA 2013). The next step in implementing urban adaptation projects will be the development of urban adaptation plans for climate change for cities with over 100 thousand inhabitants. These projects were initiated by the Ministry of the Environment in 2016. The process of preparing the Urban Adaptation Plan (*Miejskie Plany Adaptacji [MPA]*) is expected to last about 20 months for each and every one of the 44 biggest cities in Poland (MPA 2017). Urban adaptation plans will be the outcome of cooperation between the cities and expert teams.

The National Urban Policy is a document covering both the topics mentioned, namely issues concerning regeneration and issues related to adaptation to climate change. It has noted the importance of preparing city adaptation plans for these changes, and has stressed the role of local government in the coordination of the adaptation processes, as well as the monitoring of regeneration activities (KPM 2015). Despite the clear articulation of both these topics in urban policy in KPM, they have not been strongly and unequivocally linked together. This poses a threat that those relations will be omitted or marginalised. Regeneration, in line with the stipulations of the appropriate legal act, is a process of leading degraded areas out of crisis, which is carried out in a complex manner, by means of integrated activities for the benefit of the local community, space, and economy, focused on a territory, and conducted by stakeholders in the regeneration process, on the basis of a municipal programme for regen-

eration. The connection, stipulated in the legal act, between environmental issues and regeneration problems has been made in Chapter 3, Article 9. Item 1 (UoR 2015), in relation to determining the degraded area and the area for regeneration, where the occurrence of negative environmental phenomena – such as exceeding standards of environmental quality or the deposition of waste that is dangerous to the life and health of humans – is one of the conditions that allow the delineation of such an area. Although the items related to the quality of life of the inhabitants derive directly from the improved quality of the environment, the stipulations concerning them do not provide strong links with issues focused on the susceptibility of the city, and thus development of its resistance to climate change. The need to link these two strands in urban policy is perceived ever wider, not only in the context of local activities, but also from the perspective of regional development or even trans-regional links.

The dangers faced by cities/towns due to climate change are also the subject of reports and studies, which have been prepared in numerous European countries, as well as documents of a strategic nature, developed and approved by the European Union. In 2013 a document was approved, which is entitled the *EU Strategy on Adaptation to Climate Change* (EC 2013), which identifies the main challenges related to climate change, and which shows EU member states the directions to follow in the development of their own policies, aimed at strengthening their resistance to such change. That document indicates – among other things – the necessity of taking adaptation measures, initially in cities, as areas particularly sensitive to climate change. Examples of city adaptation strategies developed and implemented in major cities in Europe are also valuable from the point of view of the solutions proposed. Besides London, Copenhagen and Rotterdam, the Paris Climate Action Plan is a strategy worthy of particular attention in which a significant emphasis is given to adaptation measures connected with the regeneration of specific areas of the city, e.g. the renovation of the banks of the Seine, together with restoring the permeability of the soil and the enhancement of the “blue-green” infrastructure system (*Paris Climate Actions Plan 2012*; *Copenhagen Adaptation Plan 2011*; EEA 2016).

### **Linking the issues of adaptation to climate change with the processes of regeneration of degraded urban areas**

Adaptation to climate change is intended to provide correct and efficient functioning of a city, in all components of the urban tissue, as well as protection of its dwellers and the nature within its boundaries from possible threats. The direction of adaptation measures is defined, to a large extent, by the susceptibility of the city to threats resulting from climate change. Susceptibility to those threats and the current ability the city has to adapt to changes are defined as its vulnerability. The less prepared a city is to resist those threats, the more susceptible it is to them. It is highly probable that climate change effects will be observed to occur ever more frequently and with increasing intensity, aggravating the environmental threats and intensifying the occurrence of

disadvantageous phenomena such as prolonged heat waves, the heat island effect in towns and cities, or strong downpours (flash floods) causing flooding.

The particular threats related to climate change that affect urban areas in Poland are mainly linked to precipitation – torrential rain often resulting in floods in cities (SPA 2020, 2013). The other threats to cities include droughts, disturbed air circulation including stagnation of the air above the city, an increase in the concentration of air pollutants and smog, and finally extreme temperatures, as well as limitations in the ventilation of cities, which results in deterioration in aero-sanitary conditions and comfort. Unfortunately, many processes involved in the transformation and development of the urban structure aggravate the threats resulting from climate change (MPA 2017). Those include, above all, soil sealing that causes reduced retention capacity of urban areas and the reduction of its ability to regulate temperature via the processes of evapotranspiration. Sealing of the soil is one of the processes resulting from climate change that is strictly linked to urban areas. The soil sealing process is a result of uncontrolled suburbanisation, known also as urban sprawl, but is also a result of the expansion hard-surfaced areas within the city, including car parks that accompany shopping malls/hypermarkets and office building complexes. Soil sealing often affects natural ecosystems, increases the risk of flooding and water scarcity and contributes to global warming. According to the EEA, the total surface area of cities in the EU has increased by 78% since the mid-1950s, whereas the population has grown by only 33% (EEA 2011, 2012, 2016; EC 2013, 2016). This is also the case when urban public space, meant for the purpose of social contact, such as market squares and city squares, are paved with cobblestones or stone slabs, leaving no room for natural greenery. Unfortunately, this has also been the practice in regeneration projects. Increased absorption of solar energy by dark asphalted or concrete surfaces is a factor that contributes to the heat island effect in cities. That effect intensifies during heat waves, which are getting more frequent as one of the effects of climate change.

All these factors produce a decline in the quality of the urban environment and reduce the quality of life. The urban environment is important for the creation of social relationships and promoting human activities as well as for ensuring the quality of urban space. The importance of this connection has been demonstrated by the studies on urban space conducted by the Danish architect and town planner J. Gehl who, in the book entitled *Cities for People*, stressed the influence of the quality of the surroundings on the social activities of people using this space (Gehl 2014: 21). This is important as a substantial portion of regeneration projects applied to such space. The proper development of urban space, as well as the correct selection of construction materials and the increased share of biologically active land in the city structure, are factors which may restrict the negative consequences of climate change.

In Poland, many regeneration projects were developed and implemented in cities as part of the 16 Regional Operational Programmes implemented in the years 2007–2015. Some of them participated in competitions for the best pub-

lic space in a given voivodeship, organized by Marshal's Offices and the Association of Polish Architects (Stowarzyszenie Architektów Polskich [SARP]). For example, in the years 2007–2015, the regeneration of public space projects that entered the competition in the Silesia Voivodeship included nearly 30 projects involving reconstruction, modernisation, or regeneration of market squares, public or city squares, and streets. Despite the good architecture presented, and the attractiveness of town planning solutions, the projects presented are deprived of features that would allow one to tackle typical urban environmental threats, such as the consequences of torrential rain, heat waves, or drought in the city. In the designs and projects for the renewal of urban space that were analysed, the urban planning and architectural solutions usually involved the use of cobblestones or concrete, stone slabs, and other solid materials. On the other hand, greenery was usually treated as a decorative element, not as material whose use would contribute to the way that the space is formed. This inglorious rule can be observed both in the regeneration projects carried out in big Silesian cities, such as Katowice, Gliwice, Częstochowa, Bytom, and in smaller towns e.g. Olesno, Radzionków, Lubliniec, Żarki. Furthermore, one can find similar examples in numerous Polish cities and towns. Regeneration practice has not been complemented there with solutions which improve the ability of cities to adapt to climate change. Still, regeneration activities can be efficient tools for preventing the negative consequences of climate change or may minimise the threats resulting from them (EEA 2016; BasE 2016).

The basic condition for the regeneration process to consider the necessity of adapting to climate change is to carry out an assessment of the city's susceptibility to the above threats. It is also important to select regeneration solutions that would strengthen the resistance of the city to such changes. Despite the substantial number of examples of failure to respond to the challenges faced by cities due to the threats resulting from climate change, we can also point out good examples of regeneration, contributing to reduced susceptibility of the city to environmental threats.

The most spectacular example of regeneration, which significantly enhanced the quality of urban space and provided environmental comfort, is the (re-)development of 620 ha of derelict land degraded by industry, located on the outskirts of three Silesian towns: Katowice, Chorzów, and Siemianowice Śląskie. The former Provincial Culture and Leisure Park (Wojewódzki Park Kultury i Wypoczynku – currently the Silesian Park – Park Śląski) was established in the late 1950s, on the initiative of General Jerzy Ziętek, then on the Board of the Provincial People's Council. A sizable recreation complex was developed to replace old workings and derelict land. This consisted of an amusement park (Wesołe Miasteczko), a zoo, and an interesting development, a spacious park, with a Planetarium complex, sports facilities, restaurants and catering facilities located amongst greenery (Gorgoń, 2016). That project, reclaiming derelict land and a pioneer for Poland and Europe, not only developed an attractive leisure area for the inhabitants of the Upper Silesian conurbation, but also increased the biologically active space in the area, and thus strengthened its ecosystems, contribut-

ing to enhanced resistance to predicted climate change. Despite the fact that climate change was not on the agenda at that time, this project – vintage now – belongs to the best practices in regeneration policy, taking into account the context of adaptation to such change. Among the more recent examples of Polish regeneration projects in urban areas, in which the factor of improving the city's resistance to climate change is a consideration, there are the regeneration activities carried out by the city of Bydgoszcz, which are focused on the proper development of the 'waterfront' in the city. Such activities belong in a wider context of developing riverbank space and the creation of the so-called "blue infrastructure" of the city, which is of great importance for alleviating the adverse consequences of climate change.

### Regeneration activities increasing the city's resistance to climate change

Transformation of degraded urban and industrial areas in cities into green areas enhances the city's adaptability to climate change by increasing the surface area that is biologically active. Among the activities which increase the city's resilience in response to climate change there is also the regeneration of degraded ecosystems in cities, and the development of ecosystem-related services. The development of green infrastructure and nature-based solutions could enhance the role of ecosystem services in the processes of strengthening urban resilience. Regeneration activities which are part of a coherent programme including adaptation of the city to climate change also comprise social projects linked to raising awareness of the need for adaptation to climate change. Regeneration projects constitute an important input into a city's adaptation potential when they involve the inhabitants and entities/agencies undertaking activities and measures presenting climate-related threats. The list below contains selected groups of regeneration activities which take into account the necessity to adapt to climate change. Those activities include:

Re-development of degraded urban areas and post-industrial structures to perform new functions in the city, which is a good policy for the city and region as it increases the protection of city land and open green areas against development pressure and the processes of uncontrolled sub-urbanisation /urban sprawl/ (Gorgoń & Starzewska-Sikorska 2014);

Development of degraded and post-industrial areas for the purposes of nature and recreation, which allows the development of ecosystem-related services and increases biodiversity. These are activities which increase satisfaction in the urban environment and the quality of life of the inhabitants (Lange & Nissen 2012; Preuss & Ferber 2008);

- Re-development of derelict land in cities, e.g. riverine and former railway land, which contributes to increasing the natural capital of the city, in particular in relation to a more substantial role for, and increased protection of, urban soil, as well as the maintenance of biological diversity (Gołębiowska et al. 2011; CircUse 2013);
- The unsealing of sealed soil, as well as the clean-up of polluted land, which leads to an increase in the area of

biologically active land, the protection of city land, and – in the long run – an enhanced quality of the entire city environment (INSPIRATION 2016);

- The creation of new public open space, with the application of pro-environmental solutions, such as “green car-parks” or “green urban roads”, the introduction of water in town planning projects (fountains, water tanks, water cascades), which promotes better aero-sanitary conditions in the city, or a specific area being the subject of a regeneration project (Solarek et al. 2016; Januchta-Szostak 2014);
- The introduction of innovative technical and technological solutions in regenerated facilities – focused on enhancing environmental experience. Such solutions include: “green roofs”, vertical gardens, as well as renewable sources of energy (photovoltaic cells, geothermal solutions that may be applied in post-industrial structures such as former underground mines, where the water underground has a temperature which enables it to be used for heating purposes), as well as solutions concerning water management, in particular those which apply to small retention management and rainwater management projects in the city. (Suter et al. 2017);
- The promotion of regeneration solutions that are focused on the inclusion of the city community in the process of increasing the resistance of city areas to climate change through the development and maintenance of local green areas – squares, courtyards inside built-up areas, spaces between blocks of flats (Bierwiazzonek et al. 2012).

The findings of the research and projects presented above show the importance of climate adaptation and urban renewal as key elements of innovative urban policy. Unfortunately, there is a lack of a link between these important issues in Polish spatial planning practice. The Urban Adaptation Plans currently being prepared will provide an opportunity to introduce recommendations for the integration of these issues (MPA 2017). Enhancing the quality of the urban environment through regeneration, and adjusting it to the expectations and needs of the inhabitants, along with an increased potential for the city to adapt, are ambitious challenges for urban policy. The role of spatial planning as an instrument for shaping the urban area, as well as protecting and improving the natural environment and improving climatic conditions, cannot be overlooked in these processes. One should not underestimate the social advantages resulting from the involvement of the inhabitants and users of a given area in regeneration projects, including also measures

focused on preventing or minimising the negative consequences of adverse climatic events through local projects, e.g. small water tanks – waterholes or rain gardens – in the neighbourhood. There is a clear correlation between climate and the type of social activities visible in urban areas, and differs depending on the season of the year and weather conditions (Gehl 2010; Solarek et al. 2016; Suter et al. 2017; Watson & Adams 2011). The awareness of that dependence is also an important element in developing regeneration policy. Urban areas, which include natural components that influence local climatic conditions, are perceived as more friendly and available by users.

## Conclusions

The need for urban renewal, in particular the regeneration of crisis areas, is one of the main prerequisites that shape the development of a modern city. Regeneration programmes and projects have the objective of implementing an urban policy compatible with spatial, environmental, and socio-economic objectives. Linking the problems concerning regeneration with climate change issues has emerged ever more frequently in EU strategic documents (EC 2010, 2013, 2016, EEA 2012, 2016) and studies which are the result of scientific research projects carried out under the Horizon 2020 programme (INSPIRATION 2016). Adapting to climate change is a new challenge in the development policy of states and cities. There is a need to develop urban planning and urban renewal instruments that support adaptation to climate change in the context of improving preparation for unexpected climate phenomena in cities by increasing their resilience. In addition, a need to include these issues in regeneration projects carried out at different scales and in different locations has been ever more frequently identified. Both the regeneration processes, and projects related to them, as well as activities focused on improving the adaptation potential of the city, are elements of a contemporary and innovative approach to the management of urban space. The introduction of climate issues into regeneration practice is a key aspect of innovative urban policy. The synergy between the activities in these two areas of urban policy may result in measurable benefits and may enable a cohesive solution to be found to many crucial environmental, social, and economic problems. It may also be possible – via such solutions – to provide answers to the basic needs of city dwellers associated with the quality of city living.

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