Climate change related urban transformation and the role of cultural heritage

Matthias Ripp & Christer Gustafsson
(Eds.)

Foreword by Claire Cave

IL Sileno Edizioni

Geographies of the Anthropocene

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Matthias Ripp & Christer Gustafsson
Editors

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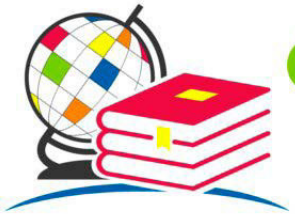

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The book series “Geographies of the Anthropocene” edited by the Scientific International Publisher “Il Sileno” (Il Sileno Edizioni) will discuss the new processes of the Anthropocene epoch through the various worldviews of geoscientists and humanists, intersecting disciplines of Geosciences, Geography, Geoethics, Philosophy, Socio-Anthropology, Sociology of Environment and Territory, Psychology, Economics, Environmental Humanities and cognate disciplines.

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7. Historical spatial-functional network system and Smart City strategy as an opportunity for the sustainable development of Kolobrzeg

Adrianna Brechelke[1]

Abstract

Kołobrzeg is a medium-sized city located in north-western Poland by the Baltic Sea. The historical urban environment was based on a tripartite functional structure which was separated by numerous parks and green areas. This layout has remained legible despite the enormity of the destruction caused by the war effort in 1945, as a result of which the urban tissue of Kolobrzeg was destroyed by approximately 90%. The system transformation in Poland led to the dynamic development of tourism and the consequent uncontrolled growth of the development of the coastal strip and suburban wetlands. This has introduced a disproportion in the historical functional system and led to an urban-functional monoculture subordinated to tourism. The intensity of holiday and spa travel resulted in the erection of residential housing, often used seasonally. The development challenges overlap with ongoing reconstruction and regeneration efforts - in addition, these transformations are taking place in the face of new problems mainly related to climate change. The article shows the correlation between the historical urban network character and the spatial-functional balance as well as contemporary adaptation necessities. The preservation of the historical structure with consideration of the current needs of tourists and residents provides an opportunity to restore the principles of sustainable development. The strategy, together with the adopted objectives based on creating the best conditions for living and recreation, cooperation between inhabitants and authorities, and an innovative economy, will provide an opportunity not only for the development but also for the preservation and adaptation of urban heritage objects in the face of the city's green transformation.

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Keywords

Cultural Heritage, Sustainability, Urban Transformation, Historical urban space, Smart City

1. Introduction

Kolobrzeg is a medium-sized city located in north-western Poland on the Baltic Sea and has been a tourist and spa mecca since the mid-19th century. The historic urban environment was based on a tripartite functional structure - the spa, the port and the city centre, which were separated by numerous parks and green areas. This arrangement had the hallmarks of sustainable urbanism, which resulted in a spatial balance around these three centres. Developed until the outbreak of the Second World War, the city was also characterised by a unique microclimate and an abundance of greenery surrounding the buildings. The enormity of the destruction resulting from the war effort in 1945 and the subsequent reconstruction led to a significant transformation of the urban structure on an otherwise clear functional and spatial basis. Progressive urbanisation since the end of the 20th century has led to negative phenomena in the urban space that represent a major problem in both climatic and planning terms. The resolution to adopt a smart city strategy, introduced in September 2021 [2], seems to respond to the problems of overdevelopment and spatial imbalance in the city. However, the smart idea alone may not be sufficient for historic cities. Linking it to the idea of sustainable development and basing it on the historically shaped spatial and functional structure may be the key to developing an optimal solution. Its implementation must be preceded by an analysis of processes taking into account its past, present and future (Sobol, 2017). This multifaceted approach to the city is considered not only in ecological terms but also in terms of heritage conservation. The research carried out therefore focuses on the analysis of the historical aspects of Kolobrzeg's spatial structure, its transformation and development plans in the context of the newly introduced smart city idea. An attempt has been made to correlate the discussed themes with the assumptions of sustainable development in ecological, spatial as well and cultural terms, trying to find optimal solutions that take into account the unique character of the city and its needs.

[2] Decree No. 97/21 of the Mayor of Kolobrzeg of 15 September 2021 on the adoption for implementation of the Smart City Strategy of the City of Kolobrzeg and the appointment of a team for the implementation, monitoring, communication and evaluation of the Smart City Strategy of the City of Kolobrzeg.

2. Sustainability and the smart city concept

One of the determining factors in halting climate change is the introduction of transformational urban design and its adaptation to modern needs. A sustainable and green economy is a direction for development and economic transformation, through which quality of life and well-being can be increased. One of its objectives is also to ensure social justice and equity while reducing environmental risks, by halting the consumption of natural resources and developing renewable sources. Sustainable development is a doctrine that assumes a quality of life that is at the level of current civilisational development. It is an answer to the emerging problems of the modern world. Together with the concept of smart cities, which stems from the principles of sustainable development, it is an answer to increasing urbanisation or other negative spatial phenomena occurring in cities (Sobol, 2017).

2.1 Principles of sustainable development

The concept and outline of the principles of sustainable development were captured at the First United Nations (UN) Conference on "Environment and Development" in Stockholm in 1972 (Piechota, 2016). At that time, the focus was on the negative effects of rapid urbanisation associated with increased environmental pollution and attention was drawn to the need to reduce it. The general formulations, recognising the superiority of ecological aspects over economic and social ones, developed at the conference did not provide a universal solution for countries with different levels of development. The next stage in the process of shaping the definition of sustainable development was the work of the UN, which defined the concept of sustainable development, as economic development that does not violate the environmental, economic and cultural balance (Piechota, 2016) A milestone in defining sustainable development was the 1992 Rio Earth Summit conference in Rio De Janeiro, which created one of the most important documents constituting a set of principles and guidelines for developing strategies of action for development at international, national and local levels. An extension of the principles introduced was the World Summit on Sustainable Development in Johannesburg.

The follow-up to the development policy was the report *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication* issued by the UN in 2011 (Piechota, 2016). At that time, the concept of a green economy was defined as actions aimed at improving the quality of human life

and well-being by increasing social equity while reducing harmful activities that lead to climate change and dynamic exploitation of natural resources. *The Future We Want* document summed up what has been achieved so far regarding introducing sustainable development policies. It is therefore assumed that the concept of sustainable development is considered in a multifaceted way, encompassing economic, social and environmental dimensions. The economic dimension is concerned primarily with GDP growth, determining the development of the country in terms of goods and services, The social dimension is concerned with meeting basic social needs, improving the quality of life and reducing unemployment. The ecological approach is concerned with improving the quality of the environment, protecting biodiversity and halting climate change.

Among the instruments supporting the introduction of sustainable development principles, apart from the above-mentioned doctrinal documents, one can also point to political and legal instruments, instruments of indirect action as well as environmental protection instruments (Midor, 2012). They perform a variety of functions integrally related to the functioning of man on earth from the basics of existence to production and technological development. They therefore represent an intrinsic value in the transformation of sustainable development and influence the economic and socio-cultural dimensions (Rogall, 2010).

2.2 Smart City

The smart city, is an urban planning concept that is based on the use of advanced information and communication technologies to improve the quality of life of citizens, and the efficiency of public service delivery. The concept is thus a component of a complex process of sustainable urban development. It focuses on improving the efficiency and quality of life in a city by applying innovative solutions at various levels of city management. In order to achieve this, it requires the cooperation of various industries and actors, as well as infrastructural links with a high level of technology (Florida, 2005). Its premise is also to ensure the centrality of citizens in a sustainable environment. [3] The concept has evolved over the years into version 2.0 and even 3.0, but its basic assumptions are based on cooperation between many aspects of city development. The smart city manifests itself in several operational areas including sustainable development understood as achieving a balance between improving the quality of life, environmental protection and economic growth, informa-

[3] International Organization for Standardization, 2019, Ciudades y Comunidades Sostenibles—Indicadores Para Ciudades Inteligentes; ISO 37122; International Organization for Standardization: Geneva.

tion and communication technologies for better analysis and management, and smart infrastructure and citizen participation in the urban management process.

Despite the differences between smart cities and sustainable development, the two concepts are interlinked. The smart city can contribute to achieving sustainable development goals by managing resources efficiently, reducing energy and raw material consumption, improving the quality of public services and promoting civil society and citizen participation. The spheres of influence of the smart city concept and sustainable development have common features, relating not only to socio-economic, but also to planning and urban planning issues (Broniewicz, 2017). The technologies introduced are used to design more efficient and functional cities. Among the available solutions addressing the aspect of architecture in the city, noteworthy ones are intelligent space management with the support of information and communication technology, enabling the monitoring of urban space (Stawasz 2005), The use of various types of electronic technologies in both communities and urban spaces is mutually beneficial (Hollands, 2008). One of the most important solutions is the planning of sustainable transport and user-friendly space for different forms of transport. Smart cities in the energy sector provide energy efficiency and energy management through the use of smart grids or green consumption through the adaptation of existing buildings and metering analysis (Rudewicz 2019). An important aspect is also the use and analysis of the data collected, which can be translated into planning decisions. This involves public participation in the urban planning process to take into account local and regional needs. The last is the transition to a green economy in smart cities, resulting in the development of innovation areas centred around integrated green urban infrastructure solutions. The introduction of the smart city concept in urban planning and urban transformation of a city can contribute to improving the quality of life of citizens, increasing the efficiency of urban services and reducing the city's environmental impact (German, 2020).

3. Sustainable development and smart cities in Poland

The transition to a green economy is one of the most important challenges facing countries around the world. The transition is not universal and requires unique solutions tailored to unique conditions. In Poland, changes in the approach to sustainable development can be seen. This is linked to

UN and EU membership, which regulate the need for the legal system to be subordinate to its implementation. Furthermore, the provision in Article 5 of the Constitution, in addition to the freedoms and rights of the human beings and the citizens, Poland also safeguards the national heritage and ensures environmental protection in accordance with the principle of sustainable development.[4]

According to the Central Statistical Office (CSO), out of 195 UN member states, Poland is ranked 15th in terms of the implementation of Agenda 2030.[5] In addition, as part of the new approach to the socio-economic situation, four additional indicators representing the state of development of the green economy were developed together with GDP. These are natural capital, environmental efficiency of production, environmental quality of life of people, and economic policy (Zakrzewska, 2019). In addition, legal acts, e.g. the Environmental Protection Law, have established the principles of its protection and the conditions for the use of natural resources.[6] The development of the economy to date has been based on unlimited consumption of natural resources. This has consequently led to irreversible climate change and the generation of further environmental threats. These changes have a direct impact on the life and functioning of societies and therefore economists point to a change in the economic model (Zakrzewska, 2019).

The Polish economy is based on non-renewable energy sources, primarily coal. In order to adapt to the requirements resulting from the signing of the three declarations[7], steps have been taken to increase the country's development in terms of sustainable policy and green energy.

Work on greening the economy has been linked to a number of programmes and strategic documents.

The transition to a green economy is one of the most important challenges facing countries around the world. The transition is not universal and requires unique solutions tailored to unique

[4] Constitution of the Republic of Poland of 2 April 1997, Journal of Laws of 1997, No. 78, item 483, as amended.

[5] https://2021.dashboards.sdgindex.org/rankings, accessed 12.04.2023.

[6] Sustainable development indicators for Poland

[7] Rio Declaration, Agenda 21 Action Programme, Declaration of Principles for the Sustainable Management of Forests, two global agreements: Convention on Climate Change and Convention on Biological Diversity

National Environmental Policy	2009-2012	Ensuring environmental security and laying the foundations for sustainable socio-economic development	
Poland's Climate Policy	By 2020	Safeguarding measures against sustainable climate change	Based on the United Nations Framework Convention on Climate Change
Poland's energy policy	By 2030	increasing the country's energy security in a sustainable manner	
A strategy for changing production and consumption patterns to favour the principles of sustainable, balanced development		decoupling economic growth from the increase in consumption of natural resources and environmental impact, and improving quality of life	
National transport policy	2006-2025	improving the quality of the transport system and extending it in a sustainable manner	

Table 1 - Development strategies based on CSO data [8]

The adopted strategies take into account the principles of sustainable development. The alignment of many activities and plans with EU requirements and initiatives has significantly improved Poland's environmental policy towards energy development, energy efficiency and environmental protection. Projects were implemented to improve river and coastal water quality and air quality. The strategies adopted also indirectly concerned urban spatial development. The successive introduction of emission-reducing measures linked to the popularisation of renewable energy or the top-down, statutory improvement of the energy efficiency of buildings and the development of sustainable modes of transport are transforming the urban fabric. However, this is a long-

[8] https://stat.gov.pl/cps/rde/xbcr/gus/oz_wskazniki_zrownowazonego_rozwoju_Polski_us_kat.pdf , accessed 12.04.2023.

term and rather difficult process. Studies monitoring the implementation of the sustainable development policy, taking into account social, economic, environmental and institutional-political aspects, show that Poland is in a strong group of countries that perform less well in relation to the requirements set by the EU (Rozmus, 2019). Taking into account the Europe 2020 Strategy, the results show that Poland has met the social targets at a quite good level, due to the achievement of EU values in 2 out of 4 indicators (Kryk, 2017). Studies show that the life expectancy rate has increased, which may indicate an improvement in the conditions of public health services. The level of employment and people with higher education have also increased. Nevertheless, analysing the reports of the Central Statistical Office, the achievement of the 17 Agenda 30 targets is on an upward trend.

The adoption of the smart city concept by cities can contribute significantly to environmental goals. It can be one of the answers to emerging contemporary urban problems and address global aspects in local and urban planning terms. Rapid development and consumerism combined with poor management have led to negative phenomena in the process of space shaping. Suburbanisation, or the takeover of suburban areas showing significant biodiversity, leads to a gradual degradation of the local ecosystem (Lopez, 2021). A high urbanisation rate requires innovative solutions to deal with complex problems in an efficient way (Yigitcanlar, 2015). The escalation of phenomena not only leads to irreversible changes in the environment but also has a direct and negative impact on human existence - existence and quality of life. Statistical surveys show that in Poland more than 60% of the population lives in towns and cities[9], thus consuming 50-80% of energy resources (Albino, Berardi, Dangelico, 2015).

Polish cities are therefore increasingly turning to the smart city strategy. One of the first to decide to implement it was Białystok. Tasks were focused on improving the quality of public transport and road infrastructure. In the case of Gdansk, a smart city refers to improving the quality of construction. Activities resulted in the construction of an energy-efficient multi-family municipal building in Dolne Młyny Street. Gdynia, on the other hand, bases its activities on the participation of inhabitants in the process of transforming the urban fabric. Created by the Institute for Urban Development, the Urban Lab creates a platform for the exchange of experience between experts and the local community focused on contemporary urban management. The smart city idea is also being implemented by other large cities in Poland, such as

[9] CSO (Central Statistical Office): Population. State and structure in territorial section.

Poznań, Warsaw, Wrocław and Krakow. However, it is increasingly reaching smaller local government centres.

4. Kołobrzeg – case study

One of the cities in Poland that are in the process of introducing the smart city strategy is Kolobrzeg. This seaside resort town can serve as an example of efforts to successively introduce the principles of sustainable development into the process of shaping historical space. It is a medium-sized city located in north-western Poland on the shores of the Baltic Sea, and its urban structure is based on mutually balancing centuries-old layers.

From the time of its foundation in 1255 until the beginning of the 19th century, the functional and spatial structure was defined by two points - the militarised harbour with its salinas, and the fortified city-fortress which was the administrative and residential area. The military development of Kołobrzeg blocked the expansion of the town into the forbidden building development area and the floodplain until 1873. Nevertheless, from the 1840s onwards, together with the interest in balneology, a new district began to emerge in the vicinity of the harbour - a resort of increasing economic importance (Heider. Kierzek, Laber, Kotuła, 2019). It was located directly on the coastal strip, initially without direct links to the rest of the city. The distinctiveness of the individual districts was emphasised by the forests and parks, forming a kind of buffer area between the spa, the harbour and the city.

Figure 1 - Map showing tripartite spatial and functional system (red)

A historical analysis of Kołobrzeg's urban structure has revealed a transformation of the urban space and a clear outline of a tripartite spatial and functional structure. The creation and development of the spa changed the relationship between the two hitherto urban centres and enriched the spatial structure of Kołobrzeg with an additional element. All this led to urban transformations that are an interesting example of functional structure transformation, its integration while maintaining the separateness of the main components in the city's spatial development process. The tripartite structure responded to the growing needs of residents and visitors by creating not only a spatial but also a functional balance. The spatial activities taking place at the time, based on the foundation of the former fortifications, enriched the urban fabric not only with hygienic streets and building quarters but also with green squares and plazas. In addition, a clear traffic system connected the different parts of the city in a way that was based on the centuries-old needs of the inhabitants, confirming the spatial balance. In the 1840s, the construction of seaside promenades was initiated and numerous walking avenues were laid out in the forest park. The creation of parks and walking avenues concentrated in the coastal areas had not only an aesthetic value but also served to strengthen the waterfront, protecting it from wind and water erosion. The dynamic growth of the city was based on a balance between new buildings and their functions and a buffer of greenery ventilating the historic centre. The balanced growth of the various parts of Kolobrzeg met the needs of the inhabitants and visitors. The city's development was abruptly halted by the Second World War. Kołobrzeg became a war lazaret at the time and in March 1945, after fierce battles, was almost 90% destroyed. In the post-war period, economic, political and conservation factors played a key role in the rebuilding of the city. The successive stages of reconstruction have influenced the shaping of the city's contemporary spatial and functional structure. The reactivation of the spa, which began in the 1960s, and the extension of the city's functions to include a holiday resort led to the dynamic development of the district.

Figure 2 - Map Views of the old town of modern Kolobrzeg (red)

Today, Kolobrzeg's development is based on service and production functions with a strong emphasis on tourism. The city's location and natural assets make Kolobrzeg one of the most popular holiday and spa destinations in and out of season. According to the Central Statistical Office (CSO) data from 2022, there were 16 hotels and 4 guesthouses in Kołobrzeg. Compared to 2008, the number of accommodation facilities increased by 10 facilities. In addition to these, there are other accommodation facilities in Kolobrzeg including spa facilities (22), holiday centres (14), guest rooms (62) and others (16).[10] Currently, the functioning of the town is subordinated to tourism, which also has negative consequences. Its intensity and significant growth in recent years have led to a process of intensive urban development. Holiday flat blocks are being built, aimed at short-term rentals. The city's largest and most profitable district has become a resort city (Ziegler, 2004), the old town has become a tourist attraction in a retrograde trend, retaining its administrative functions (Przybyszewska-Gudelis, Grabiszewski, 1986). The local labour market is dominated by offers related to tourism and spa activities. The consequence is not only an excessive growth of one function, disrupting the

[10] https://bdl.stat.gov.pl/bdl/dane/teryt/jednostka/3752, accesed 01.10.2023

historical spatial-functional structure, but also a mono-functional pointiness of individual functions.

Figure 3 - Map showing overdevelopment of the tourist function in the coastal area (dark blue) and new housing developments - suburbanisation (red)

Kołobrzeg's residents have thus been pushed into less attractive areas further away from the sea, thus exacerbating the phenomenon of urban sprawl (Mordwa, 2017). The data collected shows that every year there is an increasing outflow of Kołobrzeg's inhabitants to suburban areas encompassed by the neighbouring municipalities. The outflow of inhabitants has negative consequences in the spatial context. Suburbanisation may result in a communication infrastructure that is inadequate and not adapted to rapid urbanisation changes, together with an underdeveloped service area comprising shops, and educational, medical and cultural facilities. In addition, residents occupy valuable natural areas, which have a direct impact on the biodiversity and spa qualities of the resort. At the same time as the outflow of residents, the number of flats in Kolobrzeg is increasing. Their number has risen sharply since 2014. According to CSO data, the number of flats in 2022 was as high as 27,996, an increase of 25%. The data also shows that 97% of the newly built flats are for rent or sale. This shows the real scale of tourist facilities with flats for short-term rental.

The year	2014	2015	2016	2017	2018
Inflow of residents from villages in the voivodeship to Kolobrzeg	205	237	222	216	267
Outflow of residents to villages in the province	290	237	267	236	325
Number of flats	22226	22521	23025	23577	24530

Table 2 - Outflow and inflow of residents based on CSO data

The system transformation in Poland led to the dynamic development of tourism and consequently to the uncontrolled growth of the coastal belt and suburban wetlands. It has led to a functional monoculture subordinated to tourism. This translates into poorly diversified job opportunities and consequently inadequate living wages. This is compounded by the migration of young people and an ageing population. Development challenges overlap with ongoing redevelopment and revitalisation activities - in addition, these transformations are taking place in the face of new problems mainly related to climate change.

The intensive development of the city in terms of tourism that began in the 1960s, due to political decisions by the central authorities of the People's Republic of Poland, led to negative planning consequences. This is not an isolated case. Research indicates that urban sprawl processes are a problem affecting cities of all sizes. According to the Urban Policy Observatory, in the vast majority of urban regions, the suburban zone is characterised by a higher level of housing construction activity than the core centre. Past forms of governance have not protected Kołobrzeg from the negative phenomena faced by modern cities. It does, however, have enormous potential to implement the principles of smart cities and sustainable development. This is influenced not only by the historical urban structure which gives the city its identity but also by the associated greenery system. The preserved and protected system - the waterfront strip and numerous parks - provides a natural and historic separation between the individual districts. Preserving the historic structure together with taking into account the current needs of tourists and year-round visitors and residents provides an opportunity to restore the principles of sustainable development.

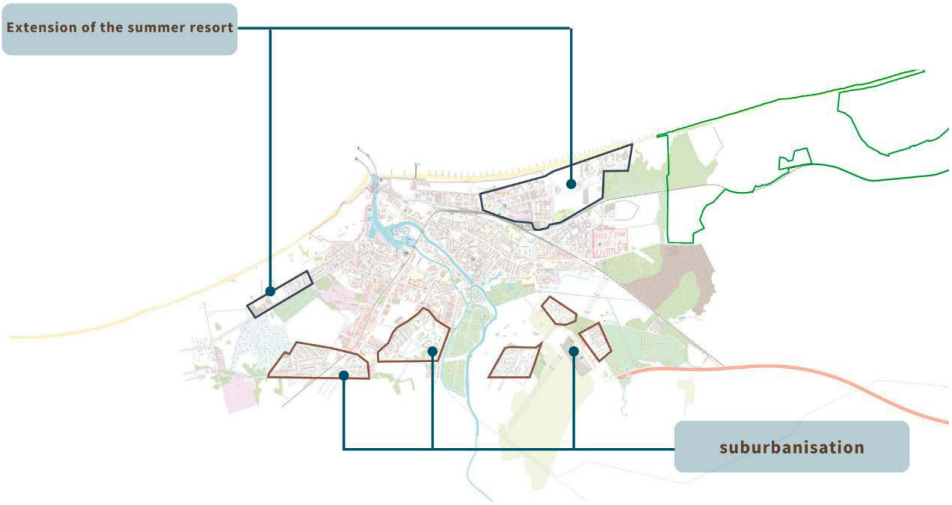

Figure 4 - the growth of Kolobrzeg in the last 30 years (red)

4.1 Smart city

In 2021, an ordinance was passed to adopt the smart city strategy for implementation. [11] It can provide a response to the negative spatial transformations taking place in the city. The strategy's assumptions try to respond to the most important smart city assumptions mentioned above, which include spatial management, sustainable transport, green energy solutions, social participation and green economy. Kolobrzeg's identified development challenges focused on the natural-economic-spatial aspect. The strategy acknowledges the already mentioned economic monoculture resulting from the dynamic development of tourism, as well as the problems of reconciling the conflicting interests of the city's various users - tourists, visitors, residents and investors. An imbalance between tourism, the environment and the local community area, as well as the city's transport problems, were pointed out. All these aspects are linked to the challenges of making life in Kołobrzeg attractive and the need for residents to participate in the city management process. The assumptions on which the challenges are based point to the aim of making better use of the resources at one's disposal, including locational and natural

[11] Order No. 97/21 of the Mayor of Kołobrzeg of September 15, 2021 on the adoption of the Smart City Strategy of the City of Kołobrzeg for implementation and the establishment of a team for the implementation, monitoring, communication and evaluation of the Smart City Strategy of the City of Kołobrzeg

resources, and building a network of economic links to increase competitiveness. An extremely important part of the city is its rich green areas. Implementation of the adopted strategy therefore includes more efficient use and conservation of natural resources as well as the preservation and increase of biologically active areas. In order to improve the well-being of residents, it was decided to develop and strengthen the city's residential function with access to public services.

Among the assumptions, an important aspect is the city's natural resources which determine not only the quality of life of the inhabitants but also the tourist space. According to Kolobrzeg's strategy, environmental protection projects are being implemented in the city. The percentage of selectively collected waste is increasing, [12] the proportion of parks and green areas is growing [13]and more areas are being developed in local spatial development plans. [14]

Figure 5 - Comparison of the proportion of greenery in the urban fabric in 1929 (darker shade of green) and 2020 (lighter)

12 33.9% of total waste

13 5.3% in 2012 to 9% in 2018

14 Smart City Strategy of the City of Kołobrzeg

The percentage share of tree area based on mapadrzew.com is only 4.20% for Kołobrzeg. Compared to other cities in the so-called Recovered Territories with a comparable scale of destruction, this proportion is relatively low (Koszalin 34.0%, Szczecin 16.9%,) but this is due to certain administrative conditions - the inclusion of forests in the urban area. Nevertheless, a quantitative analysis of the trees shows that there are far fewer trees in the old town area than in other areas of Kolobrzeg.

Kołobrzeg is gradually introducing a sustainable development policy, taking into account the resulting ecological, social and economic aspects.

The Smart City strategy, which has been adopted for implementation, seems to provide the necessary support for realising the potential of the place, and introducing economic diversity while maintaining the principles of sustainable development. The strategy, together with the adopted objectives based on creating the best conditions for living and recreation, cooperation between inhabitants and authorities, and an innovative economy, will create an opportunity not only for development but also for the preservation and adaptation of urban heritage objects in the face of the city's green transformation. Kołobrzeg therefore has great potential for multidisciplinary activities adapting the historic space to contemporary smart city solutions. In doing so, it will be necessary to utilise and appropriately develop the spatial system based on functional division, which has been in place for centuries. It provides a balance and guarantees sustainable development based on providing attractive conditions for both residents and tourists/ visitors.

4.2 Links to the historical urban fabric

Shaped in the course of its development from the Middle Ages to World War II, Kolobrzeg's urban structure developed a balance between three functionally different but also complementary districts: the downtown, the harbour and the spa. The effect of the balanced urban development was also an economic and social balance. In the context of the cited problems of the city of Kołobrzeg, a response to the needs of residents and tourists may be to strive to restore the spatial balance resulting from the historical layout. Due to the enormity of the destruction, it constitutes a great value of the rebuilt city. Of the actions listed in the public consultation and the Smart City Strategy for Kołobrzeg, some can be linked to the assumptions of the discussed functional and spatial structure. [15]

[15] Summary of diagnosis and research findings The strategy is developed within the project "KOŁOBRZEG. HUMAN, PART and SPACE".

Smart city objectives	**idea**	**Reference to the historical spatial and functional structure**
Creation of a Municipal Functional Area of the City of Kolobrzeg	the city's economic and spa function	Restoring networking and division of functions, moving away from a functional monoculture to a balance
Appointment of an urban gardener at the town hall	greenery management	In the 19th century. The function of City Gardener was performed by H. Marten, who established most of the parks in the inner city area
Access to green spaces, and recreational areas in the immediate area of residence should be increased	Integration of the local community	19th century. Supplementing the urban fabric with parks and squares on the sites of former fortifications
Use of the port	places for the development of entrepreneurship and the orientation of Kolobrzeg's economy beyond tourism and spa activities is also classified as a possible innovative measure	19th century. Redevelopment of the harbour and adaptation to new purposes - sailing basins, fishing, etc.
changes in the city's transport sphere.	Better green transport, use of rail, bicycles, etc.	Creation of new arteries after demolition of fortifications

Table 3 - Correlation of ideas related to the Smart City strategy with historical spatial and functional solutions

4.3 Possibilities

The indicated examples of Smart City objectives show that it is possible to restore, in correlation with the historical urban structure, the historical functional and spatial balance. Despite the enormity of the destruction, the original layout of the city is still legible. This will make it possible to implement the goals and objectives of the smart city strategy. It will, however, be necessary to link them to the achievement of social and ecological balance. A good solution seems to be, included in Kołobrzeg's strategy, relieving the spa zone in favour of other, equally attractive areas of the city. [16] This will allow for the dispersal of tourists and the activation of other areas, as well as taking care of the local environment and the comfort of residents and visitors. A good direction related to spatial planning will also be the successive completion of local spatial development plans for areas most threatened by the process of uncontrolled urbanisation combined with the participation of residents.

5. Conclusion

The presented analysis shows that the Smart City Strategy adopted for implementation in Kołobrzeg seems to provide the necessary support for using the potential of the place, and introducing economic diversity while maintaining the principles of sustainable development. The strategy, together with the adopted goals based on creating the best conditions for living and recreation, cooperation between residents and authorities and an innovative economy, will provide an opportunity not only for development but also for the preservation and adaptation of urban heritage objects in the face of the city's green transformation. Kołobrzeg therefore has huge potential for multidisciplinary activities adapting historical space to contemporary smart city solutions. Despite the small number of monuments and processed urban tissue, Kołobrzeg has a chance, with the appropriate application of the smart city idea and further historical analyses, to recreate the functional and spatial situation from before World War II in a modern and sustainable form. The analysis shows the correlation of the planned activities with the historical and spatial experience of the city, showing the flexibility, universality and possibility of implementing the existing, logically created urban structure. Also, the use of modern technologies that make the historic city smarter can make it even more improved.

[16] Smart City Kołobrzeg Strategy

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Smart City Strategy of the City of Kołobrzeg

Summary of diagnosis and research findings The strategy is developed within the project "KOŁOBRZEG. HUMAN, PART and SPACE".

Sustainable development indicators for Poland

https://stat.gov.pl/cps/rde/xbcr/gus/oz_wskazniki_zrownowazonego_rozwoju_Polski_us_kat.pdf , accessed 12.04.2023.

https://2021.dashboards.sdgindex.org/rankings, accessed 12.04.2023.

Starting with a systemic understanding of cultural heritage, climate-change related urban transformation processes are analyzed through a multi-disciplinary lens and methods that blend the arts, humanities, and sciences. Governance-specific topics range from relevant cultural markers and local policies to stimulate resilience, to a typology of heritage-related governance and the vulnerability of historic urban landscapes. A variety of contributions from the Americas, Asia, and Europe describe and analyze challenges and potential solutions for climate-change related urban transformation and the role of cultural heritage. Contributions focusing on innovation, adaptation, and reuse introduce the concept of urban acupuncture, adaptive reuse of industrial heritage, and how a historical spatial-functional network system can be related to a smart city approach. The potential role of cultural traditions for resilience is analyzed, as is the integration of sustainable energy production tools in a historic urban landscape. Examples of heritage-based urban resilience from around the world are introduced, as well as the path of medium-technology to address climate adaptation and prevention in historic buildings. The contributions emphasize the need for an updated narrative that cultural heritage can also contribute to climate adaptation and mitigation.

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