

ANALYSIS OF SPATIAL URBAN STRATEGIES IN THE CONTEXT OF ADVANCING GREEN URBAN DEVELOPMENT IN BELARUS

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ABSTRACT

The structural differences and nature of the social, economic and environmental challenges of small and medium-sized cities of the Republic of Belarus demand to address the Green Urban Development in a locally tailored manner. The importance of climate adaptation and mitigation at the global level finds its contextualization in the new practice of the strategic sustainable development planning that was introduced by the Green Cities Project.

The paper describes the research in progress regarding basic trends for territorial urban development in the future. It analyzes three spatial strategies for the cities of Navahrudak, Polatsk and Navapolatsk which were elaborated by the Green City Project as a structural part of the Green Urban Development Plan – a local strategy that integrated energy consumption and CO₂ emissions reduction with spatial development. The main objects of the study are the spatial elements of the “sustainable urban development” paradigm: “land use”, “density”, “transport and mobility”, “public and green spaces”, “spatial model”. The article argues that globally accepted spatial models of sustainable cities appear to match with the Belarusian context with necessary adjustments under the influence of some external and internal factors. Finally, the paper offers key directions for advancing green urban development in Belarus.

Keywords: *sustainable urban development, spatial urban strategy, Green Urban Development Plan, small and medium-sized cities of Belarus*

INTRODUCTION

Although the planning of urban sustainable development has been broadly theorized for the last decades, today implementation of concrete action plans encounter specific tasks considering spatial features of the cities. Since the New Urban Agenda and even earlier, mapping sustainable development actions in urban settlements has been a widespread global approach [1], [2], [3]. Settings for strategies improving the urban environment have found an increasing role in Belarus too. Even though the system of urban and territorial planning in Belarus is considered to be well developed, the UNECE international team of experts recommended to develop an urban planning policy for the next five years with the emphasis on achieving the UN Sustainable Development Goals (SDGs), the New Urban Development Program and the UN Geneva Charter on Sustainable Housing at a local level in Belarus [4].



In this context "green cities", "green economy" are strategically important concepts for Bealarusian cities, 50 of which have joined the European initiative Covenant of Mayors on Energy and Climate. The municipalities commit to reducing emissions, mitigate climate change and minimize energy consumption with the implementation of SECAP – A Sustainable Energy and Climate Action Plan. Recently, the traditional practice of General Planning has been enriched by experimental strategic planning at the municipal level aimed to advance green urban development in small and medium-sized cities in Belarus. Since 2017 this practice is sustained with the new experience of the strategic sustainable development planning on municipal level with the main emphasis on integrating goals of reducing energy consumption and CO₂ emissions with spatial urban planning. Contextualization of the SDGs and tailoring of social, economic and environmental targets with the local territorial potential and challenges were implemented under the Project "Belarus: Supporting Green Urban Development in Small and Medium-Sized Cities in Belarus (Green Cities)", which was implemented in 2017-2021 by UNDP in Belarus in collaboration with the Ministry of Natural Resources and financed by Global Environmental Facility. The three Green Urban Development Plans were developed for the cities of Navahrudak (29 424 inh.), Navapolatsk (107 479 inh.), and Polatsk (84 332 inh.) followed by four next small and medium-sized cities. These plans are local sustainable development strategies that sum up prospects of green urban development and formulate the unique vision of a green future. The strategies rely on the existing national (republican), regional and local long and medium-term programs and strategic documents, as well as on the current state of the city, trends, existing external and internal factors. According to the locally elaborated planning methodology [5] the specific set of the long-term development goals, as well as the priorities for a short-term horizon of 1-3 years go in line with the spatial strategy of each city.

This research in progress examines common and distinctive features of the three green spatial strategies as it is described in the plans. Specific spatial elements are considered within the local context to determine spatial innovations and trace basic trends for city territorial development until 2040. These trends compose the scalable recommendations for advancing green urban development in Belarus.

SPATIAL FEATURES OF THE CITY: GROUNDS FOR GREEN URBAN DEVELOPMENT

It is assessed that the current situation of the cities is characterized by a certain imbalance in the sustainable development components (the presented diagrams with 38 indicators evaluate the sustainability of urban development - the closer the figure is to the radius point, the more sustainable development the city has).

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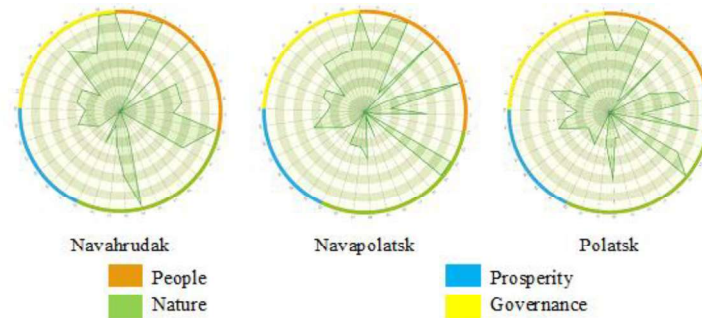


Fig. 1. Sustainability Profiles of the cities (source: assembled by the author with reference to the UNDP Green Cities Project materials [6], [7], [8])

Today, Navahrudak and Polatsk are facing natural population decline and ageing, the increase in the demographic burden borne by the working-age citizens, shortage of skilled workers and outflow of qualified personnel, combined with the reduction of a small and medium-sized businesses, lack of positive dynamics in the development of existing enterprises, as well as the lack of financing in order to modernize and develop the infrastructure, to maintain and protect natural and cultural heritage sites. The demographic situation in Navapolatsk is more stable, both in terms of natural growth rates and age structure. All the same, the existing demographic "scissors" are gradually increasing - the birth rate is lower than the mortality one, a negative migration balance is noted. Before the political crisis of 2020 the budget of Navapolatsk was one of the most well secured due to its own income sources if compared with other local budgets. Nevertheless, the share of the budget for environmental protection is equal to 0.0001%. Changes in the budgetary relations between the city and city-forming enterprises lead to a noticeable decrease in funding for the municipal infrastructure. The relative wealth of the urban economy in Navapolatsk is diluted by air pollution. However, industrial emissions tend to decrease (over 10 years, the total volume of emissions decreased by 45%). The main damage (more than 90% of total emissions) is caused by traffic. The patterns of climatic changes in the three cities are the same as in other settlements of Belarus, furthermore, in Navahrudak the effects of heavy rainfall and frequent ice-slicks are felt more acutely in combination with a marked terrain relief. The analysis of location benefits and risks reveals that solutions to many cities' problems go beyond their administrative borders.

Navahrudak has a "fan-like" spatial structure: it consists of several neighbourhoods located between the main streets of the radial direction. Inside the separate neighbourhood, density declines and acquires a "finger" shape. The streets are concentrated in the city centre where land use interventions are sporadic. The cross-links between sectors are poorly developed. The middle city belt is divided into smaller quarters with mixed use. The outer belt is characterized by the alternation of both free plots and those occupied by industrial and communal facilities.

Navapolatsk and Polatsk act as a shared centre being a large national and regional transport and industrial hub. According to the experts' estimates, the

mutual labor migration flows between cities are approximately equal and make up about 25% of the working population. The social infrastructure of both cities is gradually acquiring the features of a cluster. Two cities exist in a single space under the harmful influence of the power and chemical industry enterprises. At the same time, the existence of two cities in a single ecosystem provides common mechanisms for neutralizing those negative anthropogenic environmental impacts. The initial “linear” model of Navapolatsk now has a clear-cut elongated shape of a fairly concentrated urban fabric with a central hub and uneven cross-connections. Consistently moving along the main axis one can visually fix the differences in the architectural look of the city - the "annual steps" of its territorial sprawl. Today's Polatsk has a fragmented and uneven structure of the scattered "archipelago of the islands", which are separated by the river and railways network. There is a diverse range of the building and neighbourhood typologies, however this ancient city can't demonstrate effective land use nowadays.

SUSTAINABLE CITY PILLARS AND LOCAL CHALLENGES

Urban form, structure, and morphology have a great bearing on energy use and, therefore, on emissions [9], [10], [11], [12]. Having a goal to design a more safe, resource effective and climate-resilient city, the spatial strategy for each location was elaborated around the spatial pillars of the sustainable city: “land use”, “density”, “transport and mobility” and “public and green spaces” [13]. The following table names the main issues of concern about the city pillars.

Table 1. Current challenges viewed through the lens of the sustainable city spatial pillars

City pillars	Navahrudak	Navapolatsk	Polatsk
Land use	<ul style="list-style-type: none"> • mosaic structure • rugged borderline • dispersed industry and utilities • fire risky outdated estates 	<ul style="list-style-type: none"> • one of the densest cities in Belarus • modernistic separation of residency and work 	<ul style="list-style-type: none"> • loss of compactness, fragmentation and isolation of the parts • vulnerable wet areas • single-use and low-density new urban extensions
Density	<ul style="list-style-type: none"> • the major residential densities are far less than 50 people per hectare 	<ul style="list-style-type: none"> • only 45% of the residential areas are densely populated • gradiently distributing along the main city axis 	<ul style="list-style-type: none"> • insufficient residential density for mass transit and public services efficiency
Transport and mobility	<ul style="list-style-type: none"> • radial streets pattern • not completed ring connections 	<ul style="list-style-type: none"> • “a city of the one street” – daily rides along the main axis and to the distant workplaces 	<ul style="list-style-type: none"> • transit going through the city; one-level railway crossings • inappropriate connections between

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	<ul style="list-style-type: none"> • no off-street pedestrian and cycling infrastructure • poor street grid connectivity and insufficient crossroad frequency 	<ul style="list-style-type: none"> • insufficient cycling infrastructure and use of mass transit • heavy air pollution and traffic jams 	<ul style="list-style-type: none"> urban streets and external road network • poor connection between city districts
Public and green spaces	<ul style="list-style-type: none"> • limited availability of landscaped green spaces • separation of green areas • green-and-blue ecosystem with potential to provide ecoservices and enhance tourist attractiveness • street network unable to cope with the loads during festive events; city centre lacking vitality on regular days 	<ul style="list-style-type: none"> • limited availability of landscaped green spaces • poorly noticable nature in the city despite alternation of built-up and nature areas and proximity to the river • significant asymmetry of the central nodes distribution impeding their accessibility 	<ul style="list-style-type: none"> • historical and cultural heritage without tourist infrastructure • public spaces emerging in the outskirts; paralysed district centres • sensibility of lakes and ponds to climate change • poorly accessible river; lack of connection with other green corridors

GREEN CITY MODELS: CASES FROM BELARUS

With regard to the international recommendations [1], [9], [10], [11], [13] the elaborated spatial models for Navahrudak, Navapolatsk and Polatsk followed the “compact city” and the “transit-oriented development” concept. But, as some international experts pointed out, talking about “compact city”, “axial”, and “decentralised concentration” models, there were no model concepts that could exclusively serve as “...one-size-fits-all recipe to guaranteeing mitigation, adaptation and resilience in their entirety or combined” [14], such concepts were adapted to the context of each city.

The spatial strategy of Navahrudak strengthens the existing “fan-like” structure by saturating the sectors with new social facilities and a variety of public spaces. The most densely populated sector becomes the main development axes with mix-use interventions. In order to preserve and enhance the cultural and natural heritage – the main priority of its of spatial development, Navahrudak focuses on three space-related domains as follows: (1) Customized economic development and comfortable neighbourhoods; (2) Accessible public spaces and green areas; (3) Energy-efficient and resources saving innovations.

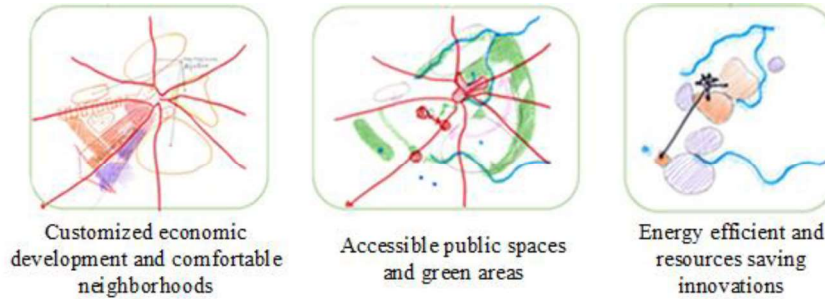


Fig. 2. Space-related domains of Navahrudak spatial strategy
 (source: author’s drawings with reference to the Green Urban Development Plan – Navahrudak-2040: Preserve the Future! [6])

Navapolatsk aims to reshape the network of urban centres that serve as “nodes” on the linear “tape”. Its spatial strategy is associated with renewal and enrichment of the urban environment, transit-oriented development, smart solutions for comprehensive improvement of the city, cohesive water-and-green ecosystem, new infrastructure for a circular economy. The strategy sees decaying residential and underutilized areas, as well as nascent public and green spaces as key action sites.

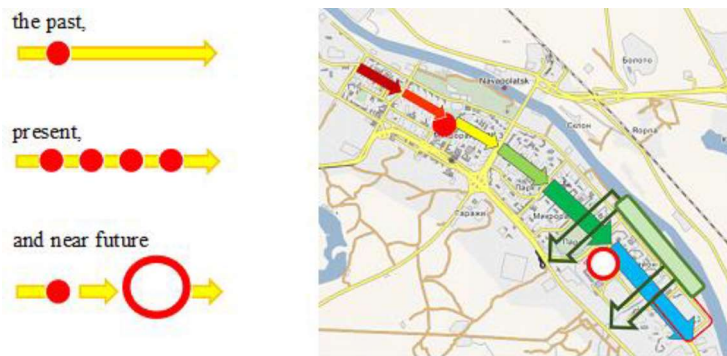


Fig. 3. Conceptual model of Navapolatsk territorial development (source: author’s drawings with reference to the Green Urban Development Plan – Novopolotsk: Renewed City. Version 2.0. [7])

The spatial strategy of Polatsk operates with a polycentric model. It grounds on transit-oriented development and secure city centre and neighbourhoods interconnections. It is planned to implement 3 scenarios: (1) Revitalization of centres; (2) Cohesive districts and mobility without excessive car use; (3) Climate-resilient Infrastructure. Some of the neighbourhoods will develop in “urban village” mode.

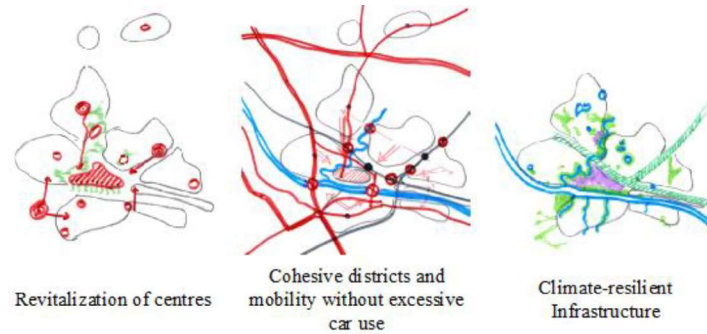


Fig. 4. 3 scenarios of Polatsk spatial strategy (source: author’s drawings with reference to the Green Urban Development Plan – Polatsk: Bridging the Gaps. [8])

The 3 cases above demonstrate the diversity of Belarusian cities, which made it imperative to tailored solutions for urban planning and development to the particular city. It was achieved through the effective collaboration of international and local urban planners, municipal authorities and citizens, which relied on studying the urban form, structure, morphology, and preferences of inhabitants. While comparing the spatial models of the green cities in Belarus with the Integrated Combination of Guiding Urban Concepts developed by the Cities Fit for Climate Change team [14], we can identify the implemented spatial elements, that ensure sustainability and play a significant role for the successful application of green urban development. The following table lists the fairly frequent features of the “linear-axial” model (corresponding to spatial strategies of Navahrudak and Navapolatsk) and “decentralized concentration” model (applicable to Polatsk case) [15], that are suggested as a combination of the elements to make a city fit well for climate change [14].

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Table 2. Common elements of the green urban development strategies

Elements	Navahrudak	Navapolatsk	Polatsk
• Keep settlements and their elements coherent and adequately compact	√		√
• Keep settlements and their elements connected (but avoid sprawl)	√	√	√
• Keep short distances to foster and consolidate adaptive behaviour	√		
• Avoid mono-functional development and inadequately low development	√	√	√
• Allow polycentric structures and development		√	√
• Reduce CO ₂ emissions by reducing waste and traffic		√	√
• Facilitate a resilient layout, infrastructure (and services) and building stock, fostering low energy consumption, or generating (renewable) and low-emission energy	√	√	√
• Identify autarkic structures/elements within the existing and planned system/layout	√		√
• Increase the adoption of development axes that allow further compact development, yet flexibility to respond to unforeseen disasters or erratic weather events	√		√
• Increase the adoption of relief corridors and spaces (i.e. ventilation)	√	√	√

CONCLUSION

The following conclusions are based on the previous survey of the current research focused on spatial urban strategies elaborated to promote green urban development in the cities of Belarus. Firstly, the considered green urban development plans contain a structural part – the spatial strategy, that allows integrating ecological aspects in urban planning and design while linking global challenges of climate change with urban and spatial development. In order to achieve green urban development, spatial elements and models of the sustainable cities should be applied in a contextually. Of course, this does not diminish the necessity to keep interconnection with its non-spatial elements, such as smart governance, public involvement and inclusion. That said, spatial planning and design are inevitably important for the provision of myriad unique solutions to climate change.

Secondly, Belarusian cities need to align with global goals and various international agreements during urban planning. Global knowledge and expertise should be leveraged to help make our cities sustainable. The “sustainable urban development” paradigm is valid for formulating locally tailored spatial strategies

taking into account local conditions owing largely to the spatial pillars: “land use”, “density”, “transport and mobility” and “public and green spaces”. Moreover, green urban planning has the potential to adjust recognised sustainable city models like the “compact”, “linear-axial”, or “decentralized concentration” city to the very context where they will be applied according to its urban form, structure, morphology, and preferences of inhabitants. Inevitable adjustments have to be employed to globally accepted spatial models to match with the Belarusian context due to external and internal factors, such as diminishing population, climate specifics, urban heritage and planning traditions, etc.

Finally, the key recommended directions for advancing the green urban development in Belarus are determined by the above-named local specifics and could be summarised as the tasks to: (a) incent vertical and horizontal integration of urban strategic planning, facilitate strategic planning at the municipal level; (b) incorporate climate-related tasks with decisions regarding urban forms and structures, enhancement life quality and urban viability; (c) explore various land-use scenarios to intensify density and diversity for the future; (d) better integrate land-use and mass transit, as well as non-motorised transport modes; (e) build a holistic environmental city framework as a part of the regional ecosystem of interconnected multi-functional green areas with preservation of biodiversity; (f) promote adequate densities, compact polycentric city model with mixed land use and human scale; (g) introduce autarkic urban structures for decentralized and semi-centralized engineering infrastructure; (h) advance sustainable water management urban design solutions within the range of resource-saving strategies.

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