Paulina LEGUTKO-KOBUS • Barbara SZULCZEWSKA • Beata GAWRYSZEWSKA • Anna DŁUGOZIMA • Renata GIEDYCH • Maciej J. NOWAK

# BARRIERS IN THE GREEN INFRASTRUCTURE GOVERNANCE IN SMALL AND MEDIUM-SIZED CITIES IN POLAND

Paulina **Legutko-Kobus** (ORCID: 0000-0003-0380-8913) – *Warsaw School of Economics*
Barbara **Szulczewska** (ORCID: 0000-0001-8589-7512) – *Institute of Urban and Regional Development*
Beata **Gawryszewska** (ORCID: 0000-0002-3153-6452) – *Warsaw University of Life Sciences*
Anna **Długozima** (ORCID: 0000-0002-5754-9542) – *Warsaw University of Life Sciences*
Renata **Giedych** (ORCID: 0000-0002-2524-5886) – *Warsaw University of Life Sciences*
Maciej J. **Nowak** (ORCID: 0000-0001-8149-8995) – *West Pomeranian University of Technology in Szczecin*

Correspondence address:
Niepodległości Avenue 162, 02-554 Warsaw, Poland
e-mail: plegut@sgh.waw.pl

ABSTRACT: The objective of this article was to identify barriers to the green infrastructure governance (GI) of small and medium-sized cities in Poland. The GI governance models and barriers to the effective implementation of the GI concept in the development policy of cities were identified on the basis of literature studies. The identified barriers were subject to assessment in the context of their validity. Online forms were used to address experts and representatives of 20 cities. Furthermore, barrier-related questions were included as an element in the online focus group research and structured interviews. The research results indicate that the GI governance barriers are not assessed unequivocally in terms of their validity. The cities clearly emphasise a problem with the lack of awareness and involvement of inhabitants, limitations in financing investments, and lack of attention to the GI conceptualisation (project team) and GI governance methods (experts).

KEYWORDS: green infrastructure (GI), governance models, focus group interview, municipal policy

## Introduction

Green infrastructure (hereinafter referred to as the GI) is also known in the literature as a sky-blue-green or blue-green infrastructure and is defined differently (Szulczewska, 2018). The GI considerations are more and more often related to the subject of a development policy and development governance at the city level (Szulczewska et al., 2022a; Feltynowski & Kronenberg, 2020). In 2006, ESPON was alarmed that the municipal research in Europe focused on large cities and metropolises, at the same time ignoring small and medium-sized cities. There is an increased interest in such units in research, municipal policies and strategic documents. For instance, in a recent report, ESPON (2024) underlines the key role of small and medium-sized cities in attaining sustainable development.

As Chmielewski et al. (2013) note, in the case of small and medium-sized cities, landscapes formed by natural and erected elements include mostly natural ones, and in many cases, they determine a local identity. Greenery is particularly important but undervalued, which can be seen in the lack of research on green areas in small cities.

The term GI does not appear too frequently in the practice of local development governance and local development programming. The following concepts are used more commonly (especially in planning documentation): a city's natural system, ecological context or nature-based solutions (Szulczewska, 2020). In addition, in Polish reality, there is a difficulty consisting in the fact that none of the legal acts includes a definition of GI, and the only formal definition which may be referred to is a definition from the European Commission's Communication titled *Green Infrastructure – increasing Europe's natural capital* (Opinion, 2013). According to this document, it is a strategically planned network of natural areas and semi-natural areas with other natural properties that is designed and governed in a manner that ensures a wide range of ecosystem services. It comprises green areas (or blue ones in the case of water ecosystems) and other physical properties of land areas (including the coastal ones) and maritime areas. Such a formulated definition is not easy to implement in local programming documentation – it is general and provides a possibility of comprehensive interpretation.

The GI concept is becoming more and more popular and recognisable in Poland, as well as in the governance practice of cities. The hitherto good GI-related practices from large cities are more and more often supplemented with considerations concerning small and medium-sized cities (Szulczewska et al., 2022b). As Wagner and Growe (2021) underline, although the course of the research on small and medium-sized cities was neglected, it has been gaining importance in recent years, also in the context of research on sustainable planning, in particular, in the following context: green and blue infrastructures, urban de-growth discourses, urban resilience, and climate change adaptation strategies. Schilling and Velasco (2020) point out that the research must specifically differentiate the categories of cities that lose their functions and are subject to depopulation since their infrastructure, as well as the green one, is designed for a considerably higher number of inhabitants. Such cities, among the small and medium-sized ones in Poland, are most numerous.

The governance of local governments assumes a gradual approach comprising planning, decision-making, collaboration, monitoring, and transformation (if necessary) (Nowakowska, 2016). The GI governance system is something more than administering since it contains an element of active impact on the course of matters and, furthermore, it is characteristic of an innovative and participatory approach (Szulczewska et al., 2022a; Szulczewska et al., 2017).

Within the context of the GI governance, there may be the following approaches indicated in local governments:

1) **integrated strategy model** – the GI governance within the integrated strategy (strategy within the meaning of the act on the rules of conducting a development policy – amended in 2020, which, apart from social and economic aspects, also contains territorial elements, including a functional-spatial structure model. This GI governance model may become more significant, considering the fact that from 1st January 2026, this strategy for the first time will become an obligatory document at the commune level),
2) **dispersed model** – the GI governance as part of the entire development governance system (and, as if alongside, sector policies connected, i.a., with: water and flood protection governance, adaptation to climate change, spatial policy, environment/biodiversity protection, natural heritage

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protection, landscape protection – it is also worth mentioning that some of the documents comprising respective sector policies are obligatory for all the communes in Poland),

3) **dedicated management subsystem** – the GI governance by a dedicated subsystem for the GI, allocated from the governance system – in such a solution, the recognition of a GI resource (diagnosis), vision (a desirable, target condition of the green infrastructure), objectives and monitoring – are dedicated to green infrastructure.

Each of the approaches presented (GI governance models) has its pros and cons (Szulczewska et al., 2022a). And not every approach will be suitable for each type of city. Although the third approach (concept/model) is advantageous for GI governance in theoretical terms, for small or medium-sized cities with a limited personnel resource and the lack of urban units dedicated to the GI subject, such an approach is extremely hard to implement. Each of them also has more or less specific barriers understood as problems or obstacles related to GI inclusion in local development governance (at each stage of this process, regardless of the GI governance model implemented in cities).

The main objective of the article is to present the results of research on barriers to GI governance in small and medium-sized cities in Poland.

The specific objectives involve:

- development of GI catalogue,
- verification of how the surveyed cities relate to the identified models of GI management and whether they point out barriers arising from them,
- examination opinions on what barriers to GI management are indicated by experts and city representatives in Polish realities of managing urban development.

## An overview of the literature

The GI governance barriers may be classified in various manners. A broad approach and categorisation of the GI barriers in the source literature is presented by Deely et al. (2020). The authors identified 56 various barriers to GI implementation, classifying them into 30 types. The detailed analysis of this classification indicated barriers typical for the implementation of specific projects concerning GI and not related to the governance system and local development programming (this catalogue of barriers – the most detailed one out of all the analysed catalogues – was used by the authors to construct an on-line questionnaire).

A different barrier division was proposed by Li et al. (2020), who indicated three broad categories: 1) biophysical, 2) social-political (covering the lack of political leadership and role of developers at the planning stage; insufficient GI role/place in regulations and policy; and poor governance and unclear responsibilities due to the involvement of a few institutions) and 3) financial.

A case study concerning barriers in the GI implementation for Newcastle, based on 30 interviews with different interested parties, diagnoses 17 types of barriers, which are divided into two main groups, i.e. 1) biophysical barriers (comprising 3 types: future use of lands and climate; lack of available space and uncertainty in physical sciences and engineering), 2) social-political barriers (including 12 types of barriers, with the most frequently indicated ones: unwillingness to support novel approaches and change of practices; lack of knowledge and awareness; financing and costs; ineffective communication or its lack; problems with projects/work in partnership; legislation and governance) and 3) mixed (covering both groups – 2 types of barriers: GI maintenance; benefits monetisation/valuation (O'Donnell et al., 2017). The EPA (United States Environmental Protection Agency) divides barriers for GI into four main categories: 1) technical and physical barriers, 2) legal and regulatory barriers, 3) financial barriers and 4) institutional barriers (EPA, 2022). Birk (2017) emphasises that many of the barriers for GI implementation are interrelated, and their separation is artificial. Yet, he notes that especially in developing countries the GI implementation must face the contrary treatment of social-economic development and nature protection as goals which are competitive (in particular, as regards financing). In this aspect, it is worth paying attention to the higher costs of the GI implementation in relation to the costs of technical infrastructure, e.g. within the scope of anti-flood protection – however, as is emphasised in the literature, these are mainly costs "perceived" by various interested parties and not the actual ones. As Cartwright and Oelofse (2016) assert, investments with the use of GI for the purpose, inter alia, of improving the well-being and quality of life are

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insufficiently included in financial planning because they do not match the existing institutional practices, and local governments are not accustomed to them. The term "path dependency" is used in literature, which means that decisions taken in the past may affect and limit future choices, leading to difficulties in abandoning a given development path. In literature, it is pointed out (Enqvist et al., 2016) that this approach often hampers GI development, especially when municipal authorities apply the same economic and organisational criteria which are used in the case of GI for the valuation and rationalisation of GI instead of adopting new criteria. In addition, as evidenced by research conducted i.a. in the USA (Chaffin & Gunderson, 2016), uncertainties connected with the application of new techniques and solutions dedicated to GI often overshadow the advantages arising from GI implementation. Furthermore, maintenance costs and long-term efficiency are frequently regarded as the most serious barrier to GI implementation, principally among experts on waste water management (Carpenter et al., 2020). As the key hindrance in GI implementation, Mekala and MacDonald (2018) draw attention to the division of competencies among urban departments, i.e. so-called "institutional silos", which prevent or hinder collaboration among the departments of offices. Another barrier is the lack of clear division as to the entities responsible for GI – in fact, there may be more owners and administrators of this infrastructure. Hence, there is a need to coordinate the implementation of green infrastructure in the entire urban sector (and it is possible, for instance, by implementing one of the GI governance models).

Yet another crucial barrier is the political one, which is demonstrated by the lack of acceptance among local leaders, urban officials, and practitioners. Baker et al. (2022) add a barrier related to legislation – contradictory arrangements and recommendations resulting from various legal acts and codes of good practices, as well as resistance (opposition) from a local community. In Polish reality, as the inspection conducted by the Supreme Audit Office (NIK, 2022) shows, a barrier to effective GI activities is, in particular, in large cities, the lack of local plans.

Most authors underline that levelling the gaps in knowledge and awareness of both urban authorities and other interested parties of the city has a key meaning for overcoming barriers in GI governance.

## Research methods

### General research assumptions

For the needs of the research presented below, the following assumptions were adopted:

- GI will be defined as urban areas covered with vegetation or water and architectural surfaces and appliances covered with vegetation, especially used for rainwater retention. Adopting such a definition entailed a conviction resulting from the research and analyses of local programming documents according to which a GI concept is still not too popular in planning practice, in particular in smaller cities; therefore, as far as the analysis of the planning documents of such cities is concerned, we will have to do only with some of its elements.
- On account of the various definitions of small and medium-sized cities which can be encountered in the source literature, the division by Runge (2013) was adopted, and it was stated that small cities are those whose population is below 20,000 and medium-sized cities are those whose population ranges from 20,000 to 100,000. The research considered only municipal communes (the research did not include cities that are seats of the communes of an urban-rural type). According to data from the Central Statistical Office (GUS), there were 264 such municipal communes in Poland (data from 2020), including 148 medium-sized cities and 116 small cities.

## Study area

The research involved 20 Polish cities (12 medium-sized and 8 small cities). These cities were selected based on the assumptions of the research project. It was connected with the following two fundamental criteria: a model of the arrangements of terrains covered with plants or water (Cieszewska et al., 2024) and a predicted development trajectory (in particular in the context of social-economic development and demographic forecasts – Polish Economic Institute (Brzostowski et al., 2019a; Dębkowska et al., 2019). In consequence, 20 cities were selected for in-depth studies. Those

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were: small cities: Hrubieszów, Kostrzyn upon the Oder, Lidzbark Warmiński, Nowe Miasto Lubawskie, Radlin, Rejowiec Fabryczny, Sławków, Złotów and medium-sized cities: Chełm, Działdowo, Inowrocław, Jarosław, Mińsk Mazowiecki, Przemyśl, Suwałki, Tarnowskie Góry, Wejherowo, Ząbki, Żory (Figure 1).

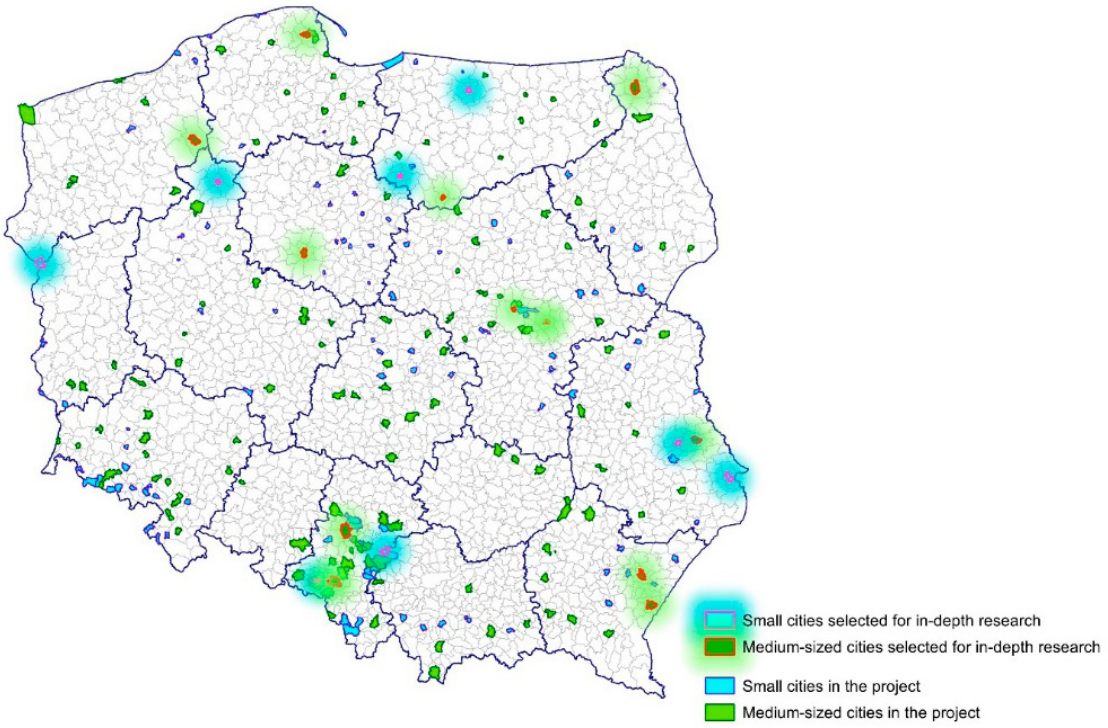


Figure 1. Cities selected for in-depth analysis at the background of municipal communes (small and medium-sized cities)

## Research procedure

The research procedure incorporated four stages presented in Figure 2. The selected research methods and procedures were applied for the achievement of the respective research objectives.

**Goal 1 The development of a catalogue of GI management barriers was achieved primarily based on the analysis of the source literature**. The aim of this analysis was the allocation of various categories of barriers and adaptation of these classifications to the specificity of Polish small and medium-sized cities.

**Goal 2 verification** of how the surveyed cities relate to the identified models of the GI management and whether they point out any barriers arising from them was achieved on the basis of the analysis of planning and strategic documents: development strategy (DS.), spatial development policy (SDP), environmental policy (EP). The analysis of the above-mentioned documents was based on the READ approach, consisting of the following steps: (1) ready materials, (2) extract data, (3) analyse data, and (4) distil findings (Dalglish et al., 2020). For the fulfilment of this task, a tool for data collection was devised in the form of an Excel sheet, which included and compared data for all the analysed local documents. Firstly, SPD, EP, and DS were collected from all the cities analysed. In total, 60 obligatory documents were collected: 20 SDP 20 EP (4 from the EP became invalid, yet they were analysed since they provided an answer to the question of how the development governance model was viewed in cities in the preceding years) and 20 DS. The documents were obtained from the Public Information Bulletin of each of the analysed cities. This part of the research covered the identification of defining GI in documents and references to the GI governance model. The GI governance models were devised according to Szulczewska et al. (2022a).

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**Goal 3 examination opinions** concerning barriers to GI management are indicated by experts and city representatives in the Polish reality of managing urban development. For the achievement of this objective, an online questionnaire dedicated to experts was used, an online questionnaire for cities, focus group research was conducted, and a land survey, as well as structured interviews, were held during said survey with the representatives of given cities. As part of the questionnaire sent to experts, an invitation to fill in a questionnaire was submitted to 37 experts – both academics and practitioners dealing with green infrastructure in the context of the development of cities. The questionnaires were filled in by 21 experts. At this stage the questionnaire was also submitted to cities – it was the same questionnaire as for the experts. It targeted 20 cities that were selected for the in-depth research. Notwithstanding the numerous incentives, it was filled in by merely 6 cities (3 medium-sized and 3 small). The questionnaire was anonymous – only a category of a city had to be ticked (small or medium-sized) – they were reminded about the possibility of filling in the questionnaire by an e-mail twice, indicating an option of obtaining a comparative material for a filling-in city to see how it was presented at the background of other cities of the same category.

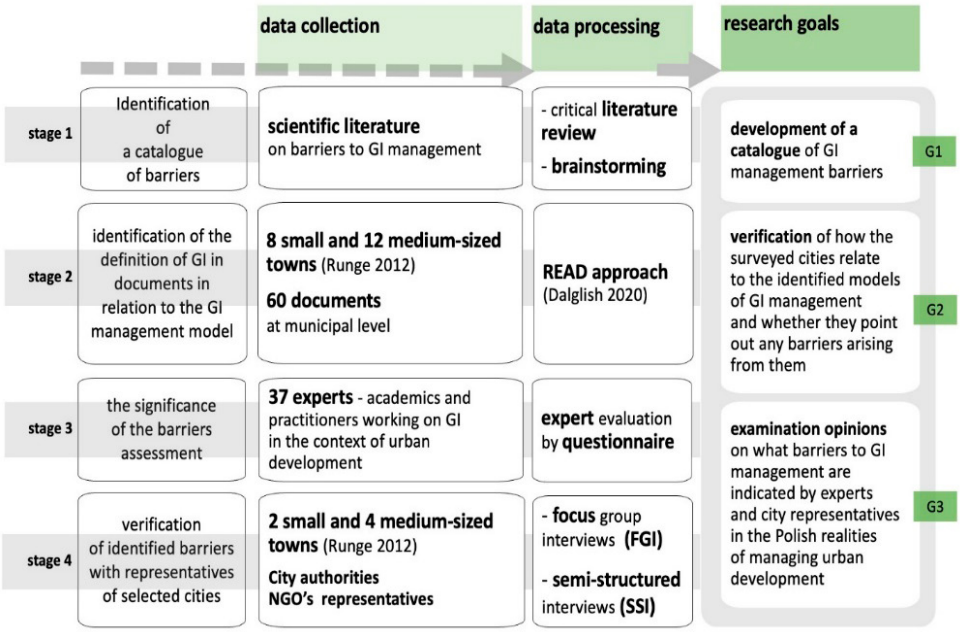


Figure 2. The research procedure applied by the authors

Due to the fact that the number of returned questionnaires was low, the results obtained from the cities were regarded as a poll, and they were subject to in-depth analysis during a webinar and online discussion (February 2023 – it was participated by the representatives of 15 analysed cities). The verification of barriers was also carried out during the focused group interviews (FGI) participated by 5 cities (3 medium-sized cities and 2 small cities, i.e., Mińsk Mazowiecki, Przemyśl, Tarnowskie Góry, Hrubieszów and Lidzbark Warmiński). Furthermore, the verification and assessment of the significance of barriers was carried out based on structured interviews held during study visits in the cities (these were 6 cities – apart from those in which focus group studies were conducted previously, Suwałki was added, which, as one of the first analysed cities introduced a concept of GI into the local development strategy). The interviews were recorded and then transcribed using the otranscribe programme. The obtained text files were analysed to find an answer to the research questions.

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## Results of the research

### Identification of Barriers

On the basis of the literature overview, the multitude of approaches to the identification of the GI governance barriers was indicated. It must be underlined that the analysed examples, in general, are applied to large cities. In addition, they were implemented in countries where the GI governance practice has a considerably longer tradition than in Poland. The research on the occurrence of GI governance barriers in Poland and in relation to small and medium-sized cities fills in a gap in the research on barriers to the implementation of the GI concepts. Considering a research gap as regards the subjects tackled in small and medium-sized cities in Poland, a catalogue of barriers in GI governance was prepared. On the basis of the overview of the literature and typologies contained therein, a list of barriers was prepared, including their broadest scope (see Table 1, column 1).

### Governance Models in Relation to Barriers

As mentioned in the Introduction, GI governance is possible within the following three models: 1) integrated strategy model, 2) dispersed model, 3) dedicated management subsystem.

Upon having analysed the documents, it turned out that all the researched cities applied the dispersed model. None of them included a document dedicated to GI. Despite the fact that in 7 out of 20 analysed cities (including in 4 small cities), development strategies are new documents – that are drawn-up during or upon amending the provisions of the act on the rules of conducting a development policy, no model based on integrated development strategy was identified.

Not only a dispersed governance model was determined as a barrier in the GI governance since, as indicated by previous analyses, it is possible to govern the GI effectively as part of each of the diagnosed models, but in general, the multitude of approaches towards the GI concept at the level of local documents (Szulczewska et al., 2022a). There are no consistent and detailed diagnoses and GI inventories at the level of cities. The analyses show that GI is treated as an element of city aestheticisation, accompanying pedestrian paths and cycling paths, whereas strategic-planning documents refer, to a limited extent, to comprehensive functions fulfilled by GI (social, economic and natural).

Both the experts and representatives of cities also drew attention to additional barriers in the questionnaire, which were not included in the statement prepared on the basis of the literature analysis. These were:

- lack of formal acknowledgement of GI as an element of strategic infrastructure,
- insufficient enforcement of an obligation to allocate a biologically active area in local plans of spatial development.

### Expert's Opinion on Identified Barriers

The identified barriers of GI governance were subject to expert assessment with the use of an online questionnaire – the results of the questionnaire are presented in Table 1. The questionnaire was filled in by 21 experts (11 academics specialising in the GI subject, 7 persons combining scientific and practical aspects, and 3 persons defined themselves as experts-practitioners managing the GI).

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Table 1. Expert's assessment of barriers in the GI governance

| Barrier | is present in Polish cities and its intensity is low | is present in Polish cities and its intensity is medium | is present in Polish cities and its intensity is high* |
|---|---|---|---|
| Lack of direct references concerning the GI planning and governance in legal regulations, which is noticeable in the difficulty of the GI conceptualisation. | 9.5% | 23.8% | 57.1% |
| Lack of consistent, holistic concept of the GI development at the city level. | 4.7% | 33.3% | 61.9% |
| Lack of expert's and informative support for cities, for instance, at the regional level, within the scope of the possible solutions of the GI governance which consider the specificity of small and medium-sized cities. | 4.7% | 28.6% | 38.1% |
| Lack of green civic budget or a green part in the civic budget. | 33.3% | 42.8% | 4.7% |
| Shortages in the inventories of areas with a potential for creating GI. | 9.5% | 19.0% | 57.1% |
| Shortages in the inventories of trees in a city. | 14.3% | 42.8% | 33.3% |
| Shortages in the inventories of green areas in a city. | 23.8% | 42.8% | 23.8% |
| Underestimating the economic functions of GI connected with the creation of new job positions, food safety, increase of a real estate value. | 4.8% | 38.1% | 47.6% |
| Underestimating the natural functions of GI (climatic, hydrogeological and biological/connected with biodiversity). | 4.7% | 42.8% | 42.8% |
| Underestimating the social functions of GI (recreational, health, cultural, educational, connected with building the identity of the place). | 23.8% | 47.6% | 19.5% |
| Incomplete recognition of the GI resources at the city level. | 0% | 28.6% | 61.9% |
| System of local documents drawing-up and implementing which is not coordinated in content-related and time terms. | 4.7% | 33.3% | 61.9% |
| System of local documents (in particular the obligatory ones) which is unfavourable for the GI governance. | 9.5% | 19.0% | 66.7% |
| Insufficient finances for the GI governance. | 4.7% | 23.8% | 66.7% |
| Unsatisfactory activity of a local community within the scope of GI – lack of bottom-up initiatives. | 33.3% | 52.4% | 4.8% |
| Unsatisfactory knowledge and awareness within the scope of GI among the official staff. | 4.8% | 42.7% | 52.4% |
| Unsatisfactory knowledge and awareness within the scope of GI in a local community. | 19.0% | 57.1% | 23.8% |
| Limited tools of the GI implementation as part of municipal spatial policy (e.g. the scope of the arrangements within the Local Plan of Spatial Development [MPZP] pursuant to the applicable act). | 9.5% | 28.6% | 53.4% |
| Problems in implementing GI on private areas (e.g. home gardens). | 19.0% | 28.6% | 33.3% |
| Implementation of point projects, e.g. green stops, flower meadows without relation to the natural network of the city. | 38.1% | 33.3% | 28.6% |
| Dispersed data on GI at the level of an office and lack of obligation to collect data in a uniform format. | 4.8% | 23.8% | 66.7% |
| Dispersed management competences concerning GI in the municipal office. | 9.5% | 23.5% | 66.7% |
| Insufficient activity of social organisations (NGOs) within GI. | 23.8% | 38.1% | 14.3% |
| Insufficient popularisation and promotion of good practices within the scope of the GI governance in small and medium-sized cities. | 14.3% | 33.3% | 38.1% |

* The assessment of barriers do not have to sum up to 100% because respondents could choose such answers as "I do not know" and "a given barrier is not present."

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The following barriers were determined by experts as having the highest intensity:

- system of local documents (in particular the obligatory ones), which is unfavourable for the GI governance,
- insufficient finances for the GI governance,
- dispersed data on GI at the level of an office and lack of obligation to collect data in a uniform format,
- dispersed management competencies concerning GI in the municipal office.

## Identified Barriers in the Assessment of the Cities

The online research was participated in by merely 6 out of 20 invited cities; therefore, it was regarded as a poll. The following most important barriers were determined: insufficient finances for the GI governance, and the second most important barrier included indications concerning local activity and participation within the GI governance.

In the context of one of the key barriers in the GI governance in cities and connected with the dispersion of management competencies, it is worth mentioning that in the analysed cities, there are competencies allocated extremely differently, and they concern the GI governance at the office level. The following staff in offices is responsible for GI: environmental protection inspectors, a Mayor's plenipotentiary for environmental protection, employees (sometimes single persons) responsible for spatial planning, employees of the divisions of Urban Infrastructure and Investments, employees of the divisions of Municipal Management and Environmental Protection, employees of the divisions of the Municipal Management, Environment and Agriculture, as well as personnel responsible for obtaining external funds. Considering the fact that GI in a city has different owners and administrators, it must be regarded as another barrier.

During the focus group research, one of the key GI governance barriers was identified as the lack of social activity, passiveness, gaps in knowledge and education (of both decision-makers and local informal leaders), lack of cooperation (i.a. at the level of various divisions and urban companies), problems connected with land ownership (not always green areas in a city are owned by such a city), staff shortages (it sometimes happens that in small cities one person is responsible for spatial planning and GI governance), financing, but also related to long-term GI treatment. Furthermore, it was pointed out that personnel shortages are also noticeable, along with problems with participation, because there is no one to coordinate these processes.

In addition, during the structured interviews conducted in the cities, a main barrier was identified as shortages in the GI inventories – incomplete knowledge concerning resources and their development possibilities is one of the key barriers in GI governance. What is interesting, the interviews did not mention a barrier connected with strategic and planning documents. There were even opinions that these documents are needed mainly for obtaining funds and not for the GI governance. Table 2. includes the selected examples of barriers indicated by cities.

To sum up the results of the research, the project team divided the analysed barriers into groups, indicating the following types of barriers:

- GI conceptualisation problem,
- legal regulations,
- perception of benefits resulting from GI,
- a manner of identifying GI resources,
- a manner of conducting the development policy and inclusion of GI in strategic-planning documents,
- level of awareness and participation,
- governance structure,
- financial challenges connected with GI.

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Table 2. GI governance barriers – based on the focus group research

| Barrier type | Statements confirming the presence of barriers |
|---|---|
| Legal regulations (and formal regulations of the condition) | *"A barrier is the lack of coordinating green area projects with an administrator. We receive a green area for administration when the investment is closed. The lack of any coordination with us, as the future administrators of areas and structures".*<br>*"Not all the areas belong to the city and not everywhere we can enter and plan".* |
| Level of awareness and participation | *"There are training courses for officials but they often lack specifics. We would like someone says specifically how to make a flower meadow, field moguls in the best way possible. What technologies should be applied? How to do it? We have to look for such information on our own".*<br>*"The mentality of people is something you cannot fight with. Inhabitants would like to have grass mown and thujas planted everywhere".*<br>*"It is really hard to explain to people that when we have a protected landscape area and there is a tree knocked down, and it lies on the river bed, that this is very good. Everyone disagrees and wants this tree to be removed because it does not look well".*<br>*"There should be more training courses for council members. They want to be seen well by inhabitants so they order clearing and mowing. If they were educated in the green areas subjects, perhaps they could influence the inhabitants somehow".*<br>*"Vandalism is very common".*<br>*"There are people who heat the atmosphere up even when the cut out trees did not have any natural value".*<br>*"People isolate themselves a lot. The covid pandemic even strengthened this tendency. Contacts are limited. People use mainly telephones, computers. In the past, people were more eager to participate in planting initiatives, and now they have a lot of excuses".* |
| Financial barriers | *"We have a lot of ideas but there is little money".*<br>*"Plant material is very expensive now. It is a priority to invest funds into equipment, appliances, and there is not enough money for green areas. Green areas are treated marginally".*<br>*"We have no money for ordering inventories which would allow us to administer green areas effectively".*<br>*"Due to budget limitations we do not have more full-time jobs".*<br>*"High costs of green areas maintenance are a barrier. Of course, there is a 3 years' or 5 years' investment guarantee. But later on you have to maintain these structures. You have to take care of them so that they do not become wild".* |

Figure 3 synthetically presents how opinion makers (experts, cities and project teams) approach the respective groups of barriers.

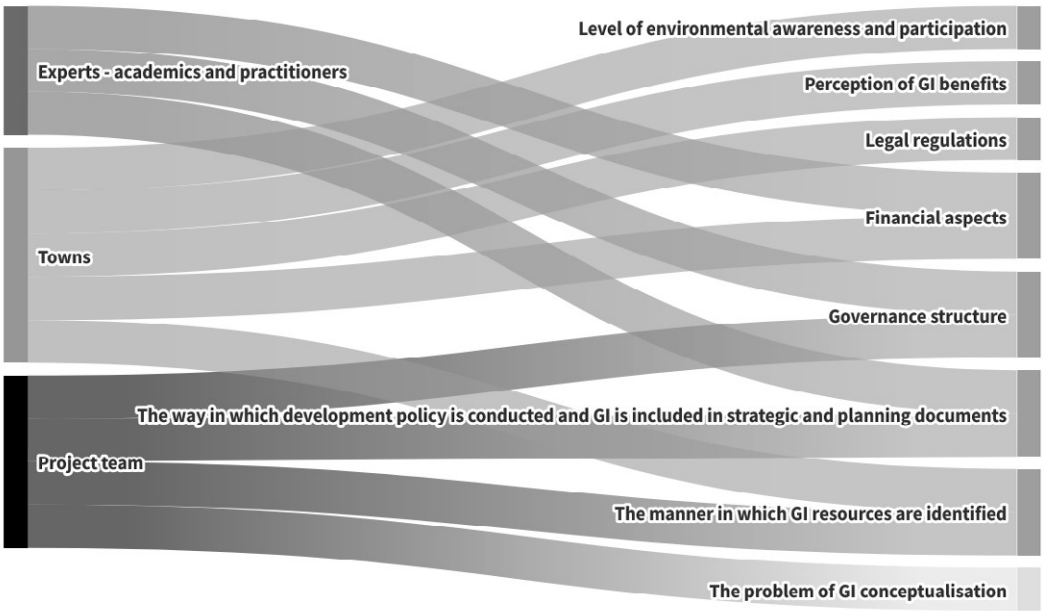


Figure 3. Barriers in the GI governance in small and medium-sized cities in Poland – synthetic presentation

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According to the data specified in Figure 3 – it is not possible to specify one set of barriers which would have a key meaning for all the assessing groups. It is more common to define such barriers in a more detailed approach indicating specific examples – such a barrier includes, for instance, incomplete knowledge of the GI resources at the city level (shortages in inventories and diagnosing a resource).

## Discussion and limitation, and future research

The studies carried out are the only ones of their kind conducted on a large scale in small and medium-sized cities. So far, these have been either case studies or comparative analyses covering the topic of GI in general rather than barriers in GI governance. The article formulates models for the governance of GI and addresses barriers in this context. Thus, the article fills an identified research gap.

Importantly, the governance models presented in the article will be valid until 31 December 2025 – as the system of obligatory documents at the local level in Poland will change after this date. The analysis carried out, therefore, provides a summary and reference point for future research into the inclusion of GI in the system of governance at the local level in small and medium-sized cities.

The research carried out has made it possible to verify to what extent the analyses conducted so far for large cities are applicable to small and medium-sized towns. As the material presented indicates, there are specificities in the approach to barriers in GI governance in small and medium-sized cities. These barriers are often related to a lack of knowledge and awareness of GI.

The specific objectives involve:

- development of GI catalogue,
- verification of how the surveyed cities relate to the identified models of GI management and whether they point out barriers arising from them,
- examination opinions on what barriers to GI management are indicated by experts and the city representatives in Polish realities of managing urban development.

For specific objective 1 – the research conducted confirms that it is difficult to prepare one catalogue of barriers. As presented in the section titled "An overview of the literature", these classifications may be extremely detailed (e.g. Deely et al., 2020) or dependent on the purpose and entity identifying the barriers. The results obtained imply that one of the most often indicated barriers are financial barriers and those related to gaps in knowledge, activeness and participation (this is confirmed by i.a. findings by Baker et al., 2022 as regards cities in general).

While conducting the synthesis of the catalogue of barriers of GI governance for Polish cities, slightly differently than in the source literature, they were presented in 8 main groups, and not as usual in literature in 3 or 4 groups (Li et al., 2020; EPA, 2022). This results from the specificity of Polish small and medium-sized cities and also the fact that the GI concept is not as popular in Poland as, for instance, in the United States. Thus, it was decided to specify a barrier related to the conceptualisation of the GI itself, its inclusion in strategic-planning documents and in the governance system at the local level.

In some aspects, barriers occurring at the level of small and medium-sized cities in Poland are similar to those diagnosed also in large cities. Such a barrier is, e.g. the GI data dispersion at the office level, lack of obligation to collect data in a uniform format and general gaps in knowledge concerning GI, as well as a "silo approach" to the GI governance (these barriers were also diagnosed by large cities in Poland as part of the MPA44 *Wczujmy się w klimat* (Let's Feel the Climate) Project.

It is also similar to the approach to a barrier connected with a green participation budget – according to experts, this barrier obtained low significance. It must be assumed that it is rather a factor fostering the GI implementation. Benefits resulting from the civic budget connected with, i.e., increasing the level of knowledge concerning GI in society are noted, inter alia, by Fundcja Sendzimira (Naumann et al., 2020).

Another barrier is connected with numerous entities governing the GI. Its consequence is a relatively low possibility of mutual influencing the decisions taken by such entities. This barrier diagnosed at the level of small and medium-sized cities was also observed in large cities, which is confirmed, e.g., by the research on Warsaw (Giedych et al., 2012).

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In terms of specific objective 2 – within the context of the GI governance, there may be the following approaches indicated in local governments: integrated strategy model, dispersed model, and dedicated management subsystem.

During the research, it was found that all the cities analysed implement a dispersed model for GI governance. The model itself (its type) is not identified as a barrier to GI governance. The barrier is the heterogeneous methodological approach and the different ways of defining GI. Consequently, this leads to a differently defined object of management. As the project team's expert analysis indicates, effective GI governance is possible in any model.

In terms of specific objective 3, surveys were conducted among experts and city representatives on the barriers to GI governance in small and medium-sized cities in Poland.

The research indicated that there is no single set of universal barriers in GI governance. According to the experts, the key governance barriers are:

- system of local documents (in particular the obligatory ones), which is unfavourable for the GI governance – cities did not identify this as a barrier, indicating that in the governance model used (and it was a dispersed model), effective GI governance was possible,
- insufficient finances for the GI governance – this barrier was also identified by cities – and its importance was significant,
- dispersed data on GI at the level of an office and lack of obligation to collect data in a uniform format – cities perceived a barrier in the lack of an inventory (what elements make up the GI in a city), but also noted that GI data should be collected, which provides the opportunity for comparisons and dynamic analyses,
- dispersed management competencies concerning GI in the municipal office – cities perceived this barrier as too few human resources and a multiplicity of competencies assigned to single individuals – office staff.

Relating the conducted research to other studies related to cities in Poland and other Central European countries:

- Legal regulations and the weakness of the spatial planning system constitute a barrier to GI management, contributing to the fragmentation of GI in the city, as demonstrated by 32 cities from Poland and 14 from Romania' (Petrișor et al., 2022). As pointed out, both the lack of local plans and excessive and rigid planning regulations have the same effect – they lead to the dominance of economic and political aspects in spatial planning and, consequently, to GI fragmentation (Petrisor et al., 2021).
- Another barrier is related to incomplete and incomparable data (the need for spatial data collection and their full harmonisation, the need to include GI data in public statistics) – studies on this topic have been conducted, among others, in cities in Romania (Albulescu & Larion, 2023) and on the example of Łódź and other 17 large cities in Poland (Feltynowski et al., 2018). Data deficiencies related not only to GI planning but also to financial aspects and the determination of economic benefits are also pointed out by Ruan et al. (2024).
- A barrier to GI governance is the lack or low involvement of stakeholders (Ruan et al., 2024) and the still low percentage of greenery-related projects in citizens' budgets (in Poland in small cities, it was in 2022 r. – 6.7 % of projects, in medium-sized cities 13.3 %, while in large cities about 20 % – Martela et al., 2023).

External validation for the identified barriers to GI governance can also be provided by a survey conducted by the Institute for Urban and Regional Development in Polish cities (the survey covered more than 430 respondents from cities of different sizes). Among the barriers most often indicated by cities in the implementation of greening projects, the following were indicated: financial (61%), social (26%), staff and content-related shortages (17%). Only 11% of cities indicated that they had not encountered any barriers.

Conducting research in small local government agencies encounters some limitations. In the researched cities, there were no specialised units dealing only with the GI governance. Therefore, data collection and winning participants for the focus group research and structured interviews met with certain difficulties. Nevertheless, they resulted mainly from the narrow human resources, especially in small cities. This was probably also the reason for the low interest in the questionnaire targeted at cities (despite a few invitations, only 6 out of 20 cities participated in the questionnaire).

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The research carried out shows the need for further analyses at the level of small and medium-sized cities in Poland. On the one hand, from 1st January 2026, the system of obligatory strategic and planning documents will have been changed – perhaps at the level of those smaller cities, the implementation of GI governance will be possible owing to the integrated development strategy. Furthermore, there are ongoing advances in introducing an obligation to have a municipal plan of adaptation to climate changes for cities with over 20,000 inhabitants. This will possibly change the approach to GI governance.

An interesting path of further research may be the comparison of the GI governance barriers presented in this study in the assessment of the cities for which GI has a key meaning in development – e.g. cities-gardens, cities with a status of a health resort or cities which are the laureates of the competitions, Ecomiasto (Eco city) and Miasto z klimatem (City with climate).

## Conclusions

On the basis of the research carried out, it is concluded as follows:

- It turns out that the GI governance model, defined as the dispersed one, which is used by all the small and medium-sized cities analysed in the article, contributes to the formation of barriers, notwithstanding the fact that the theoretical assumptions of the model imply that it should not have any direct impact on the generation of barriers. The GI governance barriers result mainly from the various GI conceptualisation methods applied in the respective documents of development programming and planning.
- There are discrepancies as regards the assessment of the significance of barriers. The cities clearly emphasise a problem with the lack of awareness and involvement of inhabitants and limitations in financing investments; yet, for the project team and invited experts, it was a barrier of the "second importance". On the other hand, cities do not pay attention to the GI conceptualisation (project team) and GI governance methods (experts).
- For the implementation of the GI investments, it seems that the key importance is assigned to its formal acknowledgement as a critical infrastructure, although – in the case of the researched cities – it would be particularly necessary to popularise this concept.
- There are two significant barriers:
  - specified by both the cities and experts is the insufficient involvement of the various groups of interested parties in the GI governance process. The conducted focus research implies that the interest and involvement is growing,
  - an informative one – indicated by cities – connected with the fact that data and information concerning GI are dispersed in the office, there are no inventories regarding the holistic approach to green areas in a city (inventories comprise mostly lawns because it is required for the tender procedures for mowing).
- Competences related to GI governance, which are dispersed in the municipal office, do not contribute to effective GI governance.

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### The contribution of the authors

Conceptualisation, P.L.-K. and B.Sz.; literature review, P.L.-K., B.Sz., R.G., and M.J.N.; methodology, P.L.-K., B.Sz., B.G., A.D., R.G. and M.J.N.; research analysis, P.L.-K., B.Sz., B.G., A.D., R.G. and M.J.N.; writing, P.L.-K., B.Sz., B.G., A.D., R.G. and M.J.N.; conclusions and discussion, P.L.-K., B.Sz., R.G. and M.J.N.

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Paulina LEGUTKO-KOBUS • Barbara SZULCZEWSKA • Beata GAWRYSZEWSKA •
Anna DŁUGOZIMA • Renata GIEDYCH • Maciej J. NOWAK

# BARIERY W ZARZĄDZANIU ZIELONĄ INFRASTRUKTURĄ W MAŁYCH I ŚREDNICH MIASTACH W POLSCE

STRESZCZENIE: Celem artykułu była identyfikacja barier w zarządzaniu zieloną infrastrukturą (ZI) małych i średnich miast w Polsce. Na podstawie studiów literaturowych zidentyfikowano modele zarządzania zieloną infrastrukturą oraz bariery skutecznego wdrażania koncepcji zielonej infrastruktury w polityce rozwoju miast. Zidentyfikowane bariery poddano ocenie w kontekście ich zasadności. Wykorzystano formularze internetowe, z którymi zwrócono się do ekspertów i przedstawicieli 20 miast. Ponadto pytania związane z barierami zostały włączone jako element do badań grup fokusowych online oraz wywiadów ustrukturyzowanych. Wyniki badań wskazują, że bariery w zarządzaniu zieloną infrastrukturą nie są oceniane jednoznacznie w kontekście ich ważności. Miasta wyraźnie podkreślają problem z brakiem świadomości i zaangażowania mieszkańców, ograniczeniami w finansowaniu inwestycji oraz brakiem dbałości o konceptualizację zielonej infrastruktury (zespół projektowy) i metody zarządzania zieloną infrastrukturą (eksperci).

SŁOWA KLUCZOWE: zielona infrastruktura, modele zarządzania, zogniskowany wywiad grupowy, polityka miejska

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