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**WROCLAW PARTICIPATORY BUDGET
AS A TOOL TO STRENGTHEN NATURAL CAPITAL
AND THE URBAN CLIMATE RESILIENCE
IN THE YEARS 2016-2018**

**WROCLAWSKI BUDŻET OBYWATELSKI
JAKO NARZĘDZIE DO WZMACNIANIA KAPITAŁU NATURALNEGO
I ODPORNOŚCI MIASTA NA ZMIANY KLIMATU
W LATACH 2016–2018**

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ABSTRACT: Participatory budgets are a popular form of residents' co-deciding about public space and quality of life in their cities. Projects submitted to participatory budgets respond to needs such as recreation, health, communication and safety. This article evaluates the projects from 2016-2018 of the Wrocław Participatory Budget in terms of aspects related to the wider issue of the natural capital and climate change. The results obtained indicate that despite increasing financial outlays on projects that can contribute to strengthening environmental and climatic aspects, the share of investments directly targeted at their implementation is relatively small. A total of 201 projects were analyzed, of which 12% directly and 18% indirectly referred to issues related to the natural capital and/or climate change.

KEY WORDS: participatory budget, natural capital, ecosystem services, urban climate resilience

ABSTRAKT: Budżety obywatelskie stanowią popularną formę współdecydowania mieszkańców o przestrzeni publicznej oraz jakości życia w mieście. Zgłaszane do budżetów obywatelskich projekty odpowiadają na wiele istotnych potrzeb dotyczących m.in. rekreacji, zdrowia, komunikacji czy bezpieczeństwa. W niniejszym artykule dokonano oceny projektów Wrocławskiego Budżetu Obywatelskiego z lat 2016–2018 pod kątem aspektów związanych z szeroko rozumianym kapitałem naturalnym oraz zmianami klimatu. Otrzymane wyniki wskazują, że pomimo rosnących nakładów finansowych na projekty mogące przyczynić się do wzmocnienia aspektów środowiskowych i klimatycznych, udział inwestycji nakierowanych wprost na ich

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realizację jest stosunkowo nieduży. Łącznie przeanalizowano 201 projektów, z czego 12% bezpośrednio, a 18% pośrednio dotyczyło zagadnień związanych z kapitałem naturalnym i/lub zmianami klimatu.

SŁOWA KLUCZOWE: budżet obywatelski, kapitał naturalny, usługi ekosystemów, odporność miasta na zmiany klimatu

Introduction

Participatory budgets

The participatory process related to a city budget was first introduced by a bottom-up initiative in the Brazilian city of Porto Alegre in 1989 (de Sousa Santos, 1998). In the late 1990s, the idea of a participatory budget spread throughout Latin America and then reached, among others, European countries, as presented in a synthetic historical-geographical perspective by M. Rachwał (2013). Some of these countries have made legislative changes in order to facilitate the involvement of residents in the decision-making process (Burchard-Dziubińska, 2014).

The participatory budget in Poland dates back to 2011, when the city of Sopot started to apply this procedure. In the following years it gained popularity, gradually reaching the number of nearly 60 cities in Poland. However, in Polish legislation the provisions relating to participatory budgets appeared only as a result of changes in the functioning of local governments introduced by the Act of 11 January 2018, amending certain laws in order to increase the participation of citizens in the process of selecting, operating and controlling certain public bodies (Journal of Laws, 2018, item 130) (Błaszak, 2019). In accordance with the provisions of the act, the participatory budget is aimed at increasing civil participation in the process of selecting, functioning and controlling certain public bodies. It embraces also a special kind of social consultation, where inhabitants annually decide on a part of the municipality's budget expenditure. All cities with district rights are required to create a participatory budget amounting to at least 0.5% of the municipality's budget expenditure of the previous year.

Participatory budgets of large Polish cities are the subject of interest mainly in terms of co-management of the city and its finances (Burchard-Dziubińska, 2014; Łukomska-Szarek, 2014; Rachwał, 2013), civil society (e.g. Brylski, Połom, 2019) and in relation to particular cities (Leśniewska-Napierała, 2017; Pietrusińska, 2017; Brylski & Połom, 2019). According to research on the Wrocław Participatory Budget, in 2014 only 7 out of 89 projects (8%) were submitted in the "urban green". Their value represented 14% of the value of all projects accepted for implementation (Solecka, Dworniczak, 2016).

The Wrocław Participatory Budget (WPB) was initiated in 2013. Following the website of the WPB,¹ it is a process that allows residents (not being councilors) to discuss and directly influence decisions on the allocation of part of the public budget for proj-

¹ <https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski>

ects directly reported by residents (see also Sintomer et al., 2008). The residents create their own projects, which directly address their needs.

Natural capital and urban climate resilience

The direct benefits for the city and its inhabitants of the participatory budget are related to the use of urban space, influencing the quality of life through, for example, its function for spending leisure time. However, many functions of urban space are less visible than, among others, the possibility to go for a walk, cycle, conduct daily activities in a pleasant environment and related to positive externalities. An example can be the infrastructure (Platje, Paradowska, Kociszewski, 2018) where shorter travel time and improved air quality resulting from a sustainable transport policy, are not directly visible. Some of these not visible functions provided by natural capital and urban ecosystems are also important to preserve or improve the resiliency of the city concerning climate change. Urban ecosystems are understood here as all natural green and blue areas (GBI – green and blue infrastructure²), performing a number of ecosystem services such as air filtration, microclimate regulation, noise reduction, rainwater collection and drainage, sewage treatment as well as recreational services (Bolund, Hunhammar, 1999). These services are derived from natural capital – a concept which was developed in the 1970s (Schumacher, 1973; Westman, 1977). One of the recent definitions indicates that natural capital is *another term for the stock of renewable and non-renewable resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people*,³ where the flow of benefits is related to ecosystem services. These services can reduce the necessity to provide them in a different and cost-saving way – for example, cooling urban areas by trees can have an annual value of millions of dollars (Gómez-Baggethun, Barton, 2013). Following an economic approach to urban ecosystems, GBI is in fact a *form of critical natural capital, able to generate a flow of material benefits* (Matthews, Lo & Byrne, 2015).

One of the critical issues nowadays concerns the negative effects of climate change, leading to an increasing number of cities to declare climate emergency.⁴ A huge problem is the intensification of adverse effects of climate change, i.e. increasing heat waves, reduced rainfall, occurrence of torrential precipitation, etc. (van Vuuren et al., 2011). The intensity of the occurrence of these phenomena is related to the presence and quality of green and water areas, including elements of green and blue infrastructure.

² Defined as: “a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings” in: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Green Infrastructure (GI) — Enhancing Europe’s Natural Capital (European Commission, (2013).

³ <https://naturalcapitalcoalition.org/natural-capital-2/>

⁴ <https://www.cedamia.org/global/>

A possible solution can be the development of GBI into urban space, since there is a direct relationship between vegetation and natural water retention, as vegetation is a biological water reservoir which, in turn, is necessary for the growth of vegetation (Wagner, Krauze, 2014). The introduction of new biologically active surfaces in the form of GBI or improved management of existing ones, strengthens the natural capital and as a consequence contributes to urban climate resilience (see Meerow et al. 2015) – *the degree to which cities tolerate alteration before reorganizing around a new set of structures and processes* (Alberti et al., 2003). When thresholds are exceeded, this may trigger off a transformation process. In order to prevent such a scenario, or smoothly go through such a process, a resilience approach including natural capital should be considered in planning, management and governance (McPhearson et al., 2014).

In 2019, the document called *Adaptation Plan of the City of Wrocław to climate change by 2030* (Wrocław City Council Official Bulletin, 2019, item 319) was accepted, identifying climate indicators, scenarios, and proposals for adaptation measures for the city. According to this document, the most important potential threats for Wrocław are thermal phenomena associated mainly with rising temperature, heat waves and urban heat island and the increasing incidence of torrential rain, as well as rainfall-free periods with high temperature. Taking this into consideration, it is highly important to properly plan and develop urban public spaces; furthermore, institutional aspects should play a key role in understanding the importance of the natural capital and GBI in adapting cities to climate change (Matthews, Lo & Byrne, 2015). It should also be noted that most of the ecosystem functions are a kind of public good, where there is no rivalry in use and no exclusion (Cornes&Sandler, 1996; Platje, 2011). For this reason, there is a task for the local government in providing such public goods.

WPB characteristics

Since 2013, 334 projects have been approved in WPB and most of them have already been implemented. In 2016-2018, projects could be submitted for 1 of 11 categories including roads, education, public transport, walking/cycling, playgrounds, courtyards, revitalization, sport, historic, green space/recreation and Green WPB. These categories are the topic of research in this paper.

Although the projects submitted to the WPB did not have to meet any specific criteria related to the natural capital (broadly understood) or climate change, they had to fit in the strategies and programs of the Wrocław municipality. For the period 2016-2018, the following documents were in force: *Study of conditions and directions of Wrocław's spatial development* (Wrocław City Council Official Bulletin, 2018, item 5), *Environmental protection program for the city of Wrocław for 2016-2020 with a perspective up to 2025* (Wrocław City Council Official Bulletin, 2017, item 481), executive documents such as the *Ordinance of the Mayor of Wrocław regarding the management of rainwater in Wrocław* (City Mayor Ordinance No. 1158/19) and the *Ordinance of the Mayor of Wrocław regarding the protection of trees and the development of green areas of Wrocław*

(City Mayor Ordinance No. 1217/19). In particular, the last two documents refer to the natural capital and adaption to climate change.

The aim of the article is to examine and provide an initial assessment of the significance of aspects related to climate change and natural capital in the projects implemented under the WPB. First, methodological issues are performed, then research data as well as the results and conclusions are presented. These results may be the basis for developing specific criteria for assessing initiatives and their importance for climate resilience and ecosystem functions related to the natural capital.

Methodology and research

The subject of the study was the verification of projects under the Wroclaw Participatory Budget (WPB) in terms of their contribution to the natural capital and urban resilience. Content analysis was applied to the description of all the 201 projects that qualified for WPB for the period 2016-2018. Three types of analysis were used for the verification of projects (see Fig. 1).

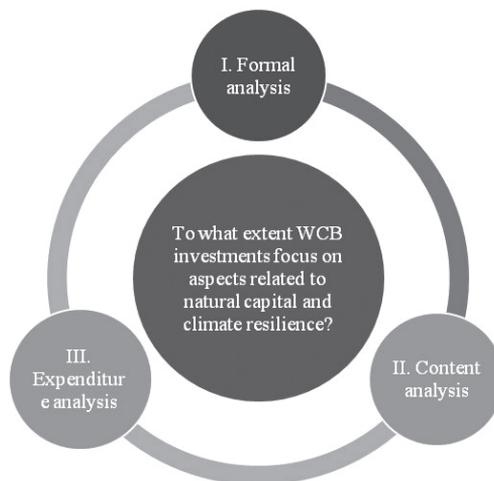


Fig. 1. The research scheme

Source: authors' own elaboration.

Ad. I. Formal analysis was used in order to assess how many qualified projects included elements directly related to the natural capital. Two categories were identified: green areas/recreation and Green WPB.

Ad. II. The content analysis included assessment of each project based on its content. This stage was divided into two parts:

1. Identification and quantification of the type of activities related to the natural capital and their impact on the natural capital and climate resilience.

2. Analysis in terms of anticipated environmental and climate benefits.

The projects then were divided into groups according to the following criteria:

- projects including activities related to planting new trees and/or bushes,
- projects including activities related to the care/revitalization of greenery,
- projects including activities related to the development of green and blue infrastructure,
- projects including activities regarding retention of rainwater.

Based on the above-mentioned criteria and analysis of the content of each project, a categorization key was created resulting in three categories of projects. These categories were called groups in order to distinguish them from the previously described WPB categories. The groups were codified and ranked from the most favorable (Code 1) to the least favorable (Code 3). The outcome is presented in Table 1. The concept of “projects meeting/partially meeting the criteria” includes projects that meet at least one of the above criteria.

Table 1

Groups of projects according to the degree in which they contribute to strengthening the natural capital and increasing urban resilience

Group code	Description of the project group
1	Projects fulfilling the criteria (aimed at the natural capital and adaptation to climate change)
2	Projects partially fulfilling the criteria (at least one of the criteria fulfilled, but not being the main aim of the project)
3	Projects not fulfilling the criteria

Source: authors' own elaboration.

The second stage of the research was content analysis. The content of the projects was analyzed from the point of view of the terminology usage indicating a relation with the natural capital and/or urban climate resilience. Also indirect indications were considered, such as planting plants in cases where in the description of the project the benefits for the natural capital and climate resilience were not mentioned.

The evaluation of the projects was based on the declared benefits, such as:

- nature benefits – project descriptions clearly indicating the benefits for nature and its impact on humans,
- climate benefits – project descriptions clearly indicating the benefits generated by nature for microclimate, air quality, etc.

This allowed determining in which part of the projects the benefits for the natural capital and climate resilience were directly indicated.

Ad III. The expenditure analysis concerned the estimated financial expenditures on realization the projects from Groups 1 and 2, identified in the content analysis. First, the number of projects in each of the three groups (Table 1) was identified. The project

budgets had to go through a procedure – they were verified by the administrative units responsible for the project implementation in co-operation with the project leader. Afterwards, this information was sent to the Wroclaw Participatory Budget Team and posted on the website. The estimated financial expenditures for each project can be found on the WPB website.⁵ This information allowed calculating the share of the projects in Groups 1 and 2 in the total of projects as well as in the total budget for the period 2016-2018.

Research data and results

On the basis of formal analysis, among the 11 categories in which WPB projects could be submitted in 2016-2018, only 2 were directly related to aspects of green space and thus the natural capital. Table 2 presents the number of projects in each of the 11 categories.

Table 2

Number of projects in individual WPB categories in 2016-2018 (I. Formal analysis)

Category of projects	2016	2017	2018	Sum
Roads	8	5	0	13
Education	9	0	0	9
Other	4	1	3	8
Public transport	0	0	1	1
Walking/cycling	11	11	6	28
Playgrounds	7	4	7	18
Courtyards	0	3	2	5
Revitalization	2	1	0	3
Sport	6	16	7	29
Historic	0	0	2	2
Green space/recreation	19	23	35	77
Green WPB	0	8	0	8
SUM	66	72	63	201

Source: authors' own elaboration based on: <https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski> (date of access 10.05.2019).

The largest part of the projects qualified for implementation concerned green space / recreation – 77 projects, which accounts for 38% of all the projects. Green WPB contained 8 qualified projects yet it was a separate category only in 2017. The share of the natural capital and climate resilience related projects increased from 29% in 2016 to

⁵ <https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski>

43% in 2017 and 52% in 2018. Based on the second type of analysis (content analysis), 3 groups of projects were identified according to the criteria presented in the methodological section. The results are presented in Fig. 2.

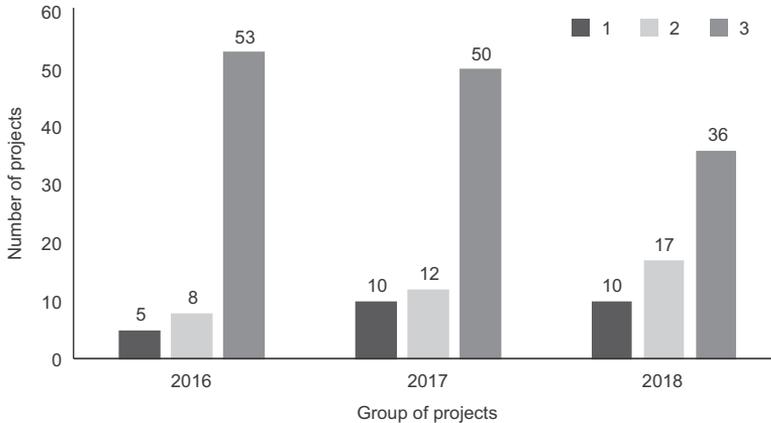


Fig. 2. Number of projects in 2016-2018 divided into groups according to their contribution to natural capital and urban climate resilience (II Content analysis)

Source: authors' own elaboration based on <https://www.wroclaw.pl/rozprawia/wroclawski-budzet-obywatelski> (date of access 10.05.2019).

The content analysis showed that none of the approved projects met the criteria for activities related to retaining or draining rainwater. Group 1 projects mainly concern new vegetation and care / revitalization of vegetation, or were related to the creation of green and blue infrastructure. The overwhelming share of these activities focused on the creation of parks, green yards and squares, pocket parks. There were also some projects aimed only at planting trees and shrubs. As part of three projects, it was proposed to create flower meadows. In three other projects, the idea was to plant ivy on a building as well as on the “Reagan Roundabout” (Rondo Reagana) – the communication node and construct acoustic screens. In two other projects, the aim was to create green bus/tram stops. Although this group is crucial for strengthening the natural capital, nature protection and ecosystem services in the city, it was the least numerous in each analyzed year, with a total of 25 projects implemented in the period 2016-2018 (which constituted 12% of all the examined projects).

A total of 37 projects (18% of all analyzed projects) can be assigned to Group 2, where activities meeting the criteria, constituted at least one (though not the most important) element of the entire project. The activities proposed in the projects most often associated with planting and/or care of vegetation in projects aimed at recreational investments, such as playgrounds. There was one project that included green acoustic screens planted with ivy, one concerned a flower meadow and one a green fence for a kindergarten.

The largest number of projects – 139 (69% of all the projects) can be categorized as Group 3 projects, as they did not meet any of the criteria. These projects concerned mainly recreational investments, such as outdoor gyms, various types of playgrounds, bicycle paths, health paths, park infrastructure elements (alleys, benches, litter bins, toilets), as well as lighting for parks, squares, construction of sidewalks or parking lots.

As shown in Fig. 3, when combining the formal analysis (I) with the first part of the content analysis (II.1) for the entire period, it turns out that 25% of the projects that fit into the green / recreation category belong to Group 1. A slightly larger share (30% of the projects) can be considered as Group 2 projects. The majority of projects (55%) belong to Group 3. In case of Green WPB, 5 out of 8 projects belong to Group 1, and 3 out of 8 to Group 2.

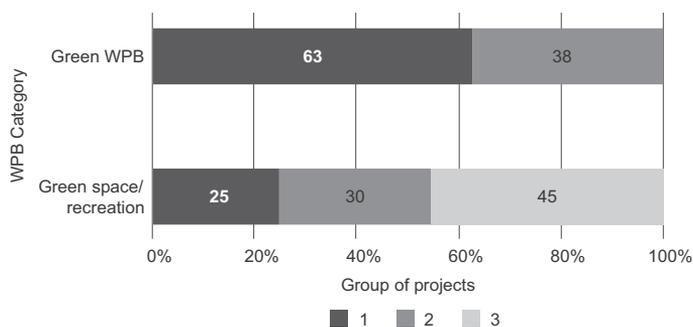


Fig. 3. Share of Group 1 and Group 2 projects in WPB categories greenery / recreation and Green WPB.

Source: authors' own elaboration based on <https://www.wroclaw.pl/rozprawia/wroclawski-budzet-obywatelski> (date of access 10.05.2019).

The second part of the content analysis concerned the benefits of the natural capital and climate change, which were directly indicated in the project descriptions. In both groups there were the same number of projects with 5 descriptions listing both nature and climate benefits. As shown in Fig. 4 and 5, projects from 2016 identified environmental benefits and 5 climate benefits. In subsequent years, the number of these projects decreased to 5 in total in 2018.

Despite the downward trend, it cannot be concluded that less attention is paid to the natural capital and climate resilience. Not directly mentioning benefits does not necessarily mean that these benefits do not exist. In the case of projects involving planting and/or maintaining vegetation, the final effect will be beneficial both in terms of nature and climate resilience. This research rather focused on the declared benefits of projects. However, the initiators of the projects are not necessarily aware of some potential benefits (as well as potential side effects) (see Sterman, 2000; Taleb, 2012). This issue needs to be researched in the future.

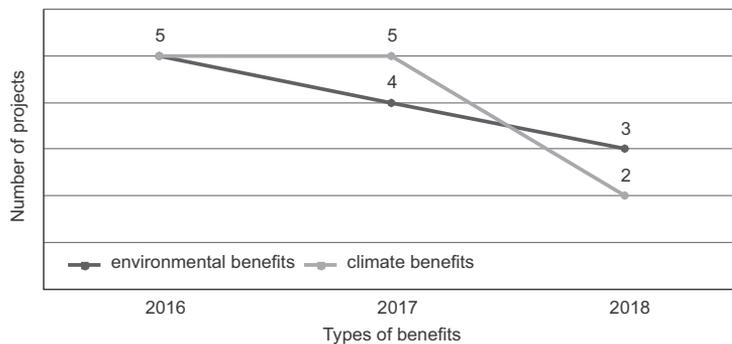


Fig. 4. Number of projects with environmental and climate benefits in individual years

Source: authors' own elaboration based on <https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski> (date of access 10.07.2019).

The last stage of the analysis referred to the financial expenditure as a share of total expenditure on WPB projects (Fig. Fig. 5 and 6). Each year a total budget of PLN 25 million (about 6 million euro) was available, while in 2017 an additional budget was granted for green WPB. The exact amounts were PLN 24.335 million for 2016, PLN 29.71 million for 2017 and PLN 24.95 million for 2018. In 2016, PLN 6.5 million was spent on the projects from Group 1 and 2 – nearly 27% of the total budget. The expenditure on these projects in 2017 was significantly higher.

However, PLN 11.49 million (almost 39% of the total budget) included the additional PLN 4.82 million for green WPB. In 2018, the total expenditure was PLN 10.85 million, 43.5% of the total. The expenditure increased by more than 60% compared to 2016, as well as 2017 when the additional green WPB is not considered.

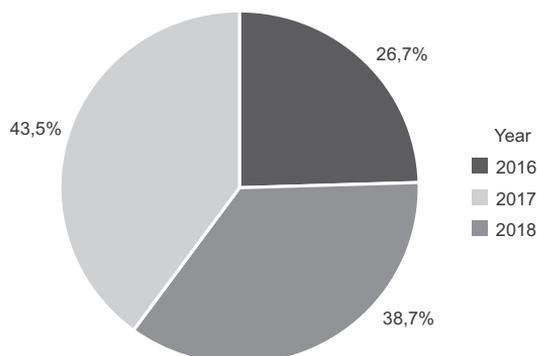


Fig. 5. Share of the WPB budget allocated to 1 and 2 group projects

Source: authors' own elaboration based on <https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski> (date of access 10.05.2019).

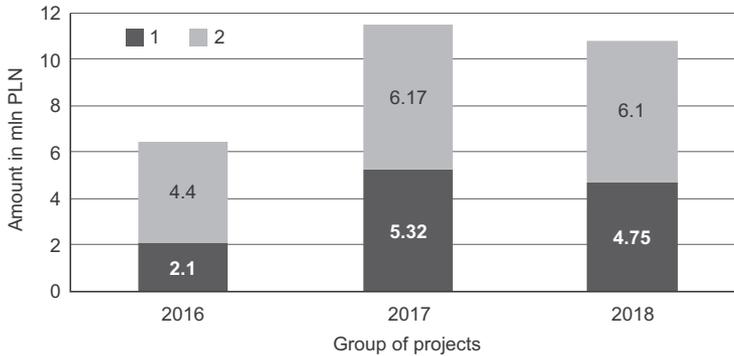


Fig. 6. Group 1 and 2 budget within 2016-2018

Source: authors' own elaboration based on <https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski> (date of access 10.05.2019).

Conclusions

The participatory budget is a way to increase public involvement of the decision process concerning the directions of urban development. Despite the fact that the participatory budget does not exceed 1% of the total budget, inhabitants can have a visible influence on shaping public space. It is especially important in an age of climate change – rising temperatures, heat waves as well as sudden heavy rainfall. A promising solution for the negative consequences of these phenomena is development of green spaces which contribute to raising the natural capital of the city and thus support adaptation processes, increasing urban resilience.

According to the research, only 12% share in all the analyzed projects within 2016-2018 contribute fully to strengthening the natural capital and increasing the city's resilience to climate change (Group 1). Their value more than doubled from 8.6% in 2016 to 19.0% in 2018. Taking into account projects from Group 1 and Group 2 (in which projects related to the analyzed issues are implemented as a part of other investments), their value increased from 26.7% (2016) to over 43% (2018). In relation to the results from 2014 (Solecka, Dworniczak, 2016) there is a visible positive change from 8 projects in 2014 to 35 projects in 2018 in the category of "green space/recreation".

Among the discussed groups of projects, a significant impact, in terms of benefits for the natural capital and adaptation to climate change, was made by the planting greenery projects, especially trees and shrubs planting, as well as the creation of green and blue infrastructure (e.g., parks, green courtyards, squares, pocket parks). These activities contribute to the quality of biologically active surfaces, increasing water retention, regulating temperature and humidity in their vicinity, and protecting biodiversity (Gómez-Baggethun, Barton, 2013). This is particularly important in the context of climate threats indicated in the Adaptation Plan and also in line with the city's policy, placing more emphasis on the development of green areas.

Considering the above, it seems to be necessary to establish criteria for assessing projects for WPB not only in terms of their compatibility with the city's policies and documents, but also in terms of contribution to the development of urban climate resilience. For example, one of the criteria could concern aspects related to rainwater retention at the place of precipitation. This would contribute to the reduction of sealed surfaces used in the city, among others, in the construction of bicycle paths, parking spaces, playgrounds, etc. and strengthens the natural capital and urban climate resilience, even as a side-effect of achieving other aims. Among other actions, the creation of such assessment criteria can also have an educational dimension to support public awareness and the importance of the natural capital and climate resilience. A further step in research can be an analysis and assessment of monetary benefits of the projects, as valuation of ecosystem services may be useful in developing policy as well as project assessment indicators.

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