


Article

The Naturalness of the Vistula Riverbank's Landscape: Warsaw Inhabitants' Perceptions

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Abstract: This paper considers the issue of urban inhabitants' appreciation of the naturalness of the landscape provided that people living in urban areas can benefit from the green space and would like to care more about its protection. This study examines: (1) Warsaw inhabitants' preferences with regard to places to spend free time outdoors; (2) public perception of the advantages and disadvantages of the semi-natural Vistula riverfront; and (3) people's connectedness to nature and willingness to donate funds to modernize the riverfront ($N = 630$). We applied a questionnaire method based on the computer-assisted web interview. The findings suggest that Warsaw residents appreciate the naturalness of the landscape at the Vistula riverfront, would not like to take direct responsibility for its condition, and would rather the municipality invest in public spaces. Therefore, the municipality of Warsaw should work to enhance inhabitants' attachment to the place and build a sense of common responsibility for the protection of the riverfront's natural environment.

Keywords: naturalness of landscapes; perceptions of landscapes; care for landscapes

1. Introduction

The definition of landscape, adopted in 2012 by the European Landscape Convention (ELC), puts emphasis on the perceptual dimension. Different components of the landscape influence its perception: natural qualities (geology, land form, air and climate, soils, flora and fauna), cultural/social factors (land use, settlement, enclosure), and perceptual and aesthetic factors (memories, associations, preferences, touch/feel, smells, sounds, form, pattern, texture, color). Therefore, environmental perception is not an immediate process [1–3]. According to Bell, perception refers to “the activity carried out by the brain by which we interpret what the senses receive. It is not merely a factual reporting, but tends to be referenced to associations and expectations already in the mind of the beholder” [4].

Testing the knowledge of urban population could contribute to the discussion on the population's awareness of the value of the naturalness of the landscape, and identify further action to be taken to stimulate inhabitants to become closely attached to the landscape and not take its current quality for granted. The Vistula River has been selected as the study area. It is located in Warsaw, the capital of Poland. This article is divided into two main parts (Sections 1 and 2). The first part covers theories of the naturalness of landscapes and perceptions of landscapes, and provides a description of the case study. The second part (Sections 3–7) presents the results of the questionnaire survey that aimed to identify Warsaw inhabitants' perceptions of the Vistula riverside.

2. Theory

2.1. Naturalness of the Landscape

Although it may seem that the idea of naturalness has been abandoned in modern academic discourse [5], the concept is still present in contemporary scientific publications, but is more often used to refer to new rather than old problems. For years, it has served as a tool to describe changes in the natural environment and has been used in spatial planning for nature conservation strategies. In general, naturalness describes how close a landscape is perceived to be to its natural state. It has been used as a conservation value and as a descriptor of the state of a landscape [6–8]. The concept's definition is based on the type of vegetation and its structure, including invasive species and landscape integrity [9,10]. The concept of a natural landscape (understood as a geological landform [11] that has only been slightly transformed by humans and is not an urban or industrial site [12,13], a native, natural, or cultural landscape [14], or a landscape that is not used or is used to some extent economically [15–17]) is not the same as the concept of the naturalness of a landscape [18], which may be determined by various criteria that broaden the conceptual scope of a natural landscape [19–21]. Naturalness can be characterized not only by landscapes that remain unaffected by humans, but also by transformed ones on which restoration processes have been carried out. The majority of classifications of landscape naturalness found in the literature are related to the degree of anthropogenic transformation of the landscape (anthropogenization), and distinguish among devastated, cultural, natural, and primeval landscapes [22]. Therefore, naturalness is one of the factors that influence the value of the landscape [23] and determines the optimal natural landscape protection strategy [24–26]. Researchers differ in the criteria [27–30] that they use to measure naturalness (dividing it into the categories: Urban landscape, city park, commercial forest, or natural forest [31] based on certain levels of transformation [32], the share of natural, semi-natural, and synanthropic plant communities [33], an indicator of the wildness of the landscape [34], the time of human interference [31], or the cultural features that coexist in the landscape [35]). Moreover, the common denominator of the aforementioned theories is that naturalness may be a feature of the cultural landscape (i.e., a landscape transformed by humans as a result of the development of a civilization, such as in the case of the Vistula riverside in Warsaw).

The shift in the usage of the naturalness concept in academic discourse is a result of the increased occurrence of the term in social science. Recently, it was discussed in the context of perceptions of a landscape (conscious and unconscious perceptions with all of the senses [36,37]) and restorativeness [38,39]. Even if the study concerns vegetation, it will refer to the perception of naturalness [40]. Many studies analyze the positive relationship between perceived naturalness [41,42] and aesthetic appreciation or perceived restorativeness [43]. The perception of landscape, wilderness, involves an aesthetic view, often visual appreciation, which is critical in making judgements about the landscape quality. Scenery assessment is the result of the complex interactions among an environment, a landscape, wilderness, and nature, and the scale at which these elements appear is important to our understanding of landscape appreciation [44].

2.2. Perception of the Landscape

There are a few theories of landscape perception. One is Appleton's prospect-refuge theory, which proposes that human beings experience pleasure and satisfaction in landscapes that respond to their biological needs [45]. Berlyne's arousal theory of environmental perception is linked to the amount of conflict or uncertainty in the environment [46]. In the information processing theory of Kaplan and Kaplan [47], information is the central concept and humans gather information from their environment through their senses, of which the visual sense is predominant. The biophilia hypothesis of Wilson proclaims that human beings have an inherent need for a connection with their natural environment and the other forms of life within it [48]. Gibson's Theory of Affordances uses the term 'affordance' to refer to a possible action that the properties of an object suggest to an observer. Tuan's concept of topophilia [49] focuses on the cultural dimension of landscape preferences. Through the repeated

occurrence of ordinary events, one can develop strong sentiments about a place, which is termed topophilia. Thus, this theory focuses on the historical factor of landscape perceptions.

In general, green environments, especially natural landscapes or landscapes with features of naturalness, are perceived to be beneficial to people. Positive affective responses can have physical effects, as they stimulate physical activity [50], and effects on psychological functioning that are related to relaxation and blocking negative thoughts and moods. These affective responses can induce changes in physical and psychological states in stressed individuals, and keep emotional resources in an optimal state in non-stressed people [51,52].

Stress-induced illnesses have become a global public health concern. According to the World Health Organization (WHO), mental health disorders [53] and cardiovascular diseases, which can be associated with obesity [54], are expected to be the two major contributors to illnesses in all parts of the world by the year 2020. It has been found that many mental disorders, including schizophrenia, anxiety syndrome, depression, exhaustion syndrome, and fatigue syndromes [55], are strongly associated with prolonged stress reactions [56].

Researchers studying the relation between perceived sensory dimensions of urban green space and stress restoration have observed that people, in general, prefer certain landscape sceneries (sensory dimensions: Serene, Space, Nature, Rich in Species, Refuge, Culture, Prospect, and Social). Refuge and Nature were found to be the most strongly correlated with stress, indicating a need to find the most restorative environments [57]. Simply viewing a landscape can have an impact on human health and mood [58]. The other frequently mentioned advantages of interaction with nature include a reduction in blood pressure and cortisol level [59–61], and a decrease in the prevalence of allergies and other chronic inflammatory diseases in children [62]. The literature on environmental preferences and restoration is also guided by the Stress Recovery Theory (SRT) of Ulrich [63,64] and the Attention Restoration Theory (ART) of Kaplan and Kaplan [47,65]. Multiple studies have found that besides actual green and nature images, colors can influence emotions and feelings [66,67]. For example, red, yellow, green, blue, and purple are associated with positive emotional responses [68].

2.3. The Aims of the Study and the Hypotheses

This study aims at determining (1) Warsaw inhabitants' preferences with regard to places to spend free time outdoors; (2) public perception of the advantages and disadvantages of the semi-natural Vistula riverside; and (3) people's connectedness to nature and willingness to donate funds to modernize the riverside (N = 630). The following hypotheses were studied: (1) The naturalness of the landscape of the Vistula River in Warsaw is important to the city's residents; (2) the inhabitants of Warsaw prefer the naturalness of the landscape of the right riverbank to the strongly urbanized left riverbank; (3) Warsaw residents are able to identify positive and negative aspects of the development of the Vistula River's embankment and they are aware of the value of the green Vistula riverside; (4) the green riverside is so valuable to the city's residents that they feel attached to this area, want to take care of it, and want to directly contribute to the improvement of the area's quality.

3. Methodology

Computer-assisted web interviewing (CAWI) has been chosen to conduct a survey as, according to Mazurek-Łopacińska [69], focused interviews better fit explanatory research. Poland has 85% total fixed Internet broadband coverage (28 million Internet users to 38.5 million inhabitants of Poland) [70,71]. Especially in Warsaw and bigger cities, Internet users represent the majority of the city population, which is legitimate for conducting Internet type of research in such urban areas as Warsaw. Moreover, it is a convenient method of communication with respondents, as they are free to choose the appropriate moment of completing the survey for themselves. Furthermore, the method used in the study enables the author to reach a wider spectrum of the Vistula riverfront users and include people who rarely or never come to visit the Vistula river area.

3.1. The Questionnaire Survey

The majority of the questions were developed by the author of the paper. Some questions were taken from such studies as “Festiwal przemiany/Festival of change” (2011) and “Urządźmy plażę/Let’s set up a beach” (2015), and then modified to obtain the perceptions and opinions of Warsaw inhabitants in general rather than only those of the Vistula riverside visitors. The content and structure of the survey were reviewed and evaluated by a panel of experts (i.e., the expert judgment approach) from a licensed research company (Combine [72]). No pilot study was conducted, as the questions did not require any specific knowledge.

3.2. Research Method and Research Tool

The conducted survey included a target group of 630 residents of Warsaw (see Section 3.3 Research Sample for details) who were selected by district of residence in equal groups (quota distribution), including people who do not visit the Vistula River (residents of all 18 districts, aged 15–65, with varied personal, material, professional, and demographic profiles). The survey included questions on the perceptions of the Vistula River, frequency of visits to the Vistula River, ideas for developing favorite places on the Vistula River, and willingness to donate money for riverside modernization. The study was carried out using the CAWI method by mailing the surveys to the nationwide B2B (business-to-business) panel [73]. The average time taken to complete the survey was approximately 10 minutes. The survey was conducted between June 2015 and July 2015. Before the analysis, the data were carefully checked for correctness and logical consistency. Data collection took place thanks to Combine, a company that specializes in social research. The analysis and interpretation of the results were carried out by the author herself.

To conduct the research, the nationwide research panel “Ariadna” was chosen. Participation in the “Ariadna” research panel [74] provides respondents with the opportunity to take part in competitions in which participants are awarded points that can be exchanged for prizes. Participation in this research panel is free and completely voluntary. The panel complies with the law in force in Poland, in particular regarding the protection of personal data of respondents, in accordance with the Act of 29 August 1997 on the protection of personal data, in accordance with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data, the free flow of such data, and the provision of electronic services, and in accordance with the Act of 18 July 2002 on electronic services. The panel also respects, and in practice gives effect to, the ethical principles of market research and public opinion as defined in the International Code of Market and Social Research, which was developed jointly by the European Association of Public Opinion and Market Researchers, the European Society for Opinion and Marketing Research (ESOMAR), and the International Chamber of Commerce (ICC). The panel also adheres to the Researchers Quality Control Program (PKJPA), which was developed and implemented in the Polish market by “Rynek” public opinion research organization and adopted by Polish polling organizations.

At each stage of the research, the provisions of the following documents were observed: The Protection of Personal Data Act (Journal of Laws of 2002 No. 101, item 926, as amended) and the Regulation of the Minister of Interior and Administration regarding documentation processing of personal data and technical and organizational conditions which should be met by devices and IT systems used to process personal data (Journal of Laws of 2004 No. 100, item 1024). A quota sample that was based on rates from the statistical data of the Central Statistical Office in Warsaw was adopted for the study. It was a quasi-representative sample of the entire surveyed population of Warsaw inhabitants, although the units included in it were not selected randomly and comprise only people that use the internet and are registered in Ariadna’s database. However, the criterion of an even number of people from each district was satisfied.

3.3. Research Sample

A sample of 630 respondents in Warsaw was determined. The determination of the sample size depended on the gender, age, and Warsaw population size. Another important factor that also influenced sample size was the district representativeness. Each district was represented by no less than 35 people, which guaranteed the possibility of between-group comparisons [72]. The group of 630 people was from the total population in all 18 districts (Figure 1) aged 15 and over. The age group of 15–18 years old was included because on-site observations of the study area showed that a large number of young people visit the Vistula riverbanks.

There were over 3000 invitations to take part in this survey sent to the Internet users located in Warsaw and registered in the Ariadna panel. More than 30% of them responded positively and filled in the form. About 5–10% of completed surveys were rejected due to the lack of coherence in the answers or too rapid completion of the questionnaire, etc. [72,74]. The responses were divided into disjoint sub-groups by district. Then, the researcher selected responses from each subgroup in appropriate proportion. This ensured that the opinions of the residents from each district would be taken into account. A licensed research company obtained the results using SPSS, R statistical software, and MS Office packages and checked the validity of the completed surveys.



Figure 1. A map of Warsaw divided into 18 districts. Source: Warsaw Municipality data processed by the author.

The respondent gender distribution (Table 1) indicates a slightly higher percentage of female respondents (54.3%, a common situation in urban agglomerations). Age of the respondents is one of the most important characteristics in understanding their views about the particular problems; by and large age indicates level of maturity of individuals in that sense age becomes more important to examine the response. Most people were aged between 26 and 35 years (27%), whereas 56 and 65 years (11%) made up the smallest age group (Table 1).

The majority (58%) of the respondents were at the higher education level (Table 2). In terms of material status, half of the study population (50.6%) reported they live comfortably on a day-to-day basis, but have to save for more serious purchases (Table 2). In terms of household size, the smallest group included the respondents who declared their status as 1 + more (5%), and the largest group of the respondents consisted of two adults with no kids (22% each) (Table 3).

Table 1. The gender and age of the respondents.

District	All	Female	Male	Up to 25 Years	26–34	35–44	45–54	55+
	630	342	288	118	170	135	139	68
Bemowo	5.6%	5.8%	5.3%	6.9%	6.9%	4.0%	5.8%	2.6%
Białołęka	5.6%	6.8%	4.0%	5.7%	6.1%	5.9%	3.1%	8.1%
Bielany	5.6%	5.1%	6.1%	7.1%	3.4%	5.6%	6.6%	6.1%
Mokotów	5.6%	5.0%	6.2%	7.8%	4.7%	5.9%	4.4%	5.4%
Ochota	5.6%	7.3%	3.5%	6.4%	2.9%	7.4%	6.3%	5.5%
Praga—Południe	5.6%	5.8%	5.3%	3.1%	6.5%	4.1%	8.3%	4.7%
Praga—Północ	5.6%	4.4%	6.9%	7.4%	3.7%	8.4%	2.7%	7.3%
Rembertów	5.6%	6.0%	5.1%	7.4%	1.7%	4.3%	8.4%	8.5%
Śródmieście	5.6%	6.4%	4.6%	7.3%	5.0%	2.3%	7.2%	6.8%
Targówek	5.6%	6.3%	4.7%	4.0%	7.2%	6.9%	4.6%	3.4%
Ursus	5.6%	4.1%	7.3%	3.0%	6.2%	6.1%	7.5%	3.4%
Ursynów	5.6%	5.5%	5.6%	3.1%	6.9%	6.5%	6.3%	3.2%
Wawer	5.6%	5.9%	5.1%	6.3%	5.4%	4.1%	7.9%	2.7%
Wesoła	5.6%	5.6%	5.5%	1.8%	5.6%	4.7%	4.6%	0.0%
Wilanów	5.6%	4.1%	7.3%	0.0%	8.2%	10.4%	0.0%	10.3%
Włochy	5.6%	5.8%	5.3%	1.9%	6.4%	6.5%	6.3%	6.4%
Wola	5.6%	5.7%	5.4%	4.9%	8.0%	4.3%	4.2%	5.7%
Żoliborz	5.6%	4.4%	6.9%	7.1%	4.9%	2.5%	6.0%	9.8%

Source: Processed by the author.

Table 2. Education and material status of the respondents.

District	All	High School	Higher Education	We Live Well, We Have Enough for Us without Special Savings	We Live Comfortably, We Have Enough for Us Each Day, but We Have to Save for More Serious Purchases	We Live Modestly, We Have to Manage Our Money Very Carefully on a Daily Basis
Bemowo	630	267	363	177	319	90
Białołęka	5.6%	5.4%	5.7%	5.6%	5.9%	6.0%
Bielany	5.6%	6.2%	5.1%	5.2%	6.2%	5.4%
Mokotów	5.6%	6.9%	4.6%	5.2%	5.5%	8.3%
Ochota	5.6%	5.5%	5.6%	6.9%	4.8%	5.4%
Praga—Południe	5.6%	7.5%	4.1%	4.2%	5.5%	8.3%
Praga—Północ	5.6%	3.8%	6.9%	4.2%	6.4%	5.1%
Rembertów	5.6%	8.4%	3.4%	5.7%	5.1%	5.5%
Śródmieście	5.6%	5.5%	5.6%	6.6%	4.6%	6.5%
Targówek	5.6%	5.8%	5.4%	4.8%	5.9%	3.5%
Ursus	5.6%	6.3%	5.0%	5.9%	4.9%	7.1%
Ursynów	5.6%	7.0%	4.5%	4.6%	5.1%	7.8%
Wawer	5.6%	4.1%	6.6%	7.0%	5.9%	1.6%
Wesoła	5.6%	4.8%	6.1%	6.2%	4.6%	6.1%
Wilanów	5.6%	7.1%	4.4%	7.2%	5.0%	3.5%
Włochy	5.6%	2.6%	7.7%	7.9%	6.6%	0.0%
Wola	5.6%	3.3%	7.2%	3.7%	5.5%	7.3%
Żoliborz	5.6%	5.5%	5.6%	3.3%	7.3%	3.2%
				5.7%	5.2%	9.2%

Source: Processed by the author.

Table 3. The number of people in the household of the respondents.

District	All	Single	DINKS	2 + 1	2 + more	1 + more	Other Situation
Bemowo	630	79	140	116	122	32	142
Białołęka	5.6%	0.0%	3.9%	5.4%	5.9%	8.4%	9.5%
Bielany	5.6%	6.3%	7.0%	5.8%	4.0%	3.8%	5.2%
Mokotów	5.6%	4.2%	5.4%	4.3%	4.8%	7.8%	7.6%
Ochota	5.6%	5.5%	7.5%	4.8%	4.5%	7.7%	4.8%
Praga—Południe	5.6%	6.4%	6.3%	6.4%	1.0%	15.6%	5.3%
Praga—Północ	5.6%	11.1%	5.3%	5.5%	4.5%	5.8%	3.6%
Rembertów	5.6%	3.2%	5.4%	4.3%	3.1%	11.7%	8.8%
Śródmieście	5.6%	7.4%	0.0%	15.0%	4.8%	0.0%	4.1%
Targówek	5.6%	13.9%	3.3%	1.3%	5.8%	7.3%	6.0%
Ursus	5.6%	1.5%	5.0%	7.0%	6.7%	7.3%	5.8%
Ursynów	5.6%	3.0%	6.7%	4.0%	6.7%	10.9%	4.9%
Wawer	5.6%	4.6%	5.7%	6.3%	9.0%	4.6%	2.6%
Wesoła	5.6%	7.0%	1.3%	7.9%	10.6%	0.0%	3.9%
Wilanów	5.6%	0.0%	4.6%	2.7%	7.8%	0.0%	11.2%
Włochy	5.6%	0.0%	5.0%	6.0%	11.5%	0.0%	4.9%
Wola	5.6%	13.9%	9.4%	3.8%	1.8%	0.0%	3.1%
Żoliborz	5.6%	9.9%	6.3%	5.0%	3.2%	9.1%	4.1%

Legend: DINKS, double income no kids. Source: Processed by the author.

4. The Case Study: Characteristics of the Vistula Riverbanks in Warsaw, Poland

The section of the Vistula River in Warsaw is 31 km in length. Nine of the 18 city districts are directly adjoined to the green riverbanks. Warsaw is inhabited by over 1.7 million people, which makes it the largest city in Poland. The capital of Poland is perceived as a place where its inhabitants are satisfied with their life and feel safe [75]. There are currently 81 parks in the capital and 225 green squares which cover the area of 1193 ha. This means that there is an average of 6.8 m² of park greenery per one inhabitant. Open green spaces in the capital cover about 20,000 ha, which is 114 m² per inhabitant. The Vistula riverside, including the right riverbank in Warsaw's downtown area, is an example of public recreational space with features of naturalness. The riverbanks located within the administrative boundaries of the city do not contain any urban structure (elements distinctive urban form/physical elements that define building form). In the monograph "Przestrzeń Warszawy"/"Space of Warsaw", Krzysztof Domaradzki analyzes the development of public spaces in the city over time and says that the city's identity and urban planning "indicates various functions of this area in a time context". Figure 2 shows changes in the width of the riverbed and natural succession of plants on the shallow right bank of the river [76].

**Figure 2.** Warsaw in 1950 and 2007 [77].

From the photographs in Figure 2, it follows that the alluvial forest communities along the Vistula River in Warsaw are not a relic of the past, but rather the effect of the transformation of this area over the last few decades.

The river acts as an air corridor along the entire length of its channel. The entire section—the Central Vistula Valley in Warsaw—is protected under the Natura 2000 network as a special bird protection site (The Birds Directive). This area is delimited by the Regulation of the Minister of the Environment, and described in detail in the materials available from the General Directorate for Environmental Protection. The riverbed and most of the right bank are covered by this form of protection.

Part of the left bank that is located in the city downtown is urbanized and built-up (Figure 3). The architectural components of the left bank provide riverside amenities in the form of a viewing platform, restaurants, bars, galleries and covered pergolas—all designed as pavilions. There are also new floating water tram stops and marinas for small pleasure boats and larger commercial cruisers. The river bank is currently cut off from the western part of the city by a busy highway—the old tunnels under the highway have been given a major facelift.



Figure 3. A view of Plyta Desantu. Source: Photo captured in June 2016 by the avialabs drone for the purposes of this work.

The right bank is characterized by naturalness of the landscape (Figure 4). The recently modernized boulevard stretches for about 8 km. Its construction began in the 1930s of the 20th century. The new version of the space is a showcase of the city. Although it is a linear public space, individual sections of the boulevard have been diversified in terms of functional program and form. The work is carried out in stages and the concepts for the space are competitively selected to ensure high quality projects.

On the right river bank, there are several designated mass recreation sites, such as Praska Beach, Poniakówka Beach, and Saska Beach with sun loungers, barbecues, and sports facilities. Places for group and individual forms of rest, such as walking and cycling paths, or reading and photography spots are scattered throughout the area. The variety of leisure activities makes it very difficult to define a single class of typology. On the negative side, visitors destroy the infrastructure and leave loads of rubbish either hidden in the sand or floating on the river's surface. On the left bank, there is a much wider range of commercial gastronomic establishments designated as places to stop and sit down. As the process of revitalization of the boulevards is underway, the small trees do not cast too much shade.



Figure 4. A view of the right riverbank. Source: Photo by M. Wojnowska-Heciak taken in June 2016 from the bridge.

4.1. The Naturalness of the Vistula River

The Vistula and the Loire rivers are the only semi-natural rivers in Europe. The level of naturalness of the Vistula embankment in Warsaw is high [78,79]. Seventy years ago, cyclic flow variability typical of the snow–rain regime [80] triggered a process of natural succession of the riparian forest community in the area of the former riverbed, which now functions as the waterfront. It is characterized by four strips of vegetation: Meadows, wicker shrubs, willow thickets, and riparian forest (Figure 4). It is the largest semi-natural public space in the city. The Vistula River is currently unregulated (except for several groins and fragmentary levees) as a result of a combination of historical events (i.e., the destruction of the city during World War II) [81] and lack of funds to invest in the riverfront. Recently, it has been observed that Warsaw’s inhabitants come to the riverfront more often. It seems that they now appreciate the landscape there and like to spend their free time at the river.

In the study entitled “The Vistula Natural Park”, a description can be found of the special qualities of that part of the downtown waterfront of the Vistula River in Warsaw that, together with the riverbed, belongs to the Natura 2000 site. “(...) Along the river in the city there are more valuable zones with Natura 2000 site priority species, i.e., in particular, the area at the Praga Port (Port Praski) between the Średnicowy bridge and the Świętokrzyski bridge (Figure 5) and, in particular, between the Świętokrzyski bridge and the entrance to the Praga port. There is a large number of old trees with cracked bark and quite significant amounts of dead wood there. In addition, this area is less penetrated due to its limited accessibility and it is a campsite of birds, especially corvidae species. A similar place can be found in the Saska Kępa neighbourhood in the area above the intakes of the Praga waterworks. The riverside wicker habitat is a nesting area of smaller birds, in particular perching birds” [78].

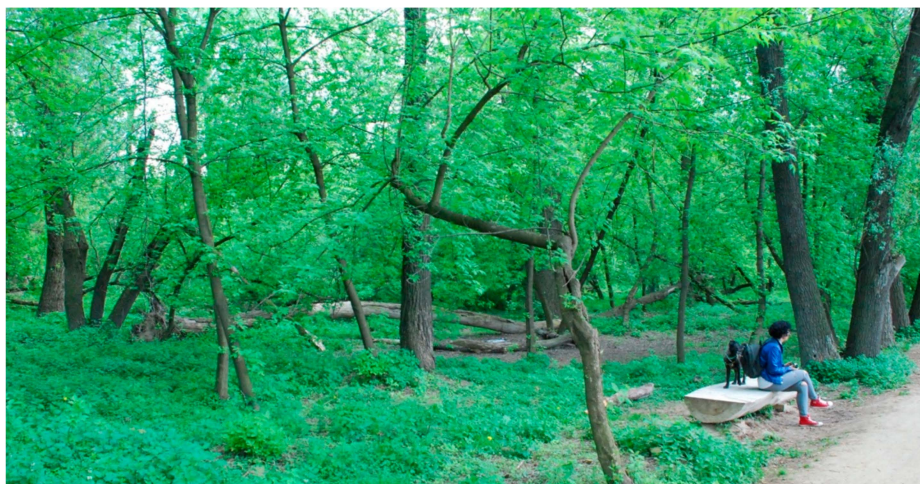


Figure 5. Biodiversity in the area between Praska Beach and the Praga Port. Source: Photo by M. Wojnowska-Heciak taken in June 2016.

4.2. Previous Surveys on the Case Study Area

In Warsaw, entities that are unrelated to each other have carried out a number of activities, consisting of informing Vistula riverbank users about the future of areas that lie adjacent to the river and stimulating their awareness of and interest in these areas. Several social opinion surveys have been carried out. To date, surveys on the development of the riverbank have taken place at the initiative of the following entities and individuals:

1. The Copernicus Science Center (CNK), with the study “Przemiany Festival/Festival of change”; the group of respondents included 202 people visiting the “Przemiany Festival”; period: 1–4 September 2011; subject: The central section of the Vistula River in Warsaw, between the Śląsko-Dąbrowski and Średnicowy (railway) bridges, along with the adjacent areas.
2. A plenipotentiary for the development of the Vistula River embankments as part of the “Urządźmy sobie plażę”/Let’s set up a beach” project; consultations were carried out as part of the LIFE + project; subject: Evaluation of the potential development of: (a) The beach at Kryniczna St. in Saska Kępa, and (b) the beach at the “Spojnia Warsaw” sports club in Żoliborz; period: 5–9 September 2013 (among the collected 111 votes, it was difficult to assess whether people repeated their votes, because the ballot boxes were placed at several locations: At the “Gray Brick” market in Saska Kępa on 17 August 2013, on the Saska Kępa beach, and in the Żoliborz alley of the Polish Army “Breakfast Market” on 17 and 18 August 2013. In addition, some people sent comments electronically).
3. Małgorzata Okołowicz, Ph.D. student at the Warsaw University of Life Sciences (SGGW). The group that was studied in detail included 62 people (part of the study consisted of observing their behavior); subject: Ways of spending time on the Vistula riverbanks and perceptions of the conditions of the area that is directly adjacent to the riverbank on the right (from the east side adjacent to Wybrzeże Helskie street and located between the Śląsko-Dąbrowski and Gdański bridges) and the riverbank on the left (downtown), a narrow strip located between the Świętokrzyski and Śląsko-Dąbrowski bridges (on the one hand limited by the river, and on the other by the Wisłostrada and Wybrzeże Gdańskie streets). Research on recreational use of riverside areas in Warsaw was carried out in the period from 4 April 2013 to 5 May 2013.
4. The Marketing Department of the Municipality of Warsaw, with the study “Warsaw Vistula through the eyes of its users”, which was performed by the pencil and paper interview (PAPI) method and evaluated the findings of 13 ethnographic walks (observations, ethnographic interview, participant observations) during July–September 2015 (on selected days of the week and hours: Wednesday from 07:00 to 09:00, Friday from 18:00 to 23:00, and Saturday/Sunday from

11:00 to 16:00). The observed group included 3232 people aged 15 and older who stayed at the Vistula River for recreational purposes (“Warsaw Vistula through the eyes of its users”, 2015).

5. Results

Biologically Vital Areas [82] in Warsaw with water, agricultural land, and forests cover 22,326 ha, which makes up almost half of the city’s area (42%). The distribution of green spaces is uneven. Forests, open areas, and complexes of natural vegetation are mainly found on the edge of the city—in the southern, south-eastern, northern, and north-western parts of Warsaw. The deployment of parks, squares, and green areas is closely related to the urbanization of the city, especially the development of multi-family buildings during the 1960s and 1970s. Natural green areas are primarily associated with the Vistula River. These are primarily water and riverbank communities with alluvial woodlands [77]. Therefore, in the light of the above, it is worth finding out whether the naturalness of the landscape (see Section 2.1 The Naturalness of the Landscape) of the Vistula River in Warsaw (see Section 4.1 The Naturalness of the Vistula River) is important to its residents, which is an interesting issue.

5.1. Warsaw Inhabitants’ Preferences with Regard to Places to Spend Free Time Outdoors

This section aims to study the preferences that Warsaw inhabitants hold in terms of spending their time outdoors, as well as the relations among the access to green space issue, the visit frequency, and the differences in usage of the public space at the riverfront. Evaluation of visit frequency will help to identify the most-liked and visitor-friendly places at the Vistula riverside. On this basis, it will be possible to infer about the site characteristics that make visitors come back.

The results of the survey show that the Vistula River is the second most preferred place to spend free time outdoors (28%), with the city park as the first choice. This data confirms the thesis that the waterfront is an important point on the city map (Figure 6). Considering the specificity of the place, the Vistula riverside definitely has more features of naturalness of the landscape than an average city park, mainly because the spontaneous plant growth (biodiversity) at the river is incomparable to the plant structure in the city park. However, the Vistula has a linear character and divides the city into two nearly equal parts with differing proximity to the river and ease of access, while district parks are more easily accessible.

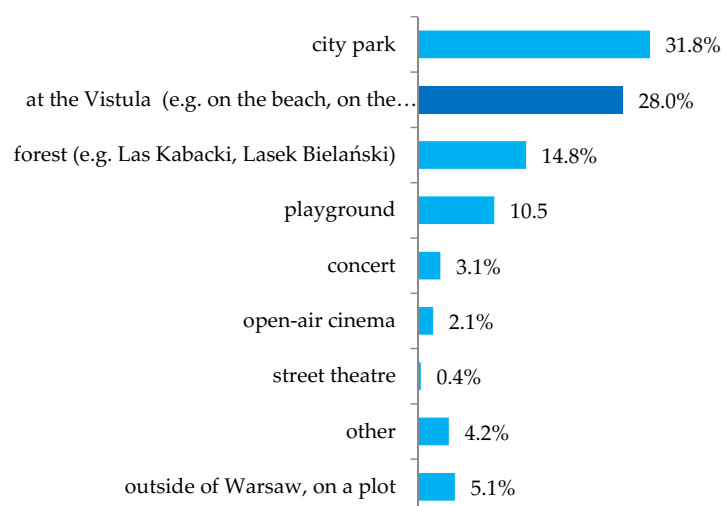


Figure 6. Places where residents usually spend their free time in the open air ($N = 630$). Source: Processed by the author.

The residents of Śródmieście, Wilanów, Wesoła, and Żoliborz—districts that are adjacent to the river (Figures 1 and 7)—usually choose to spend their free time outdoors at its banks. More than 70% of the respondents from these districts declared that they visited the Vistula River at least once

a month. The respondents from Włochy, Ursus, Wawer, Ursynów visited the Vistula River the least often. The scores show that transport accessibility and the distance from the river are relevant factors in the evaluation of preferences.

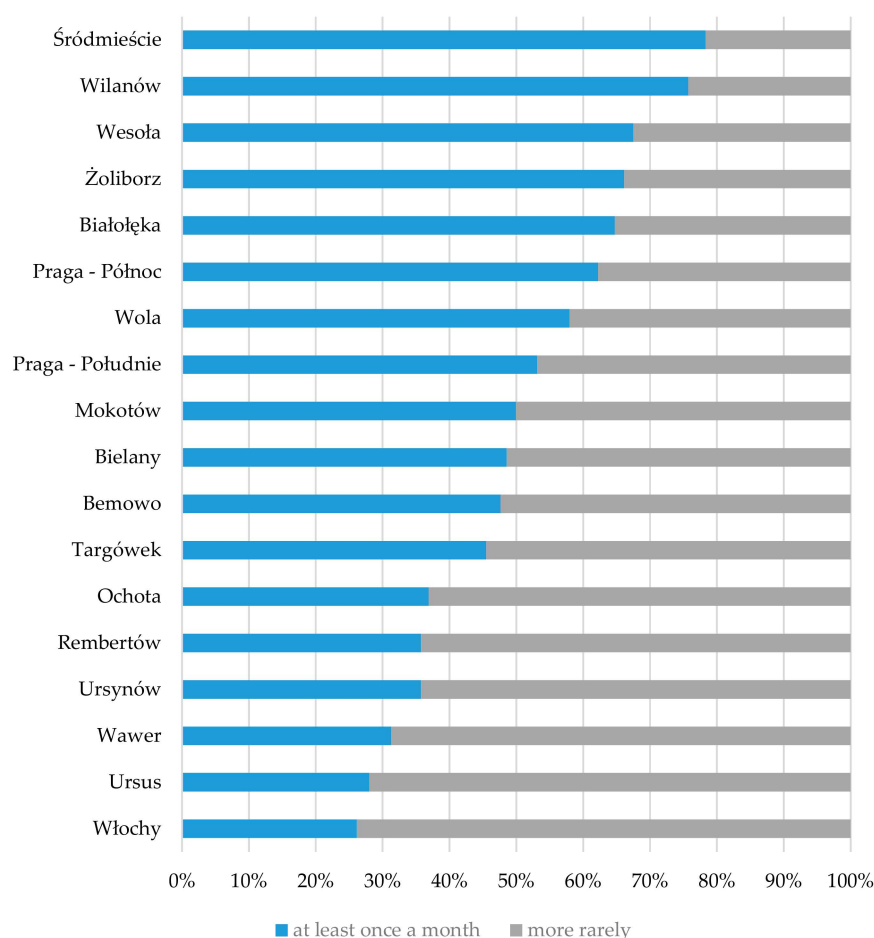


Figure 7. Frequency of visiting the Vistula River in Warsaw by district ($N = 35$). Source: Processed by the author.

Warsaw inhabitants were asked whether they spent their free time at the river in the previous month (July 2015) (Figure 8). The results marked in green show that 64.9% of all female and 69.1% of all male population replied positively. This indicates that more than half of the city population come to the river at least once a month. Their educational background indicates almost no differences; more discrepancies are visible among responses to whether they live near the river (72.2%) or further away (61.5%, still a high rate).

Regarding the frequency of visits in the previous month (July 2015), women indicated that they visited both banks of the Vistula River, whereas men indicated that they visited the left bank more often (the more urbanized riverbank). Respondents with secondary school education more often chose to visit the right bank, and the respondents who had postgraduate education more often chose to visit the left riverbank. Residents of districts adjacent to the Vistula River chose the left bank to spend their free time, whereas the inhabitants of distant districts more often visited the right bank or both riverbanks (Figure 8). Their preferences did not indicate any attachment to a specific place.

In terms of material status (Figure 9), the answers to the same question show that wealthy people spend time at the riverfront more often (more than 80%) than those who declare that they live poorly (31.2%). The wealthiest people choose the left riverbank more often (46.2%). This result is probably related to the commercial establishments in the area. There are not many places to camp here. The place

has the character of an elegant boulevard. Everything is exposed; there is nowhere to hide with a bottle of beer, and there are long distances between facilities. Of the poorest people, 68.8% state that they do not visit the Vistula riverbanks (the line in red). Here, the relationship between spending free time in at the riverfront and the material status is visible: The majority are the people who can afford it.

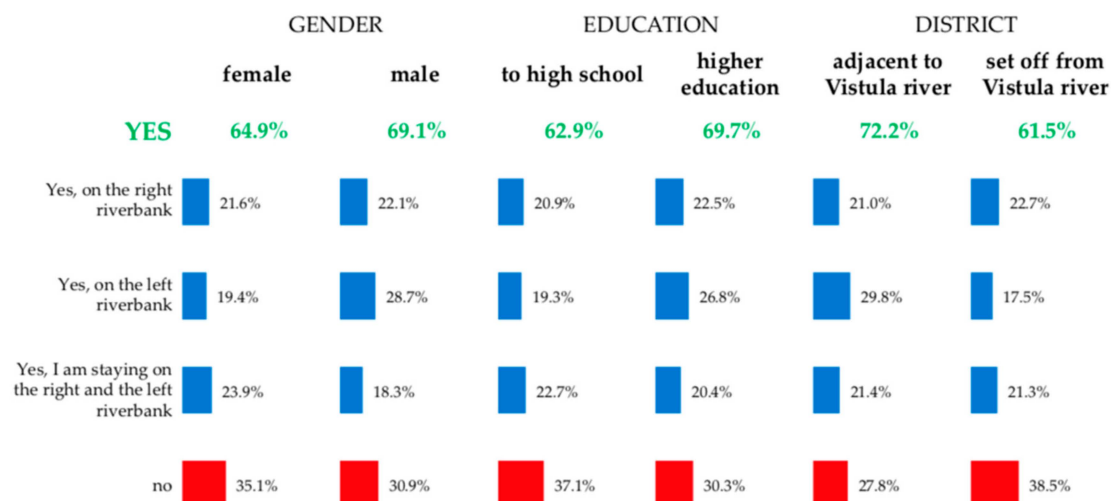


Figure 8. Frequency of visiting the Vistula River in Warsaw ($N = 342/288/267/363/315/315$). Source: Processed by the author.

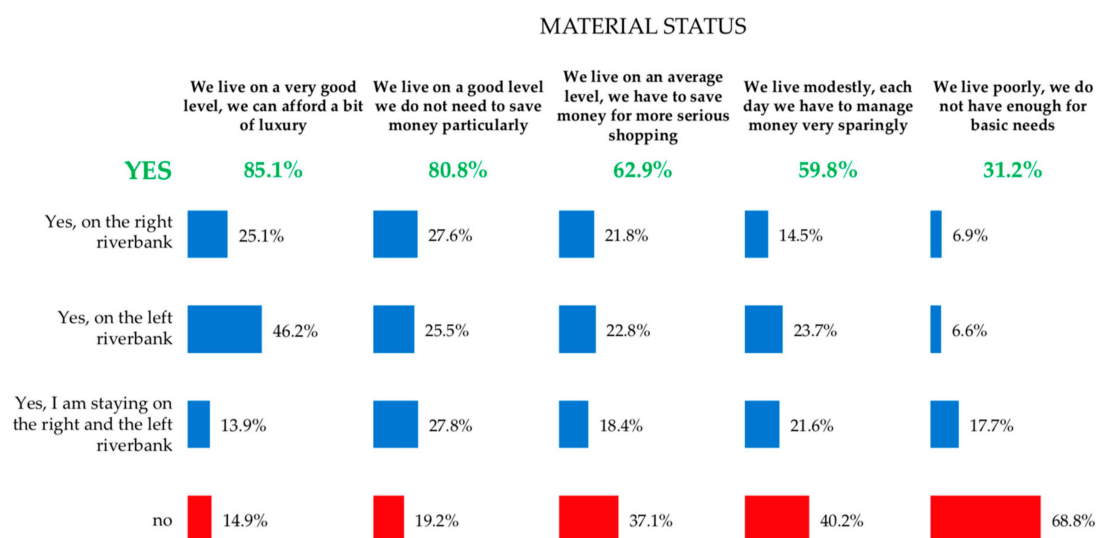


Figure 9. Frequency of visiting the Vistula River in Warsaw ($N = 18/177/319/90/26$). Source: Processed by the author.

The study results allowed building up a picture of the functional leisure space of the Vistula River in Warsaw that is defined as the preferred rest space (Figure 10). The obtained results allow us to make an urban inventory of green areas, which distinguishes areas covered with vegetation from those that additionally perform a leisure function (generally perceived as such). As demonstrated above, not all green spaces are "outdoor" leisure areas.

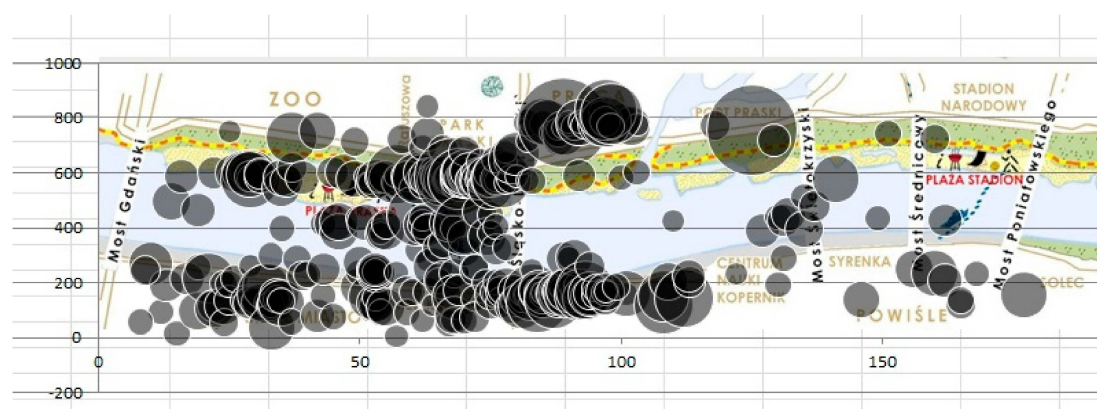


Figure 10. A map showing Warsaw residents' favorite places on the Vistula River ($N = 630$). Legend: The bigger the black circle ●, the higher the number of people who indicated the place as being the one that they visited the most often. The higher the number of circles in the area, the higher the number of people who indicated the area as being the one that they most often visited. Source: Processed by the Combine Company for the purpose of this study.

The places on the Vistula River that are most often visited by the respondents are located near the Śląsko-Dąbrowski bridge on both sides of the river. The left bank has concrete boulevards with bars and cafes dotted here and there, while the right side of the river remains mainly wild, providing a unique contrast between the two sides. The most-visited beach on the semi-wild right riverbank is Praska beach. On the left urbanized riverfront, the most-visited are newly modernized boulevards just opposite Praska beach. The choice of places is likely to be dictated primarily by the accessibility of transport. Most often, the inhabitants of Warsaw reach the Vistula River by tram or car (Figure 11). The accessibility of the riverbanks is limited for metro users. The percentage of cyclists is also low.

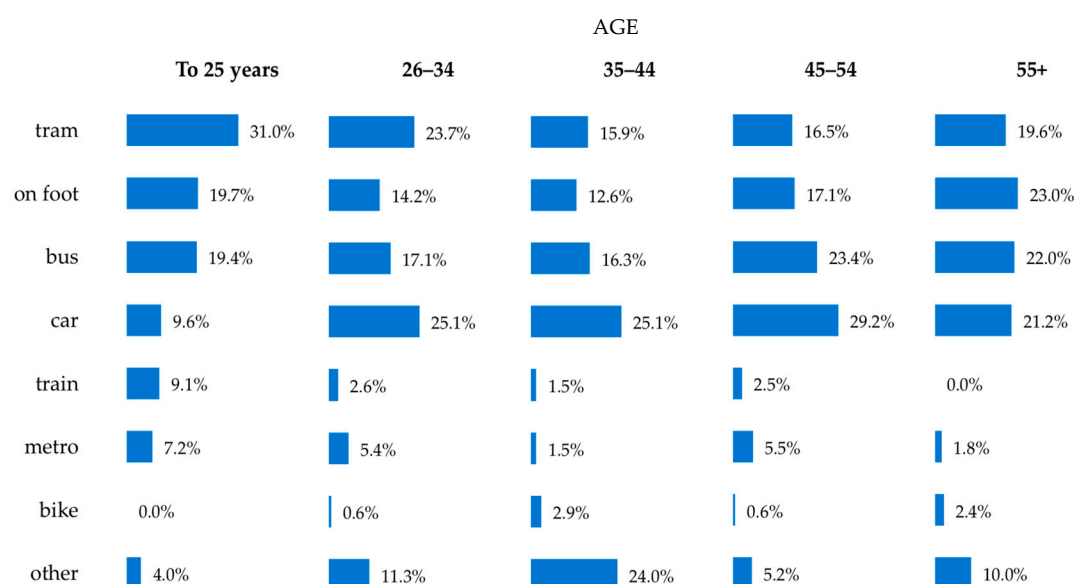


Figure 11. A figure showing the means of transport that respondents used to reach the Vistula riverbanks ($N = 630$). Source: Processed by the author.

The lack of a significant difference in the number of visitors on both banks is baffling, considering that respondents find beaches as the most attractive spots (Figure 12). Across all age groups, most people indicated that beaches were their favorite place to be on the Vistula River. This result may be related to the need to relax in the midst of nature by the river but still in the city. The clubs and bars located on

both banks were their second choice. The need for both natural and typically urban entertainment is also evident from the scores obtained. In the context of the good of nature on the Vistula, if the infrastructure on the right bank continued to expand, the riparian communities would be completely transformed into another form of landscape. It is worth noting that only 2.3–7.4% of the respondents indicated that bicycle paths were their favorite place to be on the Vistula River (Figure 12).

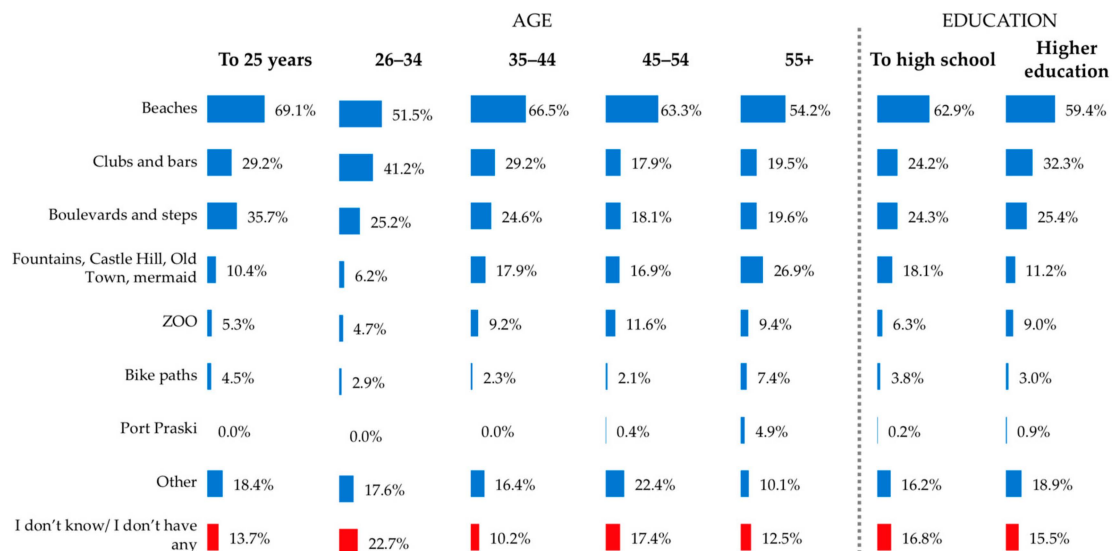


Figure 12. Favorite places on the Vistula River in Warsaw ($N = 118/170/135/139/68/267/363$). Source: Processed by the author.

5.2. Public Perception of the Advantages and Disadvantages of the Semi-Natural Vistula Riverfront

The river embankment is the city's largest green recreational space, and as such, can be expected to affect the perception of space. In this section, the connotations of the riverbank and whether inhabitants of Warsaw prefer the naturalness of the landscape of the right riverbank to the strongly urbanized left riverbank are examined.

The results show that positive associations (Figure 13) with the Vistula (the landscape naturalness features such as beach, sun, sand, and swimming (39.9%)) intertwined with negative ones (dirt, mess, and stench (26.1%)). Many respondents associated boulevards and sets of steps (17.2%) and nature, thickets, or a wild bank (11.8%) with the Vistula River. These neutral and pleasant connotations refer to activities that are related to recreation and leisure. It is worth noting that disturbingly high percentages were obtained for negative connotations.

People receive stimuli from the environment, and individual elements in the space affect its overall reception (see Section 2.2 Perception of the Landscape). Therefore, questions were constructed in order to determine what Warsaw's residents consider to be positive and negative aspects of the development of the Vistula River embankment in Warsaw, and whether they are aware of the value of the green Vistula riverfront. The scores indicate that the elements greenery, wildlife, proximity to the river, beaches, and sand of the naturalness of the landscape are the most highly valued (Figure 14).

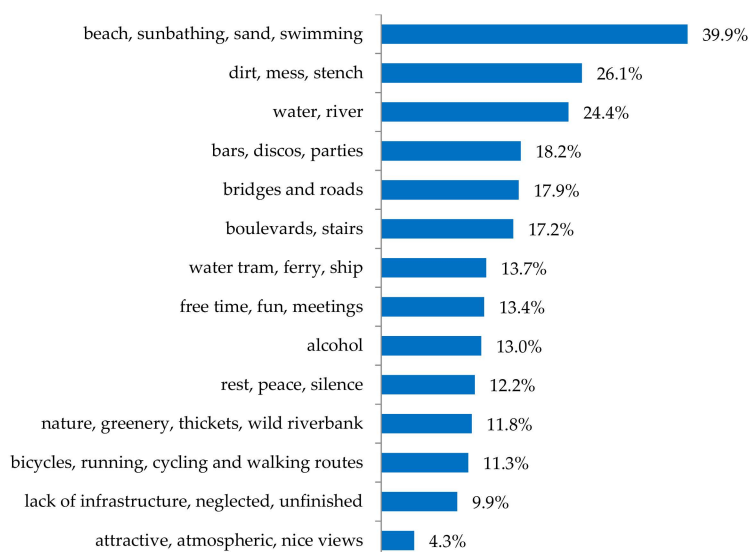


Figure 13. Concepts that Warsaw inhabitants associate with the Vistula River ($N = 630$). Source: Processed by the author.

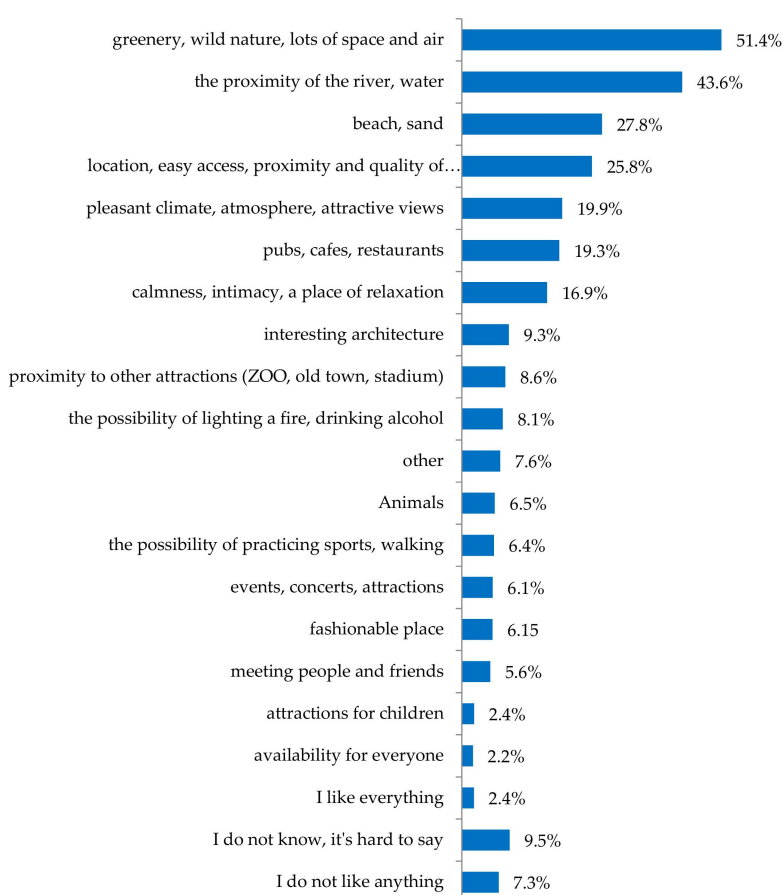


Figure 14. The elements of the Vistula River's right bank that respondents found to be the most attractive ($N = 630$). Source: Processed by the author.

The respondents dislike dirt, neglect, noise, and lack of sufficient infrastructure (Figure 15). Other weak points of the development of the Vistula River's right bank include: Crowds of people, smoke from fires, people drinking alcohol, loud behavior and dogs, the lack of a swimming pool, a beach,

or playgrounds, insufficient infrastructure (benches, litter bins, toilets, and lighting), poor access, the lack of parking, the lack of sidewalks, neglected greenery, the proximity to the road, bars, restaurants, and shops, the lack of security, the insufficient police presence, and the lack of public events and other attractions.

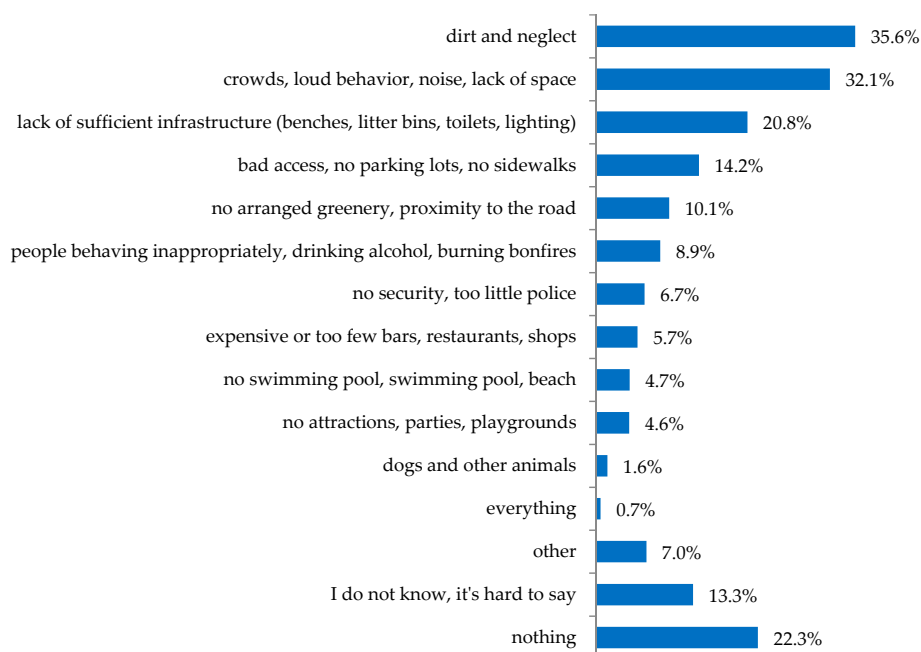


Figure 15. Negative elements of the Vistula River's right bank ($N = 630$). Source: Processed by the author.

Environmental protection can have a positive impact on economic growth, human well-being, quality of life of future generations, and nature's inherent value. The biggest threats to the conservation of biodiversity are a lack of awareness of conservation issues among users of natural resources, a lack of awareness of the value of limited natural resources, and excessive economic pressure. Therefore, the respondents were asked about whether they knew that the Vistula River in Warsaw is a unique example of an unregulated river flowing through a strongly urbanized area in Europe. Figure 16 presents the respondents' answers. The results indicate that the closer a particular district is to the river, the higher is the number of people who know about the value of the nature there (Figure 16).

Warsaw residents who are aged over 55 years demonstrate the greatest awareness (Figure 17) of the value of the Vistula riverbank (71.3%). The older people are, the more they appreciate the naturalness of the landscape and know about it. Nature appreciation among more mature people can result from the need for regeneration after stressful life in the city.

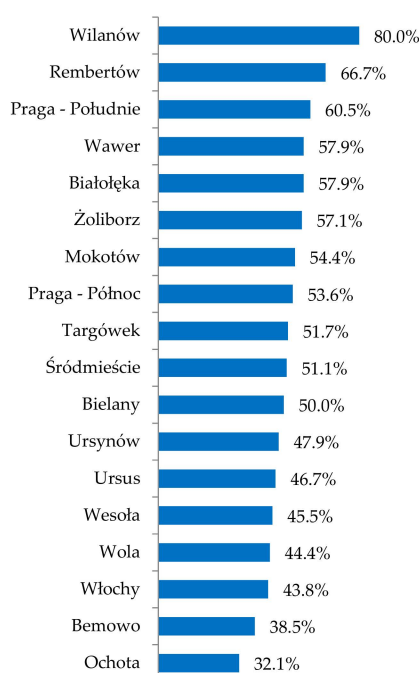


Figure 16. A chart illustrating the respondents' knowledge of the value of the riverbank and the river itself in Warsaw for each district ($N = 35$). Source: Processed by the author.

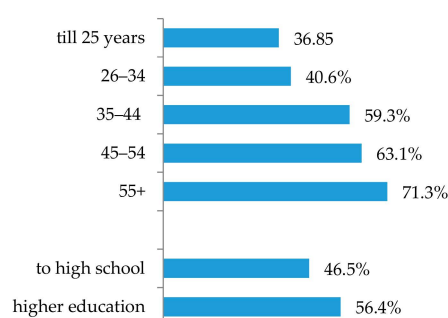


Figure 17. The percentage of respondents who are aware of the value of the Vistula River by age group ($N = 118/170/135/139/68$, $N = 267/363$). Source: Processed by the author.

5.3. Connectedness to Nature and Willingness to Donate Funds to Modernize the Riverfront

The perception of the Vistula riverbanks makes the residents identify with the place, treat it as their own place or their own property, and engage in taking care of the place. The questions below were asked to determine whether the green riverfront is a valuable area to the city's residents, whether they feel attached to it, want to take care of it, and would directly contribute to its improvement. The recognition of the need for change and the willingness to financially support hypothetical actions to modernize the infrastructure differ across respondents. Most residents (67%, $N = 630$) would not allocate any amount of money a year to invest in the revitalization of public spaces on the Vistula River right bank (Figure 18).

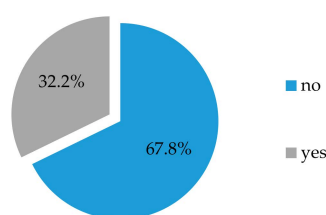


Figure 18. Would you agree to spend a certain amount of money a year to invest in public spaces on the Vistula River's right bank? ($N = 630$). Source: Processed by the author.

Despite the general trend of increasing ecological awareness and despite the need to improve the quality of public space at the riverfront (Figure 15), economic standing of the residents does not allow them to place other values over the satisfaction of their own needs. It has a special dimension in the city where the struggle for funds to ensure survival is taking place every day. The respondents who expressed the will to provide support were often those who reside in nearby areas. The inhabitants of Wesoła, Wawer, and Wilanów are most involved in the modernization of the infrastructure on the Vistula River; that is, those spending quite a lot of time on the Vistula River are most involved in its modernization, and those visiting least often are least involved in its modernization. People who do not, or rarely, visit the Vistula River do not show any interest (Figures 7 and 19).

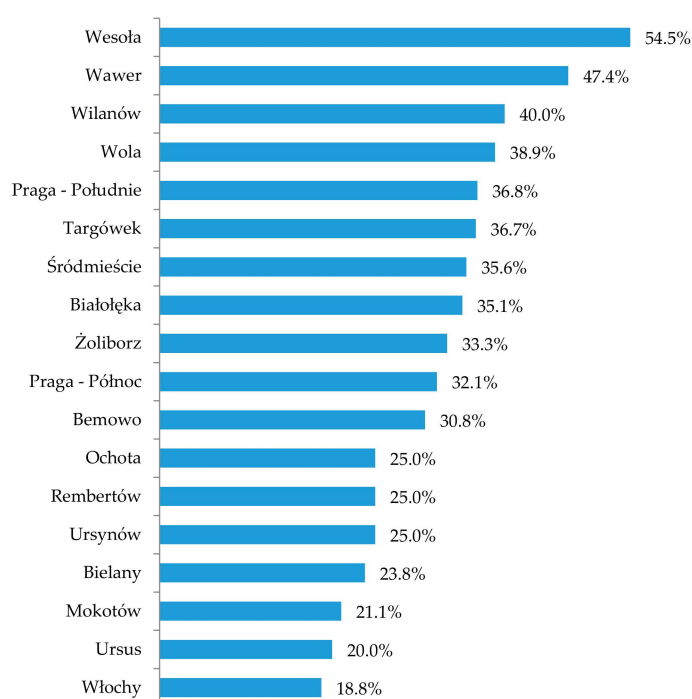


Figure 19. Would you agree to spend a certain amount of money a year to invest in public spaces on the Vistula River's right bank? "YES" answers for each district ($N = 35$). Source: Processed by the author.

The amount that respondents declared they would be willing to donate to a hypothetical development fund for the Vistula riverfront was between 0 and 5 euros in the majority of cases (Figure 20). This result indicates that the conservation of nature and improvement of the quality of the infrastructure do not seem to be priorities for the respondents, or that they would prefer the city municipality to pay the costs.

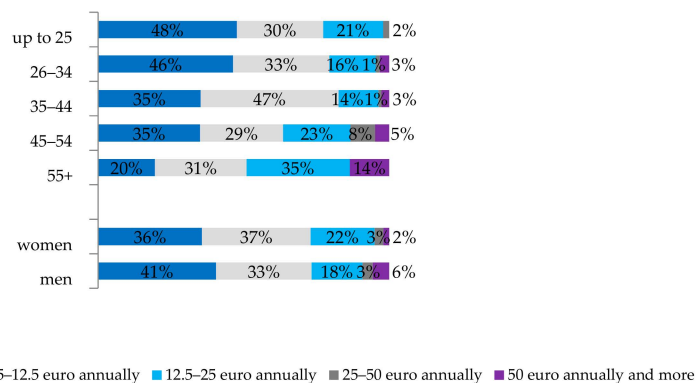


Figure 20. A chart illustrating the willingness to spend a certain amount annually for a hypothetical development fund for the Vistula riverfront ($N = 203$, 32.2% of all respondents were willing to make donations). Source: Processed by the author.

The fourth hypothesis regarding Warsaw inhabitants' perception of the positive and negative aspects of the development of the Vistula River embankment in Warsaw and the value of the green Vistula riverfront in Warsaw was partially confirmed. Residents of adjacent districts are more aware of the ecological value of this area. An awareness of the area's ecological value translates into the willingness to bear some of the cost of caring for the environment and infrastructure, and therefore is proof of a sense of attachment to and identification with the place. However, in general, the desire to share the cost of modernization (Figure 19) and the possible amount of donations (Figure 20) show that maintaining the quality of the environment and infrastructure is not a very important issue for the respondents. This in turn prompts the author of the paper to think about new actions that may increase inhabitants' awareness of the value of the waterfront and the need to care of it.

Among the respondents, there were people who declared that they did not often spend their time at the river (Figure 21). Respondents who did not spend too much time at the Vistula River (33.2%, 209 people) stated that they lacked the time (Figure 22). The rest of the questions confirmed the previous findings about even distribution of visitors at both banks.

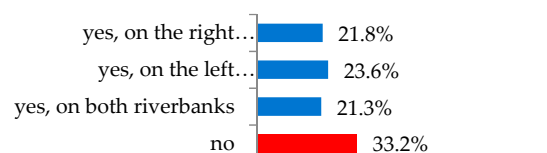


Figure 21. Have you spent your free time at the Vistula River during the last month? ($N = 630$). Source: Processed by the author.

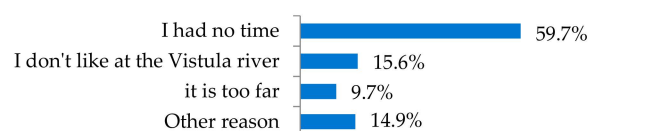


Figure 22. Why did not you spend your free time at the Vistula river? ($N = 209$). Source: Processed by the author.

Certainly, the specificity of life in a big city like Warsaw, the associated fast pace of life and a large amount of time spent at work constitute a certain difficulty for using public space on the Vistula. A group of the respondents (15.6%) (Figure 22) do not visit the Vistula riverside because they do not like it there. It seems worth considering what nature means for the inhabitants of the city. Are those only urban birds outside their window, and natural areas are perceived as a wasteland of little value?

Respondents stated that things that could encourage them to spend time at the river include events and festivals, improvements in the cleanliness of the beach and the river, and better infrastructure (Figure 23). These statements stand in opposition to each other. The more people and the more mass events organized at the waterfront, the more the amount of garbage in the area will increase.

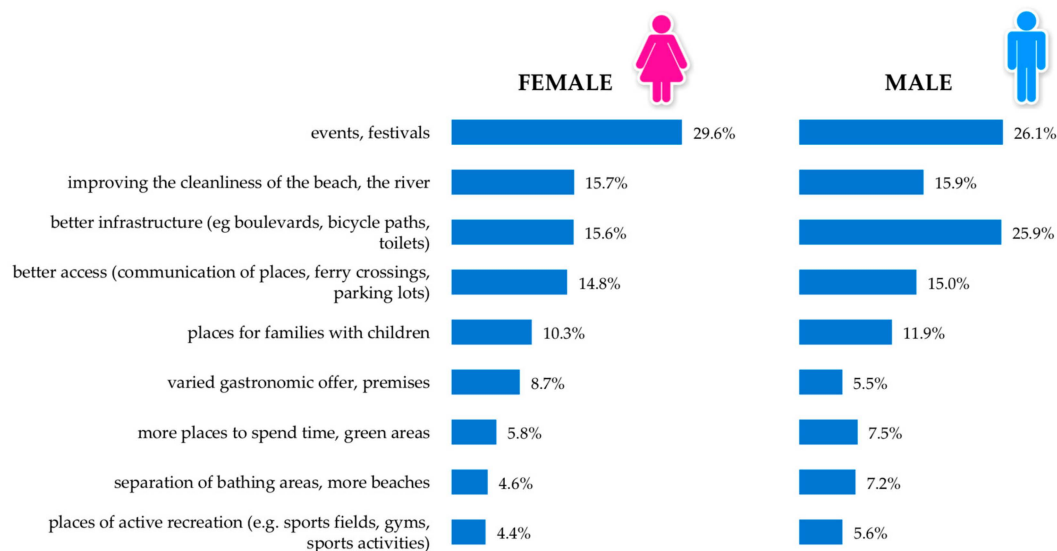


Figure 23. Suggest two activities that would encourage you to spend your free time at the Vistula River ($N = 120/89$). Source: Processed by the author.

The results show that almost one-third of the population do not visit the Vistula River at all (Figure 21). The improvements that non-visitors mentioned would encourage them to visit the riverfront (Figure 23) require funds. Frequent visits to the Vistula River increase the awareness of its value (Figure 16) and sense of identification, which may increase willingness to donate to a revitalization fund (Figure 18). Therefore, the municipality should take steps to reach this target group, if such funds are found.

6. Discussion

In reference to site preferences of spending free time outdoors by the city inhabitants in relation to the naturalness of the landscape, Qui and colleagues came to the conclusion that the wildness and naturalness of the landscape affect site selection [83], but only to a limited extent. Appreciating the value of species richness is a result of specialized knowledge. In general, naturalness of the landscape invokes positive emotions, but at the same time, people prefer places where they feel they are safe. When forest users in Norway [84] were asked whether they would rather visit an old forest (with higher rates of naturalness) or a young forest, 48% of respondents chose the old forest, 8% chose the young forest, and the others were indifferent. According to Edwards et al., regardless of the country in Europe, the more mature the forest, the better it is assessed [85]. Users consider communities such as forests and parks to be the most attractive [86], but semi-open spaces provide a greater degree of visual comfort and sense of security than dense forests. Natural clearances in the woods are considered to be more attractive [87]. Given the openness of the landscape, one can even present an equation that indicates that a value of about 40% is optimal. Forests with a view of the surrounding area are particularly advantageous in this respect [88]. In turn, a study involving children found that dense vegetation was particularly attractive to them [89], which might affect site selection for families with children. However, children have been found to prefer semi-open areas with small shrubs to dense forest vegetation. These observations correspond with the results of the conducted research, that the Vistula waterfront as a riparian forest community is the second most chosen (Figure 15) place to spend free time outdoors, behind only the city park, and that both riverbanks (including the urbanized one)

are equally visited by people. It is likely that visitors to the Vistula riverbanks appreciate the open view of the riparian communities on the right bank from the left bank's concrete boulevard (Figure 20), where they feel safe.

Public perception of the riverbanks is complex, as many variables influence the process. Among researchers, there is no consensus about the relationships between what the public sees when viewing a river and the actual ecological quality of that river [90]. Juncker and Buchecker found that naturalness of the landscape positively affects the public's perception. Natural elements at the riverbanks seem more appealing to the public [91,92]. However, in some cases, people perceive excessive plant growth to be 'untidy' and reflect a lack of management, which was also reflected in Warsaw inhabitants' answers (Figure 15). Similarly, studies were conducted in reference to the presence of fallen trees and debris in the rivers, confirming the lack for approval of those elements to be attractive in the landscape [93,94].

Considering connectedness to the landscape with features of naturalness, researchers like Brody, Highfield, and Alston [95] claim that among the many variables that influence how the public perceives a waterway, proximity to and having a personal connection with a waterway are highly relevant [95–97]. Public perception about rivers is influenced by individuals' familiarity with the waterway. Familiarity with the river contributes to greater knowledge and understanding of the conditions on this river [95].

7. Conclusions

Preferences of spending time outdoors of Warsaw inhabitants at the Vistula were summed up in the form of a map of the actively used places at the river (Figure 10), which turned out to relate to several factors, including accessibility and feeling safe at the place (perception of the place). The results show that the respondents appreciate the naturalness of the Vistula River landscape (Figures 6 and 12–14), which translates into Warsaw inhabitants' preferences for spending free time at the Vistula riverfront, as this was the second most chosen place (Figure 6), but with some reservations (Figure 10). They prefer spending time at the right natural riverbank (Figure 10) almost as much as sitting on the opposite riverbank and viewing the riparian communities from a safe distance on the strongly urbanized left riverbank.

Public perception of the semi-natural riverbank include advantages and disadvantages of the place is ambiguous. On the one hand, Warsaw inhabitants appreciate natural elements of the landscape of the Vistula River like sand, beach, and wilderness (Figures 12–14), but on the other hand, they mention untidiness and lack of management of the space, including unmanaged greenery (Figure 15). Although, they claim that they are conscious of the environmental role of the semi-wild riverfront in Warsaw, the awareness of the value of biodiverse unmanaged greenery is not associated with it. The people's background and proximity of living to the river noticeably influence their perceptions of the landscape, and do not always translate into understanding of the biodiversity value of naturalness of the riverbanks, an aesthetic appreciation of spontaneous planting growth and feeling safety at the place. These mixed findings highlight the need for continued exploration of what influences the public view on the river.

The aim of this paper, focusing on connectedness to the Vistula riverbanks, has been verified by the willingness to donate money for the riverside modernization. There were found relationships between willingness to donate money for the hypothetical riverbank fund and intensity of spending time at the Vistula riverbanks or living in the district adjoining the river (Figure 20). Warsaw inhabitants, in general, appreciate features of naturalness and the Vistula riverfront, but do not want to participate in costs of its management (Figure 18), so their connectedness to the place is very superficial. People would like to use this place, but not have to care for it.

The results that were obtained with this survey carried out using the CAWI method allowed the author of the paper to identify the perceptions that residents of all districts of Warsaw had of the Vistula riverfront. The limitations of this method boil down to the fact that the respondents were users of the Internet and the Ariadna panel. Although, the research may be considered as a quasi-representative

survey of Warsaw inhabitants' perception due to the Internet research tool limitations (focusing on people more skilled on the Internet), the quota on districts were distributed evenly, which had no precedence in the Vistula riverfront surveys. The main advantage is that it was possible to: (1) Reach people who do not visit the Vistula River in Warsaw too often and estimate their number and their reasons; and (2) gather opinions from a wider spectrum of respondents than previous surveys.

The research considered not only the possible ways to spend time at the Vistula riverbanks but also touched on the problem of residents' identification with these places. In this respect, the present study makes an original contribution to the literature as, to date, no similar study has been conducted. Further study should concentrate on changing attitudes towards green public spaces in Warsaw and in the city in general (inhabitants want to use the Vistula riverbanks but they do not want to bear the costs of the management and modernization of the site). The general conviction that this green public space belongs to everybody and nobody at the same time should change into a common sense of responsibility for the well-being of the place. Reversing this tendency would help to maintain the site in a state of good quality and retain its naturalness; otherwise, the landscape's degradation is possible. This study also indirectly considers the issue of raising awareness about the value of the naturalness of the Vistula riverfront landscapes. It has to be stated that there remains a need for an intense and well-coordinated campaign to raise awareness, as the conservation of naturalness is not a priority at the social level. Such measures as increasing the participation of local communities in activities that lead to the protection of natural heritage and educating the public should be increased and focus on the ecological value of the Vistula riverfront in Warsaw, because almost one-third of the city population has no interest in the area and, consequently, may not care for its quality. It is worth introducing people to the Natura 2000 sites in a thoughtful way so as to prevent degradation of the environment.

An important conclusion is the need to constantly raise awareness of the ecological value of this area, because increased awareness clearly translates into a willingness to protect its value and a sense of responsibility for the place. The point is to realize that the naturalness of the landscape is not given once and for all, and that the inhabitants of the city are jointly responsible for the state of nature at the Vistula River. Moreover, the results may play a role in reflecting on the value of the Vistula riverfront and on the benefits that it can bring to the lives of inhabitants.

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