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THE POSSIBILITY OF DEVELOPING WATER SPORTS AND RECREATION BY THE VISTULA RIVER IN WARSAW – ANALYSIS REGARDING EXTERNAL LOCATION CONDITIONS

Agata Pawłat-Zawrzykraj[1]✉, Piotr Kaliszek[2]✉

[1] ORCID: 0000-0001-9570-979X
[1] The Warsaw University of Life Science – WULS, Faculty of Civil and Environmental Engineering, Institute of Environmental Engineering, Department of Landscape Architecture
Nowoursynowska Street, 166, 02-787 Warsaw, **Poland**
[2] Federacja Przystań Warszawa – Federation Warsaw Marina
Jarocińska Street, 1/34, 04-519 Warsaw, **Poland**

ABSTRACT

Motives: The study examines the potential for city riverside areas to develop water sports and recreational activities. In many cities, there is an increased interest in these activities and the potential for their development.
Aim: The purpose of the article is to present the criteria for the preliminary selection of study objects and the method of assessing their suitability for the development of various types of water activities, using the example of the selected requirements associated with the location.
Results: The Vistula riverside in Warsaw was adopted as a pilot area for testing the proposed assessment approach. 61 sites were selected for the analysis. There are only 13 existing and operating river marinas, water sports clubs, and water stops for boats and ferries. The remaining sites comprise public green parks, informal beaches, and degraded areas such as former shipyards and sand pits. The authors sought to encompass a diverse range of locations with respect to facilities, infrastructure, and other amenities influencing the potential for the development of water activities. The emphasis was also placed on sites situated beyond the city centre, ensuring service provision for more peripheral urban areas. The results enable an overall ranking of the sites, the identification of facilities suitable for multifunctional use, and those most suitable for specific forms of water activities. The evaluation outcomes may guide the city authorities in introducing land use and development provisions into spatial planning acts, support the modernisation of some existing facilities, e.g. by expanding their service offer and, in other cases, adapting functions to cater to water-based tourism and recreation, thereby enhancing the diversity and attractiveness of the Vistula riverside areas in Warsaw.

Keywords: urban planning, spatial development, riverside area, multi-criteria analysis

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

INTRODUCTION

Many cities face the challenge of urban planning in developing high-quality public spaces in riverside areas (Jagiełło-Kowalczyk & Piwowar, 2018; Muszyńska-Jeleszyńska, 2013). In this case, "high quality" refers to planning and management activities that balance environmental, cultural, social, and economic factors, thereby enabling the integration of riverside areas into the city's framework. Spatial policymaking for the city is a complex topic. Some aspects of spatial development require continuity, while others require adopting a new concept. In most large cities along rivers, it is possible to identify well-developed and very popular areas among city inhabitants and tourists, as well as areas that require revitalisation and those yet to be explored. Examples of successful riverside revitalisation, including recreation and water sports facilities, are the Oosterdok and the IJhaven area in Amsterdam, the Stadtparksee and the Alster canals in Hamburg, the Sprea and the Müggelsee in Berlin, the Neue Donau in Vienna, and the Brda River area in the Polish city of Bydgoszcz (Grześkow, 2021; MPU, 2020), and finally urban canals and harbours in Copenhagen, Gothenburg and Malmö that were successfully regenerated and adjusted for swimming (Book, 2025; Jensen et al., 2015). While the aforementioned examples concern specific sites, it is equally important to consider the river as a whole in urban planning and development – focusing on city-wide dynamics rather than individual locations (Petrtýlová & Jaššo, 2022). Ensuring the seamless integration of riverside spaces with the broader urban public realm is essential to enhance both accessibility and spatial connectivity (Wang & Xia, 2025). This approach enables a broad understanding of the variability in riparian areas, encompassing current functions and utility, natural and urban landscapes, historical values, and other elements that contribute to the identity and unique character of the city areas (Samoilenko, 2021). It also considers the linear form of the river valley (Stępniewska & Sobczak, 2017), which facilitates movement along this natural corridor and promotes physical activities such as walking, jogging, and cycling, as well as water-based activities that constitute the focus of the present study.

Recreation in urban blue and green riverside areas has not been the subject of extensive studies, compared to surveys on urban parks and forests (Veerkamp et al., 2021). Obviously, there is widespread awareness of the potential and value of these areas within the city structure (Pattacini, 2021; Muszyńska-Jeleszyńska, 2013). The riverside areas are especially distinguished by their high diversity of urbanisation/natural level, their variety of landscapes, local climate conditions, and so on. Therefore, they can be helpful in meeting a wide range of needs, including health-oriented and supporting wellbeing activities (Sarkar & Webster, 2017; Vaeztavakoli et al., 2018). Regarding design, the diverse contexts of the riverside areas provide the opportunity and requirement, and, quoting Jun (2023, p. 13), "should be responsive to the evolving urban landscape while respecting the inherent characteristics of the site". The conceptual strategies that relate specifically to green and blue infrastructure vary, but basically consist of applying two main approaches:

1. "Soft approach" – this model involves the preservation or restoration of existing floodplains, the relocation of buildings away from the river, and the establishment of 'river parks' that create a linear and continuous open space, characterised by varying degrees of naturalness. Such an approach facilitates movement along the river corridor and enhances opportunities to experience its natural and cultural values.
2. "Hard approach" – it is characteristic of older urban structures with dense development along the river, where public spaces take the form of promenades or boulevards constructed on reinforced embankments. These linear arrangements are typically complemented by 'pocket parks' – urban squares or small green areas – either situated directly along the river or aligned with public axes leading towards it. In this configuration, the river functions primarily as a destination or a crossing point, directing user activity towards reaching and traversing the watercourse (Alexander et al., 1977; DCLG, 2009; Gibberd, 1953; Pattacini, 2021; Trancik, 1986).

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

One of the aforementioned development patterns typically predominates in riverine cities, although hybrid configurations combining their features may also be observed. Warsaw, the capital city of Poland, located on the Vistula River, constitutes a notable example of such a composite form, in which elements of both types of riverfront development coexist, creating a supportive spatial framework and favourable conditions for the development of a diverse range of green and blue infrastructure initiatives.

Within the framework of riverside land use, the provision of water-related sports and recreational infrastructure is broadly aligned with contemporary urban spatial policies. Such interventions contribute to the morphological and functional integration of waterfront zones into the urban fabric, while simultaneously reinforcing their amenity value and enhancing spatial connectivity with adjacent public realms.

The study topics regarding the recreational experience, spatiotemporal patterns of activities and function of urban riverside areas mainly concern, among the preferred places of activities, two main groups of factors influencing recreational experiences of urban riverside areas:

1. Social attributes: visitors' types, motivation, frequency, duration of stay, safety, and activities.
2. Physical attributes: natural elements (e.g. tree canopy cover, acoustic conditions, water quality), artificial facilities, scenic attributes, accessibility and transportation system (distance to public transport stops, entrance/exit points), distance (close-living and far-living), seasonal and intraweek preferences (weekdays/ weekends visitors), weather, maintenance and management of facilities (Cholewa, 2019; Grzyb, 2024; Shi et al., 2024; Vert et al., 2019; Walmsley & Lewis, 2014).

The primary and typical survey tools employed in this field are questionnaires, conducted either on-site during field visits or online, as well as geo-maps (geo-surveys) (Bąkowska & Waldmann, 2022; Cholewa, 2019; Grzyb, 2024). Another method relies on analysing images shared on the internet by users from the given area, web text analysis, e.g. and the textual content analysis of reviews enabled in social media (Shi et al., 2024). Despite the mentioned examples of studies on recreation patterns in urban riversides, there is a notable gap concerning complex studies dedicated to analysing and evaluating the potential of urban riverside areas for the development of water sports and water recreation. We have not found a multi-criteria method to evaluate existing facilities in terms of their suitability for various types of water sports and recreation. This highlights the need to formulate specific assessment criteria and to design a methodological approach that can be applied to provide city authorities with an integrated evaluation of existing resources and various conditions that determine future planning, implementation and maintenance of water-related activities in the river corridor.

The purpose of the article is:

– to present the selection criteria and systematics of potential water sports and water recreation facilities in the city, with the example of riverside areas in Warsaw;
– to present a methodology for assessing the suitability of selected study sites for the development of recreation and water sports, with regard to specific criteria, particularly those associated with their location.

The following research hypotheses were formulated:

1. Warsaw possesses considerable, yet largely untapped, potential for water sports and recreation in the riparian zones of the Vistula River;
2. An up-to-date and comprehensive assessment of these resources constitutes the basis for defining objectives and implementing the city's spatial policy for the development of water sports and recreation.

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

SPATIAL PLANNING AND MANAGEMENT OF THE URBAN RIVERSIDE AREAS CONCERNING THE DEVELOPMENT OF WATER RECREATION AND SPORT ACTIVITIES – WARSAW CASE STUDY

The development of the Vistula riverside areas in Warsaw is a continuous process that requires consideration of various environmental, infrastructural, cultural, and social factors. It is a multifunctional area crucial to the city's functioning, but the authors' focus is on its use for water sports and recreation.

Riverside areas in Warsaw are highly diversified. The development of the left bank of the river, especially in the central part, is based on the hardened regulation of the quay. The right bank of the river has retained its semi-natural character to a greater extent (Rybak-Niedziółka et al., 2021). The exceptions are the industrial areas of the Praski Port and the Żerań Port. Respondents to the geo-survey performed by the Sędzimir Foundation (Bąkowska-Waldmann, 2022) were asked to indicate places along the Vistula with high sports and recreational values. They pointed out the central area, from the Czerniakowski Cypel to the Grot Rowecki Bridge, as being the main one. Similar conclusions were drawn by Grzyb (2024) from the studies concerning urban riverside activities in Warsaw. This is the crucial area indicated as the one where "the city turns to the river". It includes the informal "Vistula district," promoting the river, and, of course, the latest and most representative investment of Warsaw City Hall – the so-called Vistula Boulevards, located on the left bank of the river. The boulevards fulfil many functions: recreational, social, and representative. It is divided into several zones. One of these is a pedestrian boulevard with a wharf for anchoring boats, water tram stops, cruising restaurants and bars (Jagiełło-Kowalczyk & Piwowar, 2018). Another positive example is the modernisation of Czerniakowski Port, which was accomplished in 2024. It features a marina for kayaks and boats, along with facilities for service and equipment rental. Recent research has confirmed the favourable public perception of the city authorities' efforts to integrate the Vistula Valley into the city's structure, expand the programme, and increase the cultural and recreational offer of the riverside areas (Bąkowska-Waldmann, 2022; Stakuń, 2017; Warsaw City Hall, 2024). The projects related to revitalising riverside areas in Warsaw have the character of concrete planning, organisational and investment activities, whose overriding aim is to rebuild the city-river relationship. Many of the effects of these activities are already visible. Therefore, one may ask whether "Warsaw is returning to the Vistula" – yes, but not everywhere. Despite significant and successful investments, there is still considerable need and potential for broadening the scope of activities, i.e., by including and activating new areas of the city and expanding the group of participants and beneficiaries. Such objectives should be broadly introduced into the city's strategic and planning documents. Due to the amendments to the Act on Spatial Planning and Development (Journal of Laws of 2003, No. 80, item 717), the authorities of the City of Warsaw face the challenge of developing planning acts in accordance with the new formal requirements. This primarily concerns updating the Development Strategy and developing a new document – the General Plan. Defining existing resources and maintaining conditions is also crucial for securing financing for programs supporting sports and recreation development (e.g., from the Warsaw Sports and Recreation Office). Finally, it can provide up-to-date information to city inhabitants and visitors interested in exploring the city from the river and its riverside areas.

Assessing the scale of current interest in water sports and recreation in Warsaw is difficult. Available data indicate that 6–8% of surveyed respondents actively spend time on the Vistula riverside areas (Bąkowska-Waldmann, 2022; Duda-Gromada, 2018; Warsaw City Hall, 2024). The study performed by Grzyb (2024) confirmed that 22.1% of the surveyed city residents preferred activities related to water sports. Nevertheless, we know little about the number of participants in particular watercraft and water activities in Warsaw. Other studies confirmed that in Poland, the number of water tour operators

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

(e.g. kayaking) has increased considerably in recent years, and new water tourism centres have been established in the vicinity of large urban areas (Lewandowicz, 2022). The consumption of Water Sports Equipment in Poland is growing, including the number of Polish households that own a kayak, rowing boat, or pontoon (Williams & Marshall Strategy, 2025). The number of city and suburban residents, as well as visiting tourists, interested in this form of recreation on the Vistula River in Warsaw is considerable and is expected to continue growing. However, their number largely depends on the programme offered, the level of development, and the quality of riverside sports and recreational facilities (Williams & Marshall Strategy, 2025).

MATERIALS AND METHODS

The subject of the study is the development and management of riverside areas, considering sport and active recreation on water. The term "water sports and recreation" was used to identify the various forms of activity that can be carried out along urban rivers. According to the definition in the Act on Sport (Journal of Laws of 2010, No. 127, item 857, Art. 2.1.), the term "sport" shall be understood as "all forms of physical activity which, through casual or organised participation, affect the development or improvement of physical and mental fitness, the development of social relations or the achievement of sporting results at any level". Sport is directed towards active competition and achieving sporting results. Recreation is the individual or group sport-related physical activity in leisure time. It is focused on relaxation, renewal of psychophysical strength, social integration and contact with nature (Pisarska, 2018; Skalski et al., 2021). Water sports and recreation are conducted in areas that are both functionally and spatially linked to flowing and standing water. Regarding the definitions above, the authors have compiled an extensive list of various types of water sports and recreation that, depending on the conditions, can occur in a large city. It offers a range of activities, including vessels and ferries, motorboat recreation, sailing, rowing, various types of kayaking (classic, mountain, advanced amateur, and kayak polo), water tourism, dragon boats, stand-up paddleboards (SUPs), windsurfing, kitesurfing, and wakeboarding (Table 1). Urban river swimming was excluded from the study due to its distinct operational requirements.

The article presents part of the results for assessing operating and potential water sports and recreation sites along the Vistula River in Warsaw. The initial stage of this research involved identifying and selecting objects (sites) for evaluation. The spatial scope of the analysis presented in this study primarily encompasses the riparian areas of the Vistula River within the administrative boundaries of Warsaw. According to Duda-Gromada (2018, p. 74), "riparian areas in urban environments can be defined as zones in the immediate vicinity of a river. They are limited by the outline of adjacent buildings, green spaces, or other complexes that form a 'wall' to the landscaped interior extending along the river." Besides that, the authors decided to include lands not directly adjacent to the river, provided they are functionally connected to it. It concerns mainly Żerań Port and Żerań Canal. At the same time, the Vistula Boulevards were given marginal consideration due to their current predominant use and program, which targets a different user group (e.g., mass events and numerous gastronomic establishments). While this section of the Vistula embankment fulfils many of the established criteria and could, for instance, accommodate a floating marina, only one representative location, the WWA Water Station – seasonal barges (gastronomic facilities) with mooring capabilities, was chosen. Another specific case is Port Praski, a currently inaccessible site undergoing the construction of a multi-family residential complex. While the landowner states that the port will offer water sports and recreational facilities, this claim is difficult to verify.

It was assumed that the areas chosen for the analysis must fulfil at least two of the four conditions:

1. There is water sports and recreation infrastructure (e.g. buildings, hangars, jetties, slips) regardless of their current state or operational condition.

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

2. There is transport accessibility – relatively easy access by car, public transport or bicycle.
3. They have access to water (flowing or standing) from the land.
4. They are accessible from flowing water.

The preliminary selection of study objects was guided by the authors' direct knowledge of the study area, complemented by desk research on spatial datasets (e.g. orthophotomaps). Additional spatial data used in this study (flood risk maps, sozological maps, Topographic Objects Database- BDOT10) were obtained from Warsaw City's Spatial Information System (Warsaw SIP) and the Polish National Geoportal (Head Office of Geodesy and Cartography).

The authors conducted fieldwork from May 2024 to March 2025, both on land and from water. The water level in the Vistula during the study period predominantly remained in the low range, with only brief periods reaching medium levels (HYDRO IMGW-PIB). During periods of high water, most of these facilities cannot operate, and the number of users is reduced to a minimum. The field study, conducted on both water and land, enabled us to verify the initially identified number of sites and subsequently to evaluate them according to the selected criteria.

Assessment criteria and the scope of sites' evaluation were defined by compiling a comprehensive set of conditions, encompassing proper functioning as well as users' needs and requirements for various sports and water recreation activities. The comprehensive inventory and assessment of the analysed sites incorporated a broad range of criteria, including:

1. External determinants associated with location:
   a. location relative to the city centre and district centres;
   b. location within the longitudinal profile of the river within the city;
   c. recreational function of supra-local or local importance;
   d. location regarding flood risk and nature protection areas;
   e. transportation accessibility (public transport, cars, bicycles);
   f. accessibility of the waterway, direct access to the water and the proximity of service facilities to the water edge.
2. Hydrological and environmental conditions relevant to the feasibility of different forms of water sports and recreation include: susceptibility to wave action, water depth, water level stability, presence of whitewater, wind conditions, etc.
3. Acoustic comfort and visual perception involve evaluating: aesthetics, landscape values and visual connections with the city.
4. Existing development and facilities, including:
   a. infrastructure related to water sports and recreation services (e.g. buildings, technical equipment, gastronomic facilities, camping sites, playgrounds);
   b. technical and road infrastructure.

In addition to the aforementioned aspects, the authors also investigated formal and legal issues, including:

1. Land ownership and management of the facility – crucial from the perspective of managing, maintaining, and financing investment.
2. Land-use indicated in the local area development plan (for the areas covered by plans), particularly whether the current designation permits activities related to water sports and recreation.

Due to the limited volume of the article, we present here only the results regarding external determinants associated with the location conditions. The assessment results for the other evaluation criteria, along with the final overall ranking of the analysed sites, are intended to be presented in a subsequent publication. The location conditions are considered in terms of the users' needs and operating requirements for certain types of water sports and recreation. In this study, the term 'users' refers not only to individuals who participate in water sports and recreational activities in urban riverside areas, but also to those who organise and manage recreational and sports facilities. This broader definition was adopted to capture the diverse perspectives, needs, and experiences associated with both the use and management of riverside recreational spaces. For each type of the analysed

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

water activities, the weights reflecting the importance of specific needs and requirements for the proper functioning were determined using the following grade scale:

10 – Crucial – essential for operation; activities cannot proceed without this condition being met;
6 – Highly significant – its absence poses a substantial inconvenience; functioning remains possible;
2 – Significant – clearly desirable and facilitates operations; functioning is possible even if this condition is not met;
1 – Moderately significant – advantageous, but operations can proceed without this condition being met;
0 – Insignificant – has no effect on the activity;
-2 – Undesirable – has a negative impact.

The site's assessment criteria were defined considering the site location, user demand, and significance for functioning and management. Each of the 15 types of water sports and recreation was assigned a grade reflecting the significance of a certain criterion for a certain type of activity. This assignment is presented in Table 1.

Table 1. The significance of the users' need and requirement for the functioning and management of various types of water sports and recreation associated with the location conditions

No.	Types of water sports and recreation (tp)	The significance of the users' needs and operation requirements (W^c_{pt})									
		Close to the city centre	Close to the local centre	Supra-local (occasional) recreation site	Local (everyday) recreation site	Location outside of flood risk area	Good car accessibility	Good cycling accessibility	Good public transportation accessibility	Location upstream section of the river	Good access to the water body
1	Vessels and ferries	6	10	2	6	0	6	2	3	0	1
2	Motorboat recreation	2	3	2	6	0	10	1	2	0	1
3	Sailing	0	0	6	2	1	10	1	2	0	6
4	Rowing	0	2	1	1	2	10	6	6	1	6
5	Classical kayaking	1	1	0	0	2	10	1	6	0	6
6	Mountain kayaking	0	0	0	0	1	10	1	2	0	2
7	Advanced amateur kayaking	1	2	1	1	1	10	2	6	0	6
8	Kayak-polo	2	0	0	0	2	10	1	6	0	6
9	Water tourism[1)]	6	6	0	0	1	6	1	10	6	6
10	Dragon boats	0	1	0	0	2	10	1	2	0	6
11	SUPs	2	2	1	1	1	10	1	2	0	2
12	Windsurfing	0	0	0	0	1	10	1	2	0	2
16	Kitesurfing	0	0	0	0	1	10	1	2	0	2
14	Wakeboarding	0	1	2	2	1	10	1	2	0	6
15	Water recreation[2)]	2	6	6	10	1	10	6	6	6	10

[1)] Water Tourism – a specialised tourism characterised by travel and cognitive aspects involving active leisure on or near water;
[2)] Water Recreation – short-term, often one-time or incidental activities on water with somewhat random floating equipment (kayaking, canoeing, etc). No specific skills or physical exertion are required.
Source: own elaboration.

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

The authors' subjective preliminary list of evaluation criteria, concerning needs and requirements, was discussed with representatives of the city authorities and members of the Committee for social dialogue for the Warsaw Vistula (Branżowa Komisja Dialogu Społecznego ds. Warszawskiej Wisły), associating members experienced in managing existing water sports facilities (including sport clubs, marinas, etc.), organising water sports and recreational events, and providing related services in Warsaw. The detailed evaluation list, along with the weights for the selected types of water sports and recreation, was reviewed through an expert ranking by six Committee members (sent via email).

The suitability assessment of the analysed sites for developing water sports and recreation along the Vistula River in Warsaw, regarding requirements associated with the location, was carried out in three stages.

In the first stage, based on spatial data analysis and field surveys, an evaluation was conducted to determine whether each site met the previously defined requirements for operating water-sports facilities. The following rating scale was applied: 5 – condition fulfilled; 2 – condition partially fulfilled; -2 – condition not fulfilled; 0 – condition not applicable.

A composite rating representing a simplified overall assessment of a site was prepared according to the following formula (Formula 1):

$$A_{st} = \sum_{c=1}^{10} A_{st}^{c} \quad (1)$$

where:

A_{st} – the overall assessment (A) of a site (st);
A_{st}^{c} – the assessment (A) of a site (st) regarding compliance with a selected criterion (c) – for each of the 10 criteria.

Based on these simplified assessments, an overall ranking of the sites was obtained.

In the next step, the suitability of each site was assessed for each type of water sport or recreation. We calculated the weighted average (WA) for the assessment results obtained for each criterion (c), taking into account the significance of the specific need and requirement (W) for managing certain types of water sports and recreation (tp) – (Formula 2). The significance of a specific need or condition for a specific type of water sport or recreation is presented in Table 1.

$$WA_{st}^{tp} = \frac{\sum_{c=1}^{10} W_{tp}^{c} * A_{st}^{c}}{\sum_{c=1}^{10} W_{tp}^{c}} \quad (2)$$

where:

WA_{st}^{tp} – the weighted average assessment (WA) of the site (st) for a selected type of water sport and recreation (tp);
A_{st}^{c} – the assessment (A) of a site (st) for the criterion (c);
W_{tp}^{c} – the significance/weight (W) of the criterion (c) for a selected type of water sport and recreation (tp);

Finally, for each site (st), an average score (S_{st}) was calculated from the weighted site scores (WA_{st}^{tp}) according to the Formula 3.

$$S_{st} = \overline{WA_{st}^{tp}} \quad (3)$$

where:

S_{st} – average score (S) of the site (st);
WA_{st}^{tp} – the weighted average (WA) of the site suitibility (st) for a selected type of water sport and recreation (tp).

RESULTS

Based on the criteria described in the methodology, 61 sites were selected for the assessment, comprising 23 sites located on the left bank of the Vistula River, 30 on the right bank, and 8 sites spatially linked to the Żerań Port and Żerań Canal. The locations of the sites are shown in Fig. 1, and additional information for the sites corresponding to the numbers indicated on the map is provided in Table 2. The study sites exhibit significant diversity in function, utilisation intensity, and state development. Therefore, they have been divided into the following groups:

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

1. Group A (10 sites) – the existing and operating river marinas and water sports clubs (e.g. Port Czerniakowski, TWDW, WKW, SUM, Żerań 1 – Spójnia).
2. Group B (3 sites) – the sites currently serving passengers of sailing vessels and ferries when entering and leaving the berth (e.g. water stop at the Boulevard).
3. Group C (5 sites) – previously operating as port areas, shipyard, boat houses and marinas, but are currently degraded – examples of "river brownfields" (e.g., AZS, Nurt, former Żerań Port and Żerań Canal).
4. Group D (sites) – publicly available areas, such as formal and informal urban beaches – accessible to users of water sports and recreation, but lacking appropriate equipment and infrastructure (e.g., Romantyczna Beach, Saska Beach, Poniatówka, beach by the ZOO).
5. Group E (11 sites) – service facilities unrelated to water sports and recreation activities – mostly restaurants and cafes. It is assumed that changing the previous use of the sites or expanding current activities, including water sports and recreation, is feasible.
6. Group F (2 sites) – public green park areas (e.g. the new Park by the Żerański Canal).
7. Group G (20 sites) – unmanaged areas, wasteland, including those functionally linked to transportation infrastructure, that could potentially be integrated into the water sports and recreation system (e.g. areas under bridges).
8. Group H (3 sites) – sandpits – currently ecologically and scenically degraded but possessing a highly advantageous location from the water sports and recreation development perspective. It is assumed that the current function of these locations might be changed to public areas.

From the above classification, it is evident that Group G is the most numerous. It includes a highly diverse range of sites. Many of these areas are currently used as informal leisure spots despite lacking adequate sports and recreation infrastructure.

Table 2 presents detailed inventory results and a synthesis of research findings:

– columns 2–4 describe the sites and their location;
– column 5 presents the group to which the site was assigned;
– columns 6–15 present the results of the inventory of the sites in terms of location conditions;
– columns 16–17 present the sites' overall rating (A_{st}) with the corresponding site ranks;
– columns 18–19 present the assessment score in the form of the weighted average (S_{st}) with the corresponding site ranks;
– columns 20–24 present the suitability assessment of the sites for the development of a selected subset of five water-based activities (WA_{st}^{tp}).

Specifically, five forms of water sports and recreation—namely vessels and ferries, motorboat recreation, rowing, water tourism, and general water recreation—were selected from the fifteen forms assessed in the study to provide a representative sample of diverse activities. Presenting the assessment results for the full catalogue of water sports and recreational activities was not feasible due to space limitations, as it would render the table unreadable.

Table 3 presents the overall summary of inventory results regarding the analysed external location conditions. It aggregates detailed data from Table 2, columns 6–15, providing a quantitative summary of the assessment criteria, corresponding fulfilment scores, and the percentage distribution of each criterion and fulfilment score.

The ranking of sites (Table 2, columns 17 and 19) enables the sites to be ordered from the highest- to the lowest-ranked (the higher the score, the higher the ranking). The ranking stated on the overall assessment (A_{st}) (Table 2, column 17) gives a simplified view of the complex reality. The results slightly differ from the ranking based on the average scores (S_{st}) (Table 2, column 19). The ranking of sites based on the average scores incorporates a weighted assessment reflecting both the fulfilment of the requirements and their relative importance for 15 different types of water activities. The highest-rated sites are those with multifunctional potential. According to the criteria adopted for the assessment, the top 10 sites, ranked in descending order, are: WTW (Group A, No. 9 on the Fig. 1), Rusałka/ZOO Beach (Group D, No. 47);

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

Table 2. Results of the inventory of the sites in terms of the location conditions and the assessment of the suitability of the sites for the development of selected forms of water sports and recreation

No.	Sites			Assessment criteria – operating requirements (c)[2]										Overall assess-ment (A_{st})	Average score for all 15 water activities (S_{st})[4]	The weighted average assessment for 5 selected types of water sports and recreation (WA_{st}^{tp})[3]				
	Side of the river [1]	Name	river km	group	Close to the city centre	Close to the local centre	Supra-local recreation site	Local recreation site	Location outside of flood risk area	Good car accessibility	Good cycling accessibility	Good public transport accessibility	Upstream section of the river	Good access to the water body	score	general classification.	score	general classification.	Vessels and ferries	Motorboat recreation	Rowing	Water tourism	Water recreation
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	L	Sandpit Wilanów	500	G	-2	-2	-2	-2	-2	5	5	-2	5	5	8	47	22.9	44	-4	8	26	12	16
2	L	Zawady-Wilanów Beach	500.5	D	-2	-2	5	5	-2	5	5	-2	5	5	22	28	29.4	32	11	27	30	12	33
3	L	EC Siekierki	500.5	G	-2	-2	-2	5	-2	5	5	-2	5	5	15	39	26.5	40	7	22	28	12	27
4	L	Sandpit Siekierki	507	H	-2	-2	-2	-2	-2	5	5	-2	5	-2	1	54	11.9	55	-6	6	14	2	4
5	L	Duży HOW/slip	510.2	G	2	5	-2	-2	-2	5	2	-2	5	5	16	37	27.7	37	19	24	25	27	21
6	L	MiamiWars	510.9	E	5	5	5	5	-2	-2	5	2	5	5	33	14	16.1	51	35	25	21	31	35
7	L	Płyta Desantu Beach	511	D	5	5	5	5	-2	2	5	5	5	5	40	4	35.5	23	45	40	37	44	44
8	L	Bosmanat	511+100	A	5	5	5	5	5	5	5	5	-2	2	40	4	44.0	5	49	49	43	36	39
9	L	WTW	511+200	A	5	5	2	2	5	5	5	5	5	5	44	1	47.2	1	44	42	48	50	42
10	L	Area under Łazienkowski Breach	511+500	G	5	5	-2	2	5	5	5	2	5	5	37	7	41.4	12	37	37	42	43	36
11	L	HOW	511+600	G	5	5	-2	-2	5	5	5	-2	5	-2	22	28	22.8	45	23	24	22	23	14
12	L	Stocznia/Pochylnia – shipyard	511+700	A	5	5	-2	-2	5	5	5	2	5	5	33	14	39.4	17	31	29	41	43	29
13	L	Area upstairs by the sauna	511+800	F	5	5	2	2	5	2	5	2	5	2	35	11	27.0	39	34	29	29	34	30
14	L	Przystań Warszawa -Warsaw marina	511+900	A	5	5	5	2	5	5	5	2	5	5	44	1	44.3	4	41	42	44	43	42
15	L	"Miejsce" – former police station	511+999	G	5	5	5	2	5	5	5	5	5	2	44	1	43.7	6	45	43	44	46	41
16	L	Water Station WWA	512.5	B	5	5	5	5	-2	2	5	5	2	5	37	7	34.9	24	45	40	37	40	41
17	L	Bulwar Religi – boulevard	516.3	G	5	5	5	5	-2	5	5	5	-2	2	33	14	40.9	13	49	49	39	34	38

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

18	L	Spójnia – sport club	516.4	E	5	5	2	5	-2	5	5	5	-2	2	30	19	39.6	16	48	47	38	34	35
19	L	Żoliborz Beach	516.5	D	2	5	5	5	-2	2	5	5	-2	5	30	19	33.0	27	41	38	35	30	37
20	L	Sandpit Bielany	520.6	H	-2	-2	-2	-2	2	5	5	2	-2	-2	2	53	18.0	50	1	8	21	2	2
21	L	Collector Bielany	521	G	-2	-2	-2	-2	-2	5	5	-2	-2	5	1	54	21.7	46	-4	8	24	2	9
22	L	Przystań Młociny – water stop	525	B	-2	-2	2	2	-2	2	5	-2	-2	5	6	50	14.0	53	0	9	18	-3	14
23	L	Przystań Buraków – water stop	525.5	G	-2	-2	2	2	-2	5	5	-2	-2	5	9	44	25.4	41	4	19	26	2	19
24	P	Romantyczna Beach	500.7	D	-2	-2	5	5	-2	5	5	-2	5	2	19	35	24.6	43	10	26	25	7	29
25	R	Place at the planned river threshold Siekierki	504.5	G	-2	-2	-2	-2	-2	-2	5	-2	5	0	-4	58	-11.5	59	-16	-17	-3	-6	-4
26	R	WKW – sport club	506.4	A	-2	-2	-2	-2	-2	5	5	5	5	5	15	39	32.6	28	7	13	38	28	22
27	R	Sum – sport club	506.8	A	-2	-2	-2	-2	-2	5	5	5	5	5	15	39	32.6	28	7	13	38	28	22
28	R	Baseny Kora – pools	508.2	E	-2	2	2	2	-2	5	5	5	5	-2	20	34	28.0	36	24	29	31	24	25
29	R	AZS	509.1	C	-2	-2	-2	-2	-2	5	5	5	5	-2	8	47	21.6	47	5	10	26	18	11
30	R	Nurt	509.2	C	-2	-2	-2	-2	-2	5	5	5	5	-2	8	47	21.6	47	5	10	26	18	11
31	R	YKP	509.4	E	-2	-2	2	-2	-2	5	5	5	5	5	19	35	34.2	25	9	15	39	28	26
32	R	Neptun	509.5	E	-2	2	-2	-2	-2	5	5	5	5	2	16	37	30.6	31	16	20	35	30	21
33	R	Military area	509.8	E	-2	5	-2	-2	-2	5	5	5	5	5	22	28	37.4	21	25	27	42	38	29
34	R	Sandpit Gruba Kaśka	510	H	2	5	2	2	-2	5	5	5	5	5	34	12	42.8	9	39	40	44	44	40
35	R	Plażówka (Saska) -beach	510.1	E	-2	5	5	5	-2	5	5	5	5	2	33	14	39.2	18	39	44	41	34	42
36	R	Boat House and small beach	510.3	E	2	5	5	5	-2	5	5	5	5	5	40	4	45.6	3	45	48	46	44	48
37	R	Wisełka	510.4	E	5	5	-2	-2	0	5	5	5	5	0	26	25	33.4	26	34	30	35	42	24
38	R	MOS nr 2 – sport club	510.6	A	-2	5	-2	-2	-2	5	5	5	5	5	22	28	37.4	21	25	27	42	38	29
39	R	TWDW – sport club	510.7	A	-2	5	5	-2	-2	5	5	5	5	5	29	21	40.3	15	29	31	44	38	36
40	R	Saska Beach	510.8	D	-2	0	5	5	-2	5	5	5	5	5	31	18	40.4	14	26	35	43	31	42
41	R	Baseny Odkryte na Wale – pools	511.2	E	2	0	5	2	5	5	5	5	0	5	34	12	42.9	8	28	32	45	31	35
42	R	Poniatówka Beach	511.9	D	5	5	5	-2	-2	5	5	5	5	5	36	9	43.2	7	39	36	44	48	38
43	R	Świętokrzyski Breach	512.6	G	-2	-2	5	5	-2	5	5	5	5	5	29	21	39.1	20	21	31	42	28	40
44	R	Water police station	513.2	A	5	5	-2	-2	5	5	5	5	-2	5	29	21	42.3	11	36	31	44	40	26
45	R	Port Praski	513.3	G	5	5	-2	-2	5	5	5	5	-2	-2	22	28	31.2	30	34	29	32	30	14
46	R	Foot and bike bridge	513.4	G	5	5	-2	-2	-2	5	5	5	-2	5	22	28	39.1	19	36	31	40	38	24
47	R	Rusałka/ZOO Beach	514.7	D	5	5	5	5	-2	5	5	5	-2	5	36	9	45.6	2	50	50	44	38	42
48	R	Polana przy ZOO	515.2	G	5	-2	5	5	-2	2	5	2	-2	5	23	26	25.2	42	23	24	26	17	28

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

cont. Table 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
49	R	Pawilon Kamień – Kamień Pavilion	515.7	E	-2	5	5	5	-2	5	5	5	-2	5	29	21	42.6	10	39	45	44	28	40
50	R	Golędzinów	517	G	-2	2	5	5	-2	-2	5	-2	-2	-2	5	51	-6.7	58	8	9	-2	-13	8
51	R	Area by the Kładka Żerańska	520.2	G	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-20	61	-20.0	61	-20	-20	-20	-20	-20
52	R	Białołęka Beach	522.8	G	-2	-2	-2	5	-2	-2	5	-2	-2	-2	-6	59	-12.3	60	-6	-4	-6	-18	-2
53	R	Aluzyjna Beach	527	G	-2	-2	5	5	-2	5	5	-2	-2	5	15	39	28.2	35	11	27	28	2	27
54	Ż	PBW – port Żerań next to lock	520+0.8	C	-2	-2	-2	-2	5	5	5	-2	-2	-2	1	54	13.8	54	-6	6	16	-7	-1
55	Ż	Żerań – Spójnia	520+1.2	A	-2	-2	-2	-2	5	5	2	2	-2	5	9	44	28.6	34	1	10	30	12	11
56	Ż	Żerań – former harbour canal	520+1.2	C	-2	-2	-2	-2	5	5	5	-2	-2	2	5	51	20.1	49	-5	7	23	-1	5
57	Ż	Żerań – cove eko (2)	520+1.4	G	-2	-2	2	2	5	2	2	-2	-2	5	10	43	15.4	52	-2	8	17	-2	13
58	Ż	Żerań – cove (3) – South side (green)	520+1.7	G	-2	-2	-2	-2	5	5	-2	-2	-2	-2	-6	59	9.7	56	-9	3	4	-8	-8
59	Ż	Park Żerański	520+1.8	F	-2	5	2	5	5	5	5	2	-2	-2	23	26	29.4	33	31	39	30	13	24
60	Ż	Żerań – cove (3) – North side (industr)	520+1.9	C	-2	-2	-2	-2	5	2	-2	-2	-2	5	-2	57	9.4	57	-12	-4	7	-3	-1
61	Z	Żerań – canal – water stop	520+0.8	B	-2	-2	2	-2	5	5	-2	5	-2	2	9	44	27.4	38	5	12	24	14	9

[1] Side of the river: L-left, R-right; Z-sites located in area of Żerań Port;
[2] Explanation of ratings given in columns 6–15: 5 – condition fulfilled, 2 – condition partially fulfilled; -2 – condition not fulfilled, 0 – condition not applicable;
[3] Values in columns 16, 18 and 20–24 – the higher the value, the higher score in the overall sites' classification and greater the suitability of the location for a given type of water sport and recreation;
[4] grey cells – top ranking scores.
Source: own elaboration.

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

Table 3. General summary of field survey results regarding sites' external location conditions

Assessment criteria – operating requirements (c)	Criterion fulfilled score 5		Criterion partially fulfilled score 2		Criterion not fulfilled score -2		Criterion not applicable score 0	
	no. of sites	%	no. of sites	%	no. of sites	%	no. of sites	%
Close to the city center	20	32.8	5	8.2	36	59.0	0	0.0
Close to the local center	29	47.5	3	4.9	27	44.3	2	3.3
Supra-local recreation site	21	34.4	11	18.0	29	47.5	0	0.0
Local recreation site	16	26.2	10	16.4	35	57.4	0	0.0
Location out of the flood risk area	19	31.1	1	1.6	40	65.6	1	1.6
Good car accessibility	49	80.3	7	11.5	5	8.2	0	0.0
Good cycling accessibility	54	88.5	3	4.9	7	11.5	0	0.0
Good public transport accessibility	32	52.5	9	14.8	20	32.8	0	0.0
Location upstream section of the river	33	54.1	1	1.6	26	42.6	1	1.6
Good access to the water body	36	59.0	10	16.4	13	21.3	2	3.3

Source: own elaboration.

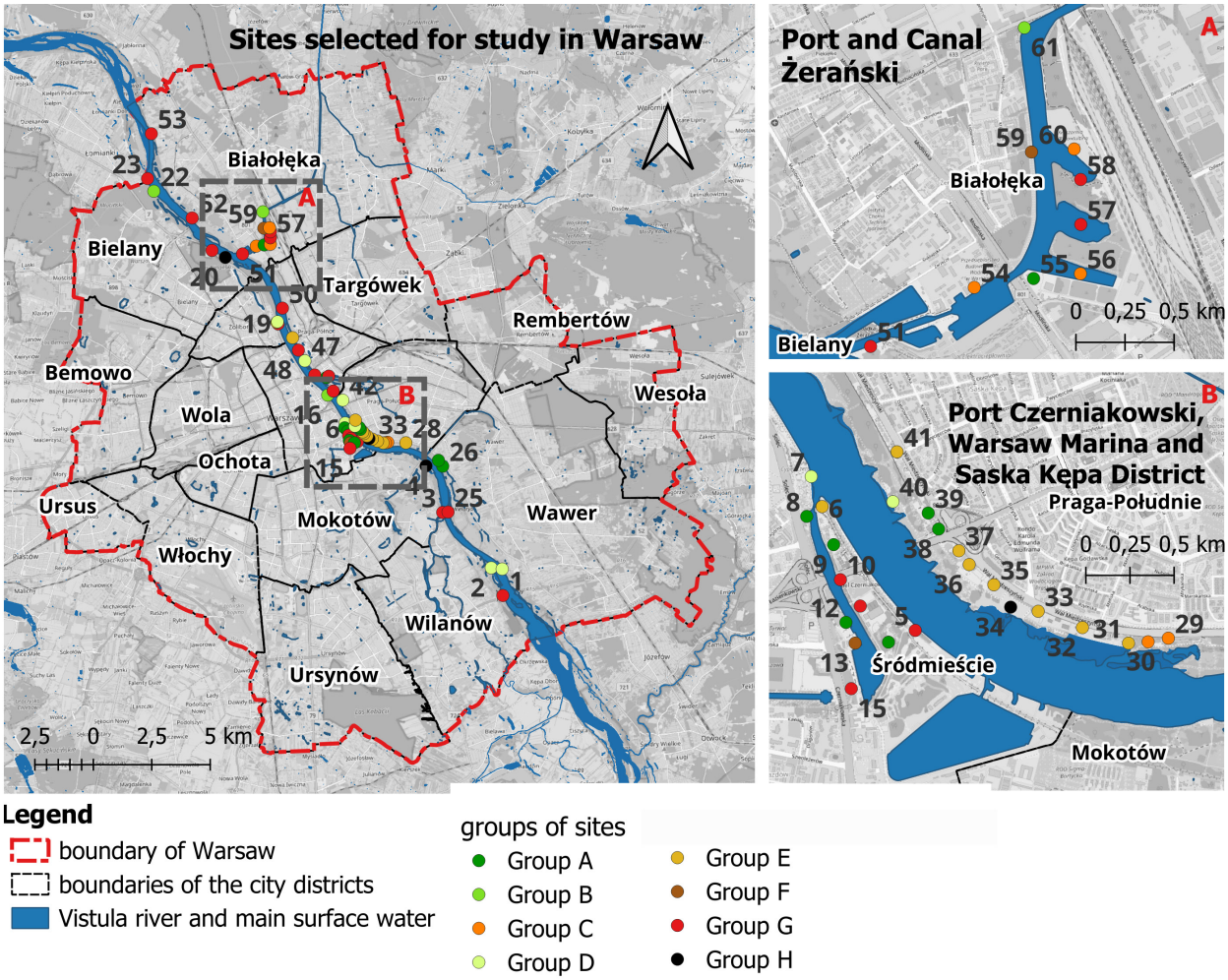

Fig. 1. Location of the study sites divided into groups
Source: own elaboration.

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

Boat House and small beach (Group E, No. 36); Warsaw Marina (Group A, No. 14); Bosmanat (Group A, No. 8); Miejsce (Group G, no. 15); Poniatówka Beach (Group G, No. 43); Pools (Group E, No. 41); Sandpit Gruba Kaśka (Group H, No. 34) and Pawilon Kamień (Group E, No. 49). It is advantageous that the highest-ranked sites represent different types (groups) of facilities.

This method also allows for the evaluation of each site's suitability, in terms of the applied assessment criteria, for the implementation of specific types of water sports and recreational activities. For example, in the case of vessels and ferries, the five highest scores based on the weighted assessment were obtained by the following sites: Rusałka Beach (G, No. 48), Bosmanat (A, No. 8), Bulwar Religii (G, No. 17), Spójnia – sport club (E, No. 18). Similarly, we can indicate the best sites for motorboats, rowing, water tourism and water recreation.

DISCUSSION

In the following section, we analyse and discuss the external determinants of the development and management of water sports and recreation in urban riverside areas, drawing on empirical results from Warsaw.

Location of the sites in relation to the city centre and local centres

The offer of water sports and recreation activities should be addressed to diverse users. Many individuals are drawn to sites located near the city centre, benefiting from easier transport links, the vicinity of other cultural attractions, and the scenic appeal of both modern and historic urban landscapes. This group of users may include tourists and residents of districts distant from the Vistula River who occasionally participate in water sports and recreation. The authors consider proximity to the city centre particularly significant for large vessels and ferries, motorised water recreation, and water tourism. The proximity to local centres considers the previously empirically established tendency for a decline in the frequency of visits to green spaces with increasing distance (Coombes et al., 2010; Giles-Corti, 2005; Haeffner et al., 2017). The proximity of sports and water activities to local centres can help attract and engage the local community. The local centre is considered a multifunctional area designed to meet the various needs of the local community. These needs encompass shopping, employment opportunities, access to social infrastructure (e.g. cultural facilities, schools, healthcare services), and, importantly, opportunities for leisure activities in public spaces (e.g., entertainment, recreation, social gatherings). The local city centre serves as a socio-economic hub for a specific part of a district or housing estate (Mól & Siłuszek, 2019; Sadowy & Niewęgłowska, 2020). This concept is close to the idea of a "15-minute city". It is consistent with the implemented "Warsaw Local Centres" program (Happach & Sadowy, 2015) and the objectives of both the current and proposed new Warsaw development strategies (Strategy of Warsaw 2030; Warsaw 2040+, 2024).

The Vistula River and its surrounding areas are one of the primary development axes within the city's spatial and functional structure. The functional performance of the analysed sites close to the city centre is advantageous in terms of their maintenance and development (a greater number of users), and positively influences the image of the city. However, from the city's development strategy perspective, having at least one water sports and recreation facility in each district bordering the Vistula would be beneficial. This factor is crucial for various water activities, including vessel owners, motorised water recreation, water tourism, kayaking, stand-up paddleboarding (SUPs), and general "on-water relaxation."

The analysis of inventory results reveals two dominant groups of sites:

1. The sites located peripherally in relation to both the city centre and local centres (sites Nos. 1–4, 20–27, 29–30, 49–58, 60–61). This factor is less significant for individuals engaged in sports, but it is important for those interested in water recreation. These facilities

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

must often attract users through a distinctive and appealing offer (e.g., program, sports infrastructure). Good and diversified car and public transport accessibility is also crucial for these locations.

2. The sites located close to the city centre and local centres (Nos. 16–19, 34–40, 42, 44–48). These locations are highly advantageous and can be expected to attract a large and diverse group of users with varying needs. The offer of such water sports and recreation sites could include access to the Vistula river cruises and less skill-intensive activities (e.g., recreational kayaking).

Transport accessibility and sustainable urban mobility

The functional performance of sports and recreation facilities is critically dependent on their integration within the urban transportation system, particularly in relation to sustainable urban mobility. Individuals with higher accessibility to leisure opportunities are more likely to translate potential into visits to a broader range of leisure locations (Liao et al., 2025; Liu et al., 2023). This issue encompasses three mutually complementary transportation subsystems:

1. Car accessibility – particularly crucial for transporting water sports equipment, access for persons with reduced mobility, and other users of water-based facilities;
2. Public transportation accessibility;
3. Cycling accessibility.

The majority of the analysed sites are accessible by car; nonetheless, vehicular access to several facilities (Nos. 6, 25, 50–52) is restricted or unavailable due to the poor technical state of certain roads, including unpaved or concrete slab surface, and embankment crossings. Public transportation accessibility is relatively good, though it is not possible in several cases (Nos. 1–5, 11, 21–25, 50–54, 56–58, 60). Undoubtedly, the biggest asset of the transportation system is cycling accessibility. The Vistula River Valley is a natural corridor for bicycle communication, facilitating north--south movement virtually along riverbanks, river crossings, and access to areas distant from the Vistula. The cycling path network, supplemented by low-traffic roads, is increasingly extensive, offering relatively safe cycling conditions and thus being highly popular among Warsaw residents. Cycling access is possible to almost all analysed sites, including those inaccessible by car. However, in many cases, secure bicycle parking facilities are lacking. The significant interest in this mode of urban transport has encouraged some event organisers, such as those of kayaking events, to offer bicycle transport services to the endpoint of the river trips. It follows from the above that integrating various transport modes within Vistula-based sport and recreation has the potential to foster the development of sustainable urban mobility.

Flood risk as a factor affecting the operation of water sports and recreation sites

Flood risk is one of the most significant factors affecting the potential use of the analysed sites. Most of them are located within areas of high flood risk, specifically within zones of particular flood hazard with a probability of occurrence once every 10 years (Q10%). Only sites in the Czerniakowski Port (Nos. 8–15) and those in the Żerański Canal and Żerański Port (Nos. 54–56, 58, 59, 61) are beyond the reach of the flood. Effective land management within flood--prone areas involves minimising flood risk, which is understood as the reduction of potential adverse social, economic, environmental, and cultural impacts of flooding. Land use planning to manage flood risks must balance competing needs: it should seek to maximise net benefits from waterfront economic and recreational activities and ecosystem services, while ensuring minimum loss of life and property through safe location, safe construction, and safe activities. In the case of water sports and recreational areas, these measures primarily involve aligning the intensity of land use with the implementation of technical and construction solutions to match the assessed level of flood hazard. Water-related land use, such as ports, marinas, sport and recreation facilities, can and should be considered in urban planning documents

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

that determine land use and development principles within flood-prone areas (Baca Architects, 2009; DCLG, 2009; Januchta-Szostak, 2014). The diversity of water sports and recreational activities allows us to consider the implementation of various solutions and design strategies. They include:

1. Appropriate selection of sites according to the flood risk level:
   a. in the area of the flood zone – sites and facilities that can operate using lightweight construction, partially temporary structure (e.g. lightweight and floating platforms that can be easily dismantled or reconstructed);
   b. in the area with low to medium flood risk (distant from the riverbed, on high ground or outside the flood zones) – sides and facilities with a broader scope of water activities which require permanent structures such as hangars, equipment storage warehouses, workshops, administrative, sanitary, and catering buildings.
2. Construction and materials for buildings and other similar structures with appropriate physical properties, including strength and resistance to periodic flooding.
3. The location, spatial form, and construction of sport and recreation facilities cannot limit or adversely affect floodwater run-off.
4. Waste, water, sewage and fuel infrastructure should be designed and maintained in such a way as to minimise the probability of water contamination.

All planning, decision-making, and investment activities in this area must be based on formal requirements, particularly compliance with the provisions of the Act of Spatial Planning and Development (Journal of Laws of 2003, No. 80, item 717) and the Act of Water Law (Journal of Laws of 2017, item 1566). These legal frameworks establish the basis for cooperation and the integration of activities between the municipal authorities of the City of Warsaw and the relevant administrative bodies responsible for water management within the Vistula River basin, specifically the State Water Holding – Polish Waters (hereinafter referred to as Polish Waters). The City itself, without the involvement of Polish Waters, does not have the legal authority to undertake works on watercourses. The potential for good cooperation is demonstrated by, among others, the development of the Vistula Boulevards and the construction of bicycle paths within the floodplain on the right bank of the Vistula, as well as along the flood embankments. Reactivating old water sports and recreation facilities and integrating new ones into the system is challenging and will require further institutional cooperation and coordinated actions.

Location upstream section of the river

The authors considered this criterion relevant to how water sports and recreation are organised and operated. The location of facilities "upstream of the river" was deemed especially advantageous for sites that operate as water tourism and recreation spots (e.g., places for stopping or starting trips). Such a location, for instance, is conducive to organising short river trips, whose routes are limited to the city itself. It is particularly relevant for users seeking to maximise the navigable distance in a city available for activities such as kayaking or canoeing. In the case of the Vistula in Warsaw, the Świętokrzyski Bridge was set as the boundary for this division between upstream and downstream of the river. In the so-called upper course of the river within Warsaw, there are 33 facilities (19 on the right bank and 14 on the left bank – most of which are close to the city centre).

Good access to the water body

Of all the analysed requirements for operating water sports and recreation, access to the river water body is one of the most important. The degree of physical accessibility to the river channel affects the number and variety of water activities. "Water accessibility depends on several factors such as – the horizontal distance from the public space to the water edge, – the vertical distance from the open space ground to the water level; – the physical and visual barriers between the water and the open space (vegetation, fences, walls, breakwaters etc)" (Durán

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

Vian et al., 2021). According to the field studies, 36 sites have good water access, 10 have limited access, and 13 have no access (Table 2 and 3). The latter group mostly concerns the facilities that provide or have provided service activities such as training, renting and servicing of water equipment, as well as some of the currently non-functional facilities (e.g., Kora Swimming Pools – no. 28). Some of the facilities are located on a high quay, restricting some users' water access. An unfavourable location, in this case, does not always preclude conducting service activities. They can support the operation of other nearby, more favourable sites.

CONCLUSIONS

Warsaw authorities will undoubtedly continue to incorporate the Vistula River and its riverside areas, which are functionally and spatially connected, into the city's structure. The multifunctional development of city riverside areas requires consideration, among other things, of the ability to enhance water sports and recreation programs. The basis for decision-making should be up-to-date knowledge of existing resources, development factors, and user needs. The study results have practical applications. They can support city authorities in decision-making regarding spatial planning and development, as well as financing water sports and recreational activities. The study results are related to the particular case study. However, the methodological approach can be helpful and recommended for other cities facing the issue of land use and development in urban blue areas.

A crucial methodological stage of the study is the selection of sites to be included in the analysis. It is worthwhile to approach the subject broadly and consider sites that do not currently function as sports facilities. In some cases, extensive land-use changes should be considered. The field study conducted on the Vistula riverside in Warsaw identified 61 locations that have potential for the development of water activities and could be considered an element of the water sports and recreation framework. There are only 13 existing and operating river marinas, water sports clubs, and water stops for boats and ferries. An interesting and challenging site comprises sand pits, areas under bridges, and derelict water recreation facilities, including shipyards, boat houses, and marinas. These currently degraded areas should be regarded as valuable urban resources that can be revitalised to serve new functions, including water-based activities, and contribute to the sport and recreation framework within the river corridor (Kosiacka-Beck et al., 2024).

Assessing the city's potential for developing water sports and recreation requires a multi-criteria analysis. The broad scope of the analysis and the method itself enable the elimination of some locations due to their low suitability for water sports and recreational functions, to identify facilities suitable for particular forms of water sports and recreation, and to identify multifunctional ones. Due to the limited volume of the article, we decided to present only part of the study results, including management and development conditions related to the location of the facilities within the particular spatial structures and connections.

Based on the development conditions and requirements presented in this paper, it can be stated that only a few of the analysed sites, including those currently in operation, have an optimal location. The primary constraints stem from flood risk, which impacts nearly all facilities. The assessment with respect to other location criteria is more diversified, with transport accessibility emerging as the most favourable factor.

The multi-criteria analysis of factors affecting the suitability of sites for various types of water sports and recreation facilities, as presented in this study, enables a comprehensive overall ranking of sites and detailed assessments of individual locations. The obtained research results may serve as a valuable foundation for subsequent measures in spatial planning and management, aimed at developing particular solutions at both the city-wide level and within specific sections of the riverside areas. Such actions might be primarily beneficial for riverside areas that currently offer limited sports and recreational activities or require revitalisation. Secondly, it enables diversification

✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

of the water sports and recreation programme – from comprehensive, multi-activity offers to those focused on a single water activity.

The proposed methodology for assessing selected sites is primarily based on an understanding of the needs and operational requirements of various types of water sports and recreational facilities. It draws on the practical expertise of managers, supervisors, coaches, and organisers of water sports and recreational events, as well as participants' perspectives. Since this issue remains open to further discussion, the selection of criteria and their weighting was consulted with several professionals representing these groups. This reliance on practitioners' experience may be considered a limitation of the study. To achieve greater methodological objectivity, additional expert consultations and interdisciplinary discussions are recommended. Moreover, the method provides a valuable framework that can be adapted to incorporate local factors relevant to the specific conditions of riverside use in other cities.

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✉agata_pawlat_zawrzykraj@sggw.edu.pl, ✉piotr@przystan.warszawa.pl

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