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APPROACHES TO ORGANIZING RECREATIONAL SPACES IN FOREFIELDS OF HISTORIC FORTIFICATION

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Abstract

The article analyzes the techniques of landscape design in the castle territories of Oświęcim Castle, Malbork Castle, and Wawel Castle in Kraków. The main features of the territories and the influence of water bodies on the nature of the layout of recreational areas are determined. The common and distinctive features between the applied recreational techniques are analyzed, and on this basis, possible options for transforming the castle territories into park areas with a different set of functions are indicated. Despite the positive consequences, the landscaping of the historical forefield has certain problems, since it contributes to additional moistening of already subsiding soils, which, in turn, affects the soaking of foundations and gradually leads to soaking of masonry, subsidence of parts of buildings, and the appearance of active cracks, especially if part of the castle is located close to the water and not on an elevation (as in the Lower Castle in Malbork).

Keywords: *Specificity; Recreational space; Historical fortification, Oświęcim Castle, Malbork Castle, Wawel Castle*

Introduction

The issue of the modern use of Forefield Castle territories in modern conditions is relevant for countries with historical fortifications. As can be seen from the examples of Poland, such territories are often transformed into recreational park areas. In the case when, for certain reasons, part of the fortress walls are dismantled, their place is symbolically determined by a strip of park area of the corresponding outline. A well-known example of this is the Planty in Kraków, which is arranged according to the outline of the old fortifications of the historical medieval part of Kraków. Today, the Planty separates the oldest part of Kraków from the buildings of the 19th-21st centuries.

A separate issue is the use of the territories adjacent to the castles, the so-called forefield, which originally performed a strategic function and therefore will be deprived of any development. In modern conditions, these territories have gradually found themselves in the central areas of cities, and the proximity to rivers makes them attractive for the creation of recreational areas. Another argument for the creation of park areas here is that the forefield cannot be built up so as not to block the panoramic views of the castle. In addition, it is usually a fairly narrow strip of the coastal zone that is flooded by floods.

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The study analyzed methods of modernization and the arrangement of pre-castle waterfront areas for recreational purposes. The examples of three castles in Poland were studied: in Oświęcim, in Malbork, and in Kraków.

The purpose of the study was as follows: to analyze the influence of the location of castles relative to the terrain and proximity to water on the possibilities of creating park and recreational areas in the forefield and to compare the methods of making such areas with the appropriate layout and set of functions.

The objectives of the study were as follows:

– to characterize the location of castles in the natural environment and their corresponding impact on the planning of the recreational area;

– to compare landscaping techniques and determine the commonalities and differences between them;

– based on field studies of the arrangement of pre-castle territories, to determine a list of possible landscape design techniques for managing such areas.

The purpose and objectives of the study determined the choice of the source base in the following areas:

– publications devoted to the problems of preservation and rehabilitation of the historical environment [1], [2], [3];

– studies devoted to the history, restoration, and modern use of historical fortifications of Poland and the Czech Republic [4-21];

– studies devoted to the interaction of a historical object and the surrounding space [2], [3], [18], [19], and articles covering restoration technologies [20-21].

Also, a large series of bibliographic references from the scientific literature in the field were used in the preparation of this study, of which we mention only a few representative ones [22]-[26].

The study of the source database identified the need for research that analyzes how the forefield is used in modern conditions.

Materials and Methods

The purpose and objectives of the study determined the choice of methods used in the study. The method of historical analysis allowed us to determine the history of outstanding castles and the periods of development of castle development. This allowed us to argue certain features of the forefield formation in each specific case. The method of comparative analysis allowed us to compare three examples of the location of castles in the natural environment, to determine what is common and what is different, and then to project these results onto the features of the forefield territories. The method of comparative analysis also allowed us to compare the methods of transforming the forefield territories into park recreational areas, determining what is common and what is different in landscape design.

The evidence base of the study and the conclusions obtained as a result are the iconographic method (study of archival and scientific sources, archival photographs, and drawings) and the method of photo fixation.

Results and discussion

Location of castles and surrounding waterfront areas

For the analysis of the organization of recreational park areas, only riverside forefields were taken. The castle in Oświęcim and Wawel Castle (Kraków) are located high above the water level – the castle in Oświęcim above the Soła (Fig. 1) and Wawel Castle above the Vistula (Figs. 2, 3). At the same time, a network of strategic tunnels was organized in the thickness of the castle mountain in Oświęcim in the 19th–20th centuries. On the other hand, the lower castle in Malbork is located almost

at the level of the river, which causes part of the castle to be flooded in the event of a flood. The Nogat River is located in the Vistula Delta, and the castle itself is located on its right bank.

Fig. 1. Castle in Oświęcim (2025)

Fig. 2. Wawel Castle. View from the river (2024)

When analyzing the width of the rivers in question, it should be noted that the width of the Vistula near Wawel is 130–140 m, the width of the Nogat near the castle is 27 m, and the width of the Soła near the castle is 10 m. The Soła and Nogat are tributaries of the Vistula, while the Soła is a mountain river. It is worth noting that the Vistula and Nogat are navigable, so cruise ships and water trams, among others, sail here. In Kraków, barges moored on the Vistula also serve various functions. On the Soła, on the other hand, especially in the summer, various events such as festivals combined with competitions and games are organized.

Fig. 3. View of part of the Wawel Castle and the river (2025)

The rivers discussed are an important element of water tourism, which undoubtedly has a significant impact on the recreational areas located in their vicinity. The proximity of water allows for wider use of the recreational areas located near the castles.

In terms of the level of tourist trails above the water level, it is lowest in Malbork and higher in Oświęcim and Krakow.

Techniques for creating recreation areas within the coastal zones of the castle

The main attraction of recreational areas is the presence of tourist attractions – historical fortifications – former defensive walls on the banks of rivers and lakes. However, the presence of greenery in the immediate vicinity of castles and water reservoirs, as well as ground subsidence, is damaging to these structures, as moisture contributes to the disruption of the "ground-foundation-structure" system. For example, in the wall of the oldest part of the castle in Oświęcim – the tower – moisture can be observed in the lower part and cracking of the mortar (Fig. 4). Similar situations can be observed in many places in Wawel Castle (Fig. 5).

The degradation processes observed in both castles are typical for historical masonry structures located in humid environments. The capillary rise of water through the foundation walls sometimes reaches heights of 1.5-2.5 meters, depending on the porosity of historical building materials and the lack of modern damp-proof courses. Chemical analysis of efflorescence on the surface of walls reveals the presence of soluble salts (mainly sulfates and chlorides), which migrate with moisture and crystallize in the pores of the material, causing progressive disintegration. The cyclic freezing and thawing of water accumulated in the masonry during winter months accelerates the destruction of mortar joints and brick surfaces. Historical lime mortars, with compressive strengths ranging from 0.5 to 2.0 MPa, are particularly vulnerable to moisture-induced deterioration compared to modern cement-based mortars. The proximity of dense vegetation additionally reduces natural evaporation from wall surfaces and creates microclimatic conditions favorable to biological colonization by mosses, lichens, and fungi. In the case of the Oświęcim tower, thermal imaging surveys have detected thermal bridges at the base of the wall, indicating areas of maximum moisture concentration that require priority intervention through the installation of drainage systems and possible injection of chemical damp-proof barriers.

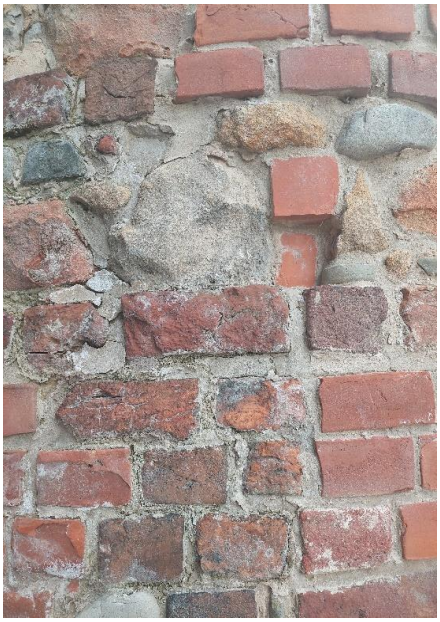

Fig. 4. Castle in Oświęcim. Peeling off ancient mortar (2024)

Fig. 5. Wawel Castle. Dampness in the wall (2025)

The church of the Salesian monastery in Oświęcim stands on the same subsidence soils, and subsidence phenomena are recorded in the interior, on the vaults and walls, in the form of active cracks with tendencies of opening. We have given the example of this church because it is located not far from the Oświęcim castle and above the recreational park area of the Soła River. In Oświęcim, the recreational area consists of two parts on several levels – one of them has a more natural character and is adjacent directly to the Soła bank (Fig. 6).

Fig. 6. Riverside Park in Oświęcim (2025)

Walking paths with trees stretch from the foot of the castle hill. The level of the green belt changes with distance from the castle to the fourth bridge: around the mountain, this belt is

narrow, and after the second bridge, it gradually expands due to the inclusion of territories remote from the river. In the middle part of the green zone, there is a sports ground with exercise machines and a recreation area in the summer. The regional character is given by wooden sculptures on tree trunks and ducks that are not afraid of people. Work is underway to create additional entertainment areas and underground parking. As already noted, this green zone is a favorite place for citizens to relax at different times of the year, where festive events are held.

In 2021–2025, a modern terraced park with an elevator for people with disabilities and underground parking was organized (Fig. 7). This park differs from the riverside recreation area in that it has a strongly artificial character and consists of several connected terraces with seasonal flowers. The creation of such an underground parking also had advantages from a geological point of view, namely, strengthening the subsiding steep slope.

The park was named Planty Oświęcim. It uses the method of maximum environmental friendliness; the underground parking for 142 cars is hidden in the slope, and on its roof, there are terraces with benches and lighting, planted with flowers and low-growing shrubs. The third stage should be completed in May 2026 and will cover the area from the Jagielloński Bridge to the parking lot on Bulwarna Street, with an area of 10 hectares. It is planned to plant 105 species of trees and perennial plants of bright colors and arrange green lawns. The new park area will include roller skating tracks, a children's playground, a water park, and a dog walking area. A walking area on wooden platforms among the plants has been designed.

Fig. 7. The upper terrace of the parking lot near the Salesian Church (2025)

The width of the riverside strip in front of the castle in Oświęcim and Malbork is similar in some places. In Malbork, this is the promenade area of the M. Kilarski Boulevard, from the railway bridge to the end of the city beach. As in Oświęcim, views of the castle are provided from the bridges over the river and from the undeveloped riverside space (Fig. 8).

Here, the recreational area is designed in three levels:

– the lower one with river plants and a slope;

– the main middle promenade area with paths, resting areas with benches and lighting, and the upper slope area with trees and lighting, which adjoins directly to the retaining wall of the building.

The park area is visually and functionally connected by wide stairs to the upper level, where the castle and adjacent buildings are located.

The work on the creation of a modern park and recreation area along the banks of the Nogat River was completed in the summer of 2022 as part of the project "Common paths – the development of the tourist potential of Malbork and Swietłyj" in accordance with the 2014-2020

cross-border cooperation program. A so-called parkrun, a free sports event, is organized along the route, when participants cover a distance of 5 km to the Rotmistrz W. Pilecki Bridge and the city beach (Fig. 9).

Fig. 8. View of Malbork Castle and the recreation area from the bridge (2025)

Fig. 9. Park and recreational zone of the Nogat River (2025)

These two riverside park areas near the castle have the following in common: undeveloped open spaces that do not obstruct the view of the castle, and the castle is included in the visual panoramas of the recreational area. Both projects aim to create a green recreational space with a simultaneous combination of different forms of recreation – active and passive.

The differences between the two projects are as follows: the larger area of the riverside areas in Oświęcim opens up opportunities for a larger scale of landscape design and a variety of recreational activities. A larger number of trees are also used, while in Malbork, herbaceous plants take on the main role.

The riverside area in Oświęcim is located on several levels. The levels are terraced and connected by slopes. The first level, adjacent to the water, has the most natural character; on this

level, there are two paths connected by a lawn. The second level is separated by a green slope with a large number of trees of local species. On this level, there is a pedestrian path paved with tiles and a wide asphalt road. On the other side, the asphalt road is separated by a green lawn with trees and benches with lighting; here, local tree species also prevail.

In contrast to the natural English character of the park is a modern park on the roof of the parking lot, where there are no tall trees, and the tiers are planted with hydrangeas, lavender, echinacea, low-growing plants of bright colors, and herbs. This park is designed in the traditions of Scandinavian minimalism.

The first tier is oaks, acacias, ash trees, Canadian red oaks, willows above the water, and lindens. The slope between the first and second tiers is landscaped with conifers, lindens, maples, and chestnuts.

The connection between the first and second tiers is a natural stream with a waterfall that flows into the Soła.

The further from the castle, the slope between levels 1 and 2 becomes flatter. There is a sports area and a children's play area, as well as a recreation area for citizens.

Under the trees on the 2nd tier, flower beds of hostas, bush roses, and bushes are arranged. There are yew bushes, plane trees, and ginkgo. The contrast to the natural nature of the landscaping of the 2nd tier is the landscape design of the landscaping of the underground parking lot. The slope is divided into four tiers, connected by stairs and ramps, in front of which there is a free stage space. The layout provides for holding various musical events and concerts here.

The forefield-riverside castle area of Oświęcim is more intimate and similar to English parks with an emphasis on naturalness and coziness compared to the parks in Kraków and Malbork. A water park will be built in more remote areas, where local centuries-old trees, Canadian oaks, lindens, maples, and several old acacias grow.

Thus, when planning the castle riverside recreation in Oświęcim, the emphasis is on subordinating the attractions to the natural environment. Tree trunks that have fallen into the water and bushes on the coast add naturalness and picturesqueness to the landscape. The main difference between the situation in Oświęcim and the riverside areas near Wawel Castle and Malbork Castle is a narrower river and an undeveloped opposite bank with dense vegetation.

Compared to the castles in Oświęcim and Malbork, the riverside area of the Wawel Castle is the widest, and the castle itself stands highest above the water. Recreation has a terraced character on two levels – the upper terrace is adjacent to the castle's retaining walls; there are pedestrian and bicycle paths, herb gardens, benches, park sculptures, and souvenir stalls (Figs. 10, 11).

Fig. 10. The upper terrace of the recreational area under the walls of Wawel Castle (2025)

Fig. 11. The upper terrace of the recreational area under the walls of Wawel Castle (2025)

Fig. 12. View of developed recreational areas on the other side of the river (2024)

Then a steep grassy slope leads to a wide embankment with pedestrian and bicycle paths. In contrast to the landscaping of the parking lot in Oświęcim and the embankment in Malbork, the riverside area under the Wawel Castle has a more traditional character with herb gardens and traditional tree species – oaks, ash trees, lindens, maples, and chestnuts. There are more deciduous trees here than in Malbork and fewer than in Oświęcim. In fact, only here is a true wide embankment arranged. Unlike Malbork and Oświęcim, recreational areas are also arranged on the opposite banks of the Vistula (Fig. 12).

Conclusions

The tradition of designating former defensive walls that have not survived as recreational areas is quite widespread. A classic example is Krakowskie Planty. However, the analyzed examples of recreation are organized within the historical foreland, which should have been undeveloped.

The main differences between the transformation of riverside forefields of castle territories into recreational areas in Oświęcim, Malbork, and Kraków were due to the following:

1. Natural factors, such as the relief and width of the river.

2. Urban factors: in Kraków and Malbork, the buildings approach the opposite bank, and the bank is open to view, while in Oświęcim, on both banks of the Sóla, there are park areas with a lot of greenery.

As a result of the influence of external factors, the park area in Oświęcim has a greater amount of greenery from local trees, shrubs, and plants and has a more intimate character, akin to the principles of English parks of the 19th century.

The recreational area in Malbork is more modern in character, based on the principles of Scandinavian minimalism and akin to the terraced landscaping of the parking lot in the boulevard area.

An analysis of the landscaping of the pre-castle areas of three famous castles in Poland has shown that security restrictions do not allow building on these areas, and instead, the best option is to create recreational areas around the castles. Various approaches are possible, including adhering to the principles of the so-called "English park" and using local tree and plant species or emphasizing artificially created green spaces, where the amount of greenery is less, and instead of tall and dense tree species, herbs, low-growing plants, and shrubs are used.

Such an arrangement of the castle territories for undeveloped green recreation has several advantages:

– the absence of new development does not hinder the inspection of the castle;

– such recreation contributes to the influx of visitors not only to the park but also to the castle.

At the same time, such landscaping has certain problems, as it contributes to additional moistening of already subsiding soils, which, in turn, affects the wetting of foundations and gradually leads to wetting of masonry, subsidence of parts of buildings, and the appearance of active cracks, especially if part of the castle is located close to the water and not on an elevation. From a structural engineering perspective, the transformation of castle forefields into park areas creates a complex soil-structure interaction problem that requires careful geotechnical assessment. The additional irrigation of green areas, combined with natural precipitation and river flooding events, increases the saturation level of already compressible soils, typically characterized by high plasticity indices and low bearing capacity. The root systems of mature trees, particularly willows and poplars planted within 10-15 meters of foundation walls, can penetrate existing cracks and exacerbate structural damage through both mechanical action and the draw of moisture from soil during dry periods. Engineering solutions should include the installation of comprehensive drainage systems with perforated pipes laid at depths of 0.8-1.2 meters below ground level, directed away from foundations, and regular monitoring of groundwater levels using piezometric wells. The use of water-permeable paving materials for pedestrian paths, combined with bio-retention swales for rainwater management, can significantly reduce the hydraulic load on foundation soils. In critical zones, particularly where medieval foundations lack adequate depth (often only 0.6-1.0 meters below ground level), underpinning with micro-piles or soil stabilization through controlled grouting may be necessary to prevent further settlement and structural distress.

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