Human Factors in Architecture, Sustainable Urban Planning and Infrastructure, Vol. 153, 2024, 7–14
https://doi.org/10.54941/ahfe1005333

Problems of Designing Infrastructure of Tourist Trails in Protected Landscape and Nature Areas. Analysis of Selected Examples

Alicja Maciejko[1] and Michal Grzeskowiak[2]

[1]Institute of Architecture and Urban Planning, University of Zielona Gora, ul. Prof. Z. Szafrana 1, 65–516 Zielona Gora, Poland
[2]Institute of Geography and Regional Development, University of Wroclaw, pl. Uniwersytecki 1, 50–137 Wroclaw, Poland

ABSTRACT

The article presents problems of designing the tourist infrastructure for tourists, including disabled people in protected landscape areas on the selected examples from Europe. They concern design problems and intense tourist traffic towards and within protected areas. The quality of access to protected areas is significantly influenced by the architecture of tourist infrastructure objects presented in the article. At the introduction, there is an analysis of current regulations and implementation practice from the designer's and user's point of view. Design problems were discussed on the selected examples in terms of changing regulations and under the influence of increasing the social sensitivity to the problem of accessibility for the people with disabilities and also, which is the essence of the design in an area of unique natural values, responsibility for the quality of natural open spaces, protected landscapes. There are many studies discussing the problems of disabled people in the apartments, public spaces and buildings. Now, this issue is expanding into open landscape areas, tourist routes and areas of legal nature protection. However, the implementation of full accessibility, as well as making the protected landscape available for tourism, is conditioned by many limitations. The article presents an analysis of what actions can be taken and what areas can be designated for full and partial accessibility. The principles of designing infrastructure on hiking trails in the context of natural and technical conditions as well as safety and ergonomics were also presented.

Keywords: Hiking trails, Ergonomics in architecture, Accessibility in tourism, Nature protection, Mountain trails, Small architecture

INTRODUCTION

An important problem that encourages investing in the development of active tourism (including the design of accessible hiking trails) is overpopulation of cities and increasingly common civilization diseases, including mental ones, related to stress, pollution of the urban atmosphere with exhaust fumes, light and noise. Directing tourist traffic to the periphery results in the development of spaces for recreation and rest in nature. Providing access to naturally

attractive areas involves the construction of communication infrastructure towards natural areas and national parks under nature protection, as well as the development of tourist services and accommodation. Project activities related to making nature conservation areas available for tourism are carried out in many landscapes and national parks around the world, even though they are inevitably associated with possible irreversible degradation of natural landscape elements. Nature conservation in national parks takes priority over other activities related to making them available for tourism. Natural environment and specific landscape features are protected there. For this reason, designing in protected landscape areas is very different from designing public space in landscapes or urbanized areas. Despite the openness to tourist activity and the promotional activities of parks encouraging this form of recreation, as well as the expansion of the offer addressed to sports-active people and people with mobility limitations and other problems, both the preparation of routes and information about the possibilities of using them should be done individually, after analyzing many aspects related to the terrain features of places and climate. This involves overcoming many technical limitations. Making nature conservation areas available for tourism includes hiking, cycling, skiing, kayaking and other routes. This article discusses the problems of designing the infrastructure of hiking trails in selected national parks.

DESCRIPTION OF THE PROBLEM

Buildings located near national parks, such as hotels and hostels, are usually built in strategic places, accessible by transport, and design rules apply in accordance with the law and standards as for public facilities located on construction plots. The principle of nature protection is a primary and integral part of design in protected areas, but the buildings and related infrastructure always significantly disturb the existing landscape. Technical, construction and functional aspects, equipping the facilities with media, technology related to the preparation and serving of meals (for restaurants), equipping the hotel rooms for tourists and the principle of accessibility are implemented and regulated by law.

The infrastructure on the hiking trails usually includes small architectural objects and their design is not covered by any applicable design rules, because they are usually located in areas that are not intended for construction activities. This means that construction law regulations do not have to apply. Moreover, the very planning of the type, character, size, and location in the landscape, density and number of these objects is also not regulated by the general planning law, according to which these objects should be designed by an authorized architect, as in the design of buildings. Therefore, there is a potential possibility that these objects may be constructed without observing ergonomic standards, aesthetic principles, and strength calculations, even in the case of large observation towers. The architect does not participate in the process of planning routes or in the selection of locations for small architectural objects. Meanwhile, according to the authors of this article, these facilities should be designed with much greater aesthetic and technical

care than urban facilities, due to difficult terrain conditions, natural, scenic, functional, and aesthetic problems.

The definition of tourist infrastructure facilities (landscape architecture) is not clear. In this case, it concerns facilities that are not buildings and are constructed in areas of legal nature protection, i.e. they are not implemented as public utility facilities in construction areas. These are both small-sized elements, e.g. signs, plaques, signposts, educational and information boards, buckles and chains, plaques (tin trail markings, signs are placed on field objects (trees, poles, rocks, walls, etc.), places to sit, fences, tables, waste bins, facilities at the entrances to protected areas (gates), ticket offices, rest shelters as well as engineering facilities implemented in difficult terrain conditions, such as routes, platforms, stairs and observation towers. Allowing tourist traffic in protected areas requires compliance with nature protection law, which assumes the least possible interference in the existing landscape, but still, for the benefit of the users, taking into account their needs (including disabled users). This includes, among other things, the designation of the routes of tourist trails that usually run through the most attractive and at the same time the most valuable natural places. This necessitates the use of unusual design principles, which should fit into the canon of requirements for public buildings. The architectural objects themselves must also stand out aesthetically; attract tourists with both functionality, accessibility, and attractive forms.

METHODS, SELECTED TOURIST ROUTES – CASE STUDIES

For the purposes of this analysis, tourist trails were characterized as mountain or lowland trails intended for hiking, both short - several kilometers, one-day long and long-distance trails, intended for several-day hikes, even several hundred kilometers long. The design of long-distance routes should include places for overnight stays. The system of hiking trails occurs mainly in the mountains, to a lesser extent in the lowlands. A significant number of them are in national and landscape parks and, what is characteristic from the point of view of design challenges, in difficult-to-reach areas, far from access roads, accessible only on foot or by air.

For the purposes of this article, three hiking trails located in Europe were selected for analysis.

1. Hiking trails in the Table Mountains National Park in Poland,
2. Tour du Mont Blanc long-distance hiking trail in France,
3. Kungsleden long-distance hiking trail in Sweden.

They are diverse in terms of nature, location, climate, length and difficulty of routes, as well as technical infrastructure and transport accessibility from urban agglomerations. Tourist traffic is also diverse in terms of the number and type of users, which is largely due to the natural environment and difficulty of the routes, due to diverse terrain, natural and climatic conditions. The management of the mentioned trails is based on different local laws, and there are no global standards for equipping and providing access to tourist routes in valuable natural areas.

The criteria for selecting the trails for analysis was the authors' own research supported by photographic documentation. Observations were made to investigate and evaluate the following issues.

- presence of disabled tourists,
- communication accessibility and existing architectural barriers,
- aesthetics, quality and functionality of infrastructure facilities available to tourists,
- accommodation facilities along hiking routes,
- readability of information (also for visually impaired people),
- ergonomics, comfort and safety of use,
- equipment and amenities (access to electricity, access to drinking water),
- the influence of terrain on individual design solutions.

The results were used to develop unified design principles. The main difference between the trails is the length of the trails and the location. One short trail located in mountainous terrain (1), one long-distance trail in mountainous terrain (2) and one long-distance trail in flat terrain (3) were selected to assess how the length of the trail and topography affect design solutions and accessibility. In the Table Mountains National Park, you cannot stay overnight outside the prepared accommodation facilities (there are several shelters there, one camping site in Pasterka). There are no overnight accommodations located along the trails or sanitary facilities, which are available only in a few of the most popular places. Admission is ticketed, one-day. The situation is completely different in Sweden and France, where overnight huts are part of the local tradition and are located along tourist routes. These facilities are usually equipped with the necessary elements needed for survival, such as wood, food, and have sanitary facilities with running water and electricity. In Sweden, there is also a sauna quite often near the huts. A gravity system is usually used to supply water, lead from existing streams, dirty water is discharged into the area, cleaning products are provided, the sauna stove is heated with wood, and drinking fountains are also available in France. The use of huts, sauna and tent sites is specified in the regulations and is subject to payment.

DESIGN RULES

Designating pedestrian routes in attractive, naturally shaped areas involves overcoming many problems, including applicable nature and landscape protection law as well as environmental, planning, logistic and technical issues related to the design of infrastructure elements in specific locations.

Small architectural objects appearing on long and short routes are largely designed similarly and should constitute a coherent, legible set of signs and forms, uniform for a given area. The aesthetics, functionality and location of all, even the smallest elements interfering with the landscape, such as signs and information boards, are particularly important because, on the one hand, they are elements that can regulate tourist traffic (eliminating accidental and intentional leavingthe trails), and on the other hand, they can be facilities that contribute to increasing the attractiveness, safety and comfort of users. These

are also elements located in hard-to-reach places, so the implementation process itself, related to transport to the construction site, the use of construction equipment, etc., is also a threat to the landscape. Some examples show that in many cases these may be objects that cannot be transported in whole, composed of small assembly elements, carried onto the trails by people or horses or transported from the air.

Logistical and field limitations introduce the rigor of design and responsibility for each designed element and result in a different nature of preparatory and design work. The issue that causes confusion in the design process is the fact that these are not areas where construction law applies, so the designer is not bound by detailed regulations such as those that are the norm for the design of public spaces in cities, e.g. regarding the dimensions of stairs, width and height of passages, lighting, sewage and rainwater drainage, as well as accessibility for people with limited mobility and people with other limitations. On the one hand, this is a justified approach, because these rules could not be met in any of the parks, where the terrain conditions are usually difficult and completing the routes requires a lot of physical effort. On the other hand, in accordance with the modern doctrine of equality and in accordance with the principles of universal design, all people should have the opportunity to use tourist attractions. Even if the use of facilities is not obligatory, an accessibility analysis should always be carried out to estimate to what extent the project can use ergonomic solutions that are friendly to both able-bodied and disabled users.

In situations of limited accessibility, consideration should be given to how to divide and mark portions of routes that have amenities such as ergonomic handrails, smooth and wide surfaces, appropriately designed driveways and parking lots, while visual information accessible to all should be included as part of the design. When designing these individual solutions, it is necessary to carry out a geographical analysis of the existing natural and climatic conditions, which have a significant impact on the design solutions, as well as a view analysis - so as not to introduce solutions that compete with the natural landscape, deform the space or obscure attractive rock formations. In many cases, the implementation of infrastructure elements may constitute dangerous elements for users and disabled people. In an open space, precision of workmanship and quality of materials are essential. Sometimes it turns out that the landscape without infrastructural interference was more friendly to disabled people than the completed project. Difficulties are most often caused by poor quality materials, aging and mechanical damage to devices and connectors, imprecise workmanship, improper maintenance of wooden elements, as well as lack of consultation with disabled people before starting the design. Freedom in designing infrastructure and marking trails can lead not only to discomfort in use, inappropriate functional solutions, disruption of spatial order, but also to disinformation, which may contribute to safety-related threats.

Functional, Technical, and Ergonomic Parameters, Design Guidelines

Analysis of the above trails showed that limiting the values of the natural landscape requires searching for universal solutions in the design of small architecture that meet the following general assumptions:

- ability to adapt to difficult mountain terrain with the least possible interference with the surroundings,
- resistance to difficult climatic conditions, durability, availability and easy use,
- simplicity, repeatability of elements, ease of manual assembly.

From a technical point of view, the choice of design solutions is most influenced by:

- resistance to water and moisture penetration,
- snow and ice load, wind load, foundation conditions
- resistance to high temperatures.

At the same time, many solutions result from individual location analysis. Elements of pre-design analysis:

- Communication: route length, tourist traffic intensity, type of sections, number of easy and extreme sections, number of tourists, access road, accessibility for parking and turning around, existing maintenance roads and fire protection conditions, natural path materials.
- Natural restrictions: protected species of plants and animals, natural elements and areas of strict protection.
- Terrain conditions: denivelation, rock formations, forest cover, sunlight exposure, course and type of watercourses, scenic attractions, availability of drinking water, terrain difficulties, surface waters, landslides and other violent weather phenomena.
- Analysis of existing infrastructure: presence of built-up areas (villages, hamlets), agricultural areas and private plots that may cross hiking trails, selection of camping sites and accompanying infrastructure.
- Public consultations on the needs of disabled people and assessment of the impact of the facilities they use on the quality of life.

Architectural solutions:

- Environmentally friendly: the greatest possible use of materials and solutions using local materials, green roofs, rainwater collection systems, elements of renewable energy for lighting.
- Safe and durable: new forms and materials should be safe and resistant to acts of vandalism and used in accordance with the principles of ergonomics, universal design and respond to the maximum extent to modern human psychological needs.

Landscape protection

- the designer's responsibility towards the protected nature,

- introducing materials of natural origin, durable but at the same time biodegradable,
- natural aesthetics (forms referring to local, regional architecture,
- the designer's responsibility towards the existing cultural heritage and social rules for the use of trails (different rules in different parts of the world),
- nature protection enforces legal restrictions - interference with the natural landscape is controlled and monitored, routes are often ticketed and adapted to low tourist traffic.

CONCLUSION

The problem of design in protected landscapes is becoming more and more relevant because tourism in such areas is developing very quickly, larger areas are being made available, and new structures are being built, such as observation decks, towers and bridges. Even if they do not directly affect the natural landscape (hanging paths), they irreversibly change the composition and character of natural places, and in critical cases cause irreversible degradation, although often unintentional. Therefore, there are justified demands for the inclusion of detailed design guidelines in the implementation process alongside general plans, partial development plans for investment sites, and each time analysis of views, composition and their hierarchy in the general plan, which would also include a description of available solutions. There are many studies discussing the problems of disabled people in apartments and spaces. public and buildings. Currently, this issue is expanding to open landscape areas, tourist trails and areas of legal nature protection. The implementation of full accessibility and making the protected landscape available for tourism is subject to many restrictions and is extremely difficult, almost impossible, to achieve in high mountain areas. However, there are many examples, including in the most attractive places in the world, where, despite the lack of a legal obligation to provide access for people with disabilities, accessibility is partially or fully implemented. Small architecture objects are usually located in places with diverse and difficult terrain conditions that require walking and where it is impossible to maintain the standards required for public spaces. The trails are adapted to the available tourist traffic to a low extent because interference with natural landscape and natural systems is strictly controlled and monitored. However, according to the authors, design standards characteristic of public spaces should be implemented in specific locations to the greatest extent possible (high aesthetic and technical standards, detailed development plans, elevations against the landscape, cross-sections covering the adjacent natural area prepared by architect designers). Traveling along the trails requires physical strength, which is a limitation for many users. The needs of disabled people should be met not only through infrastructure projects, appropriate assistive devices (walking sticks, prostheses, and winches that can be taken on routes) but also through modern technological solutions (smartphones, apps, GPS).

REFERENCES

Maciejko, A., Czajka, R. (2019). Public Space Projects in the Open Areas. W: J. Charytonowicz, C. Falcão, Advances in Human Factors, Sustainable Urban Planning and Infrastructure. AHFE 2018. Cham: Springer.

Maciejko, A., Strzelecki, M. (2016). Ład natury i architektury. Projekt małej infrastruktury technicznej na obszarze parku narodowego gór stołowych. Wrocław: Wydawnictwo Polskiego Towarzystwa Ergonomicznego PTErg.

Maciejko, A., Strzelecki, M. (2022). Projekt małej infrastruktury technicznej Parku Narodowego Gór Stołowych. Wrocław: Strzelecki Biuro Architektoniczne.

Maciejko, A., Wojtyszyn, B. (2019). Tourism Infrastructure Providing Access to Areas of Protected Landscape and Nature in Poland. Selected Examples. IOP Conference Series Materials Science and Engineering, 603(4), 042049. https://doi.org/10.1088/1757-899X/603/4/0420491Zob. https://legislacja.rcl.gov.pl/projekt/12356100 (dostep: 10.2023).

Maciejko, A., Wojtyszyn, B., Skrzypczak, A. (2019). Design Problems of Tourism Infrastructure for People with Disabilities in Protected Landscape Areas in Poland. IOP Conference Series Materials Science and Engineering, 603(4), 042048. https://doi.org/10.1088/1757-899X/603/4/042048

Rozporządzenie ministra środowiska z dnia 12 maja 2005 r. w sprawie sporządzania projektu planu ochrony dla parku narodowego, rezerwatu przyrody i parku krajobrazowego, dokonywania zmian w tym planie oraz ochrony zasobów, tworów i składników przyrody.

Turystyka dostepna dla wszystkich, (November 07, 2023) Polish Goverment Website: Turystyka dostepna dla wszystkich - Ministerstwo Sportu i Turystyki - Portal Gov.pl (www.gov.pl).

Ustawa z dnia 16 kwietnia 2004 r. o ochronie przyrody.