Tourism Infrastructure Providing Access to Areas of Protected Landscape and Nature in Poland. Selected Examples

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Abstract. The article presents design problems of tourist infrastructure in protected landscape and nature areas in Poland. They concern discrete regulation of the intensity and course of leisure and tourist traffic towards and within protected areas. Such regulation can only be carried out on the basis of the structure of accessibility of areas covered by protection and spatial development plans, shaped in accordance with environmental conditions. The quality of access to protected areas is also significantly influenced by the architecture of tourist infrastructure objects presented in the article. It concerns selected objects of small wooden architecture designed in areas with special landscape and natural requirements, which have been implemented in Poland in recent years. These objects are small elements, e.g. signposts, information and educational boards, benches, tables, waste bins, rest shelters, objects at entrances to protected areas (gates), ticket offices, as well as impressive engineering structures built in difficult terrain conditions, e.g. terraces, platforms and observation towers. These issues will be presented on the basis of many years of research and design works concerning protected areas in Lower Silesia (arch. Boguslaw Wojtyszyn) and original designs (arch. Alicja Maciejko and arch. Mirosław Strzelecki) realised on the tourist routes of the Stolowe Mountains National Park in Poland, shaping tourism and recreation accessibility for all users including disabled people in protected landscape and nature areas.

1. Shaping tourism and recreation accessibility of protected areas

The growing recreational and tourism movement in Poland towards protected, park valuable complexes nature and landscape is associated primarily with the rapid expansion of communication accessibility of these areas, which is caused by:

- intensive development of means of individual and collective communication in the field of transport and transmission of information, which enables more and more people to reach quickly, cheaply, comfortably and safely to green areas located more and more farther from the city,
- unfavorable spread of dynamically developing urban areas towards protected park and forest complexes, which the buildings of gradually surround them, and often enter their areas [1, 2].

Along with the increasing communication accessibility of protected greenery complexes, the way of realizing recreational and tourist needs of people staying in their area is also changing. The change in the implementation of these needs is significantly influenced by the savings achieved on time and travel.
costs to protected areas, as well as the ease of obtaining information in order to choose a place to recreation or tourism. Therefore, there is a more and more it is frequent other than before way of using these areas and the associated increase in threats to the nature and landscape there.

The growing size and, as a consequence, the changing structure of the recreational and tourist traffic refers both closer and further location of the green complexes with different status of legal protection, in the neighborhood the urban areas [2]. This phenomenon is also connected with the fact that instead of the term "tourists", the term "park visitors" is used more and more often.

In the spatial development of areas with exceptional landscape and natural values, having legal protection status (e.g. a national park or reserve), are not always perceived and removed conflicts that are created due to lack of conformity in between organized way of using, protecting and providing access to green areas, and the quickly changing within their limits, ways of realizing tourist and recreational needs of inhabitants of urbanized areas. Such long-lasting state of incompatibility violates the balance of occurring ecosystems there. This leads to permanent unfavorable adaptation transformations that degrade the landscape and nature values of these areas. Followed is a spontaneous species exchange adapting nature to new environmental conditions and systematic depletion of its biodiversity (Figure 1).

Figure 1. The general diagram of the relationship between the level of communication accessibility and the natural and landscape status of protected areas [3]
• External circulation of relations - the course of assessing the level of accessibility of protected areas,
• Internal circulation of relations - the course of assessing the level of compliance of the existing forms of use with the planned forms of protection and the ways of access to protected areas,
• Vertical axis of relations - the course of the impact a properties tourist and recreational of protected areas on the assessment of the degree of protection of their natural and landscape values,
• Horizontal axis of relations - the impact of the level an accessibility on the existing forms of use, affecting the assessment of the conservation status of protected areas.

Shaping the structure of accessibility in this type of green areas in the vicinity of urban investment zones requires the use of the specialized methods of providing accessibility in accordance with environmental conditions and planned protection directions. Accepted tourist attendance for planned forms of protection and access to green areas is practically higher in periods peak of tourist traffic intensity, and its distribution spatial on the entire surface, far from being correct [3]. Artificially created barriers in the form of technical or administrative solutions, that needlessly hamper access to green areas, are often not accepted by tourists, especially when they are a provisionally supplemented with also additional restrictions introduced outside the spatial tourist accessibility plan. Therefore, it is necessary, consistent with environmental conditions, to discreetly regulate the intensity and course of tourist traffic in the direction and within the protected complexes green. Such regulation can only be carried out thanks to an individually for each park, designed a tourist infrastructure, which will provide visitors with:

• safe and convenient access to these areas,
• the use of these areas in a way attractive and not degrading their natural and landscape values.
• It should be noted, that any adverse change in natural conditions, even in a small area, may have a significant impact on the condition of a much larger area, which in turn may cause the degradation of more sensitive elements of a higher-order natural system.

In shaping the of tourist accessibility structure, especially in areas of increasing anthropopression, it is allowed greater dynamics of plant development (resulting from genetic and varietal conditions) and the regionalization of their selection, which makes it a possible increasing a resistance natural of environment in a controlled manner and the possibility creating conditions for the formation of ecological systems with self-regulating properties.

Along with improving the accessibility of green areas, in order to achieve increased ecological activity of their entire systems for the enhancement of nature protection, the basic principles of ecological shaping of nature, in particular the principles of maintaining spatial continuity and biodiversity, must be observed. A well-structured of tourist accessibility structure of protected areas, creates a strong foundation, according to the experience related to the participation of authors of this article in earlier planning for access and protection, including: Karkonoski National Park, Książański Landscape Park and Szczytnicki Nature and Landscape Complex in Wrocław, and current design studies of the tourist infrastructure of the Góry Stołowe National Park, for the effective protection of each object, regardless of its legal status and location conditions. According to this relationship one of the authors of the article defined previously formula, that the motto of anyone who will undertake the management of valuable green areas, should be the principle: "The best way to protect nature it is to not limit its accessibility but in wise way of creating to it access" [4]. This formula has also found its confirmation on the market gardening and arrangement of park-assumptions, because it is cited by specialized companies as its own advertising slogan in regional publishing houses.
2. The project of tourism infrastructure providing access to areas of nature protection in Stołowe Mountains National Park

National Parks, in addition to their essential protective function under the Nature Conservation Act of 2004, are also made available for tourist purposes. It is one of their basic, social tasks, as it makes it possible to satisfy the basic needs of human contact with nature, it is a form of acquiring knowledge of nature and sightseeing. Poland currently has 23 national parks. They occupy slightly more than 1% of the country's area and are distinguished by a relatively small area (the average size of a national park in Poland is 13,00 ha). Theoretically, these areas should be free from any form of development and human intervention in the natural environment of these areas. However, each of them is to some extent developed and covered by human economic activity, which causes various changes in the natural environment, including the landscape. Stołowe Mountains National Park is an area of legal nature conservation. It was established in 1993, the area is 6,34 ha. It is located in the Central Sudetes in the north-western Klodzko region. The border of the Park runs partly through the Polish border with the Czech mountains. The highest mountains in the Park are Szczeliniec Wielki (919 m above sea level) and Skalniak (915 m above sea level). Trails and hiking trails of the Stołowe Mountains National Park are characterized by varied difficulty (Figure 2, 3). Tourist routes form a dense network with a total length of about 100 km. The Park is also crossed by a section of the main Sudeten trail named M. Orłowicz, which crosses the tourist route Błędne Skały. However, the Park is not only the two most famous tourist routes mentioned above. Less populated Skalne Grzyby, Radkowskie Skały and Białe Skały are also attractive locations. The routes run through the most attractive places, and in protected areas, including national parks, allow for regulation of tourist traffic, mobility is allowed only on designated places.

![Góry Stołowe](image1)

Figure 2. Location of Stołowe Mountains National Park [5]

![Unique rocks in Stołowe Mountains National Park](image2)

Figure 3. Unique rocks in Stołowe Mountains National Park [5]

Investing in technical infrastructure in the protected landscape is subordinated to nature conservation, therefore, design in these areas largely differs from the design of public space in urbanized areas. In the public space the most important are the preservation of urban, historical and cultural order, accessibility
for all users, safety of use and, above all, public good. In the protected mountainous landscape, accessibility is limited, routes are adapted to tourist traffic in a narrow range, interference in natural landscape and nature systems is strictly controlled and monitored. Similar restrictions apply only to the space of historical sites, subject to strict conservation protection.

National parks are looking for architectural solutions that would change the image of the place and adapt to the requirements of modernity. The elements of small architecture have a key role in the management of tourist routes and the provision of protected landscape for tourism, because they are, apart from permanent facilities such as hostels and educational centres the only technical elements in the natural landscape. That may affect its devastation, but also a change in the image places and contribute to increasing the attractiveness of tourist routes. Elements such as footbridges, bridges, information signs, field stairs often occur in places that are hard to reach and are the most attractive in nature, properly shaped and protect rock elements and vegetation. Sheds for rest, fireplace shelters set in strategic, analysed locations limit the number of cases of walking off the routes from the trails. Infrastructure elements are characteristic "points" scattered in the mountainous environment, they not only affect the feeling of safety and comfort, but also are a determinant of subsequent stages of overcoming space, and they must ensure visual coherence associated with the identification of the place. They are also a place of recreation for all age and social groups; they can be conducive to establishing contacts. They are a social space, an important part of public spaces, in which elements of art, aesthetics and with the help of which you can stimulate intellectual ambitions, in accordance with the value and challenges of the modern world, inspired by natural, often yet virgin environment.

Figure 4. Regional architecture of the Sudetes [6]

The project implemented in Stołowe Mountains National Park includes a series of elements of landscaping made in a uniform style and the concepts of ticket office buildings at the entrances to the tourist routes of the Stołowe Mountains - Szczeliniec Wielki and Bledne Skaly. Despite the fact that the project concerns relatively small objects has an impact on the visual, symbolic and cultural perception of the region, it has become a clear image element, in its context it is already referred to as the so-called "new Sudeten style". The small architecture elements were located throughout the entire area of the Stołowe Mountains National Park, taking into account the requirements of specific tourist routes (Figure 4). In design practice, this means that each place is diverse and requires an individual approach while using mobile, standardized elements. Sometimes these places are uncomfortable for assembly works of
infrastructure elements (e.g. very steep slopes, boulders, narrow passages) but strategic for the tourist route.

The ambition of the Stolowe Mountains National Park was to create new design, implementation and utility standards for elements of small architecture in the protected area, emphasizing the natural richness of the area. It was heightened by a strong conviction about responsibility towards nature and the extraordinary natural value of this beautiful place, with a specific character, unprecedented in other National Parks in Poland (Figure 5). This can be seen in the care of every detail, ranging from the choice of places to careful workmanship. Elements of infrastructure are placed in different places, but nevertheless they constitute a coherent and expressive icon, which began to gain the reunification of users and became a role model. The aim of the project was to create elements of technical infrastructure on touristic routes such as: shelters, tables, signs and information boards, fences, stairs, footbridges. The idea of the project was to create homogeneous, repeatable, stylistically consistent elements built into various, also hard to reach places, touristic routes. The project is continued, the elements are successively built depending on the needs of the Stolowe Mountains National Park. The aim was, on the one hand, to design elements protecting the landscape as much as possible, and on the other hand to create strong, distinctive forms (discouraging from gliding off the trails), remaining in harmony as well as in specific contrast with the surrounding rocks, beautiful and "strong".
The traditional forms used were received with applause. However, to modernize the applied tradition of forms, formal modifications of these elements were made by using slightly different proportions of individual fragments of these objects, scaling details, modern materials. The main design motif is the massive elements of beams made of larch laminated wood, in a natural colour, which is a modern modification of the traditional construction material, which is wood. The project also includes an entrance gate to the trail leading to Szczeliniec and ticket offices for tourist routes to Szczeliniec and Bledne Skaly (Figure 6, 7) which are also designed in a similar style and refer to the existing Sudeten style and the existing building at Szczeliniec.

3. The access for all users, including disabled people.
On many sections, Stolowe Mountains National Park tourist routes can be adapted for the disabled. It is worth noting that there is no question of segregation. It is based on the possibilities of terrain so as to counter exclusions that can be avoided, not because of real difficulties but because of other factors related to, for example, the lack of adequate information. Descriptions of the routes taking into account the accessibility are to be included in the information about Stolowe Mountains National Park available on the Internet and on specially prepared maps. The disabled people also practice competitive sports and professional tourism. It is worth noting that the project also addressed the following general aspects, which were not only guidelines for design but also became a mission for the vision of the implementation of further stages of the project in the future. (Not all of these elements have been introduced yet). They are:

- Summary of the number and structure of people including disabled visitors to Stolowe Mountains National Park (surveys and statistical data),
- Analysis of the possibilities of sharing, to what extent adaptations and facilities for disabled people will be included, Whether the elimination of technical barriers will cover all groups of disabled people, or due to field conditions, certain groups will not be able to use the given places,
- Pledging selected spatial problems, which can be solved in the area of priority nature protection. By assumption, it is known that natural and legal limitations will occur here,
- Measurement and inventory of route fragments that can be fully adapted for disabled people on wheelchairs, monitoring whether there are natural obstacles related to the operation of nature, such as landslides, stones, submersion, forestry activities, breaking trees or branches. It is worth noting that the routes should be designed to prevent deliberate and accidental deviation from the routes, in a legible way also for the visually impaired,
- Preparation of a clear information code describing the ascending features of the area, e.g. an even terrain for a long driveway and descent, sharp driveway and descent, drainage grooves. The information should include, among others, the total sum of distances, distances between individual sections, landmarks, type of road surface or road, and terrain profile,
• Placing visual information in the field, on specially designed boards and signs giving the length of the route, obstacles, type of surface, level difference, road drop, e.g. steps and terrain stairs, type of terrain (sandy or wetland may prevent movement of the trolley), occurrence rocks that reduce passage light, lack of barriers or balustrades on footbridges and bridges, periodic streams intersecting roads,
• Development of infrastructure project elements of small architecture objects, in accordance with the accepted design principle, consistent with the aesthetic and material design. The natural and locally occurring materials with high resistance to weather conditions are used to the maximum extent,
• Designation of parking spaces with appropriate parameters in all places where access is possible,
• Developing the possibility of using routes due to weather conditions. Unfavourable weather conditions (rain, strong wind) can be a significant obstacle to hiking.

On the basis of many analyses, project guidelines were created, which, however, are implemented depending on the terrain conditions:
• Preserved communication areas enabling passage and manoeuvring for access, the entrance zone and for the tourist facility,
• Elimination of obstacles, if possible,
• Equipped with handles and other support devices for the disabled,
• Preservation of appropriate anthropometric coverage zones, e.g. at ticket offices,
• Design stable, non-displaceable, permanently attached pieces of equipment, so that they are aids in movement and not a threat to a person wishing to grasp them in the event of loss of balance,
• Equal modelled communication surfaces without unnecessary thresholds and stairs, in necessary and possible cases, using the slipway,
• The use of floors and protective surfaces against slipping in adverse weather conditions, in case of icing, which cannot be corrected and other hazards, the route should be closed or inform about the danger,
• In tourist facilities, use of emergency buttons, hangers, places to place bullets, sticks, prostheses, light and acoustic signalling,
• Furnishing small-scale touristic objects with ergonomic furniture, using benches and stands (for resting in a semi-standing position) of various heights, ergonomic backrests, armrests that help you get up and tables with space for a trolley. Sheds for rest are also an element supporting tourists with reduced mobility, the arrangement of a network of elements for rest, such as sheds and benches is determined not only by the attractiveness of places, e.g. in viewpoints or interesting nature, but also takes into account the facility of covering the area for people, which due to their health condition need frequent stops,
• Use of visual information of appropriate size and contrasts, according to readability data from a suitable distance by people with weaker perceptions,
• Marking of obstacles such thresholds, stairs, footbridges etc. should also be possible to return in case of an obstacle impossible to overcome by a disabled person,
• Knowledge of sign language by park staff.

In the area of interest of the Park there is also the creation of an interactive smartphone application using a GPS system showing in detail the course data of tourist routes along with information about temporary difficulties, with possible voice support providing detailed information to enable the selection of a road in the area depending on the degree and type of mobility and weather conditions - both difficulties and facilities. Not all disabled people expect maximum facilitation, e.g. asphalt roads with small inclinations, on which you can move comfortably. Many disabled people overcome the challenges of acquiring routes with a significant degree of difficulty, requiring significant physical effort, as well as fully functional people.
Figure 6. Entrance gate on touristic routes to Szczeliniec Wielki. Visualization: M. Strzelecki [7, 8]

Figure 7. Buildings of ticket offices on touristic routes to Szczeliniec Wielki and Błędne Skały. Design of a small technical infrastructure of the Stołowe Mountains National Park: A. Maciejko, M. Strzelecki. Visualization: M. Strzelecki [8, 9]
4. Conclusions
Design in a protected and inaccessible landscape is connected with many formal, legal, technical and aesthetic problems. These are also stereotypes concerning architectural forms, attachment to the traditional style called "highlander" and the conviction of the impermanence of wood. To make the project proper for implementation in many next years in future, design which become new icon of the place, the designers analysed five important problems and solved them with success: 1/ designing in protected landscape, 2/ possible degradation of natural landscape elements, 3/ designing in the existing cultural landscape of the Sudety area in the form of regional architecture with very strong and characteristic stylistic elements 4/ designing contemporary architecture, taking into account strength requirements, durability in a difficult climate, functional and technical aspects and 5/ designing for physically active and disabled people with different degrees of physical activity and the ability to adapt and access routes (which by nature are difficult to access) for people with different disabilities, under ergonomic and safety conditions. The groups of users of this architecture include: people in wheelchairs, people walking with crutches, walking sticks of prostheses and other equipment, people with manual impairments, blind and partially sighted people as well as deaf and hard of hearing people. Due to the existing environmental conditions, not all projects of this kind of tourism infrastructure are willingly implemented in every place in protected areas. The proper architectural solutions of the protected mountainous areas are response to improves the quality of life of tourists and also people with disabilities. The article shows that the overriding goal in the design of tourism infrastructure in protected areas should be to enable every traveller, including people with disabilities, maximum independence in contacts with the external environment in the most natural and comfortable way for them, so as to minimize interference with natural resources and landscape. This is a challenge for designers and managers of protected areas.

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