

## Summaries

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### **ALPINE HUTS: ARCHITECTURAL INNOVATIONS AND DEVELOPMENT IN THE HIGH TATRAS UNTIL THE FIRST HALF OF THE 20TH CENTURY**

**Mária Novotná**

*Keywords: alpine architecture, modernism, innovations, High Tatras, alpine hut, chalet*

The traces of history in the alpine environment reveal how the colonization climbed up the terrains and transformed them into exploited slopes. The paper examines the reflections on architecture discourse in the High Tatras. Analysing the initial discussions while the High Tatras were part of the Hungarian Kingdom and mapping the implementation of innovations during the first half of the 20th century allows to reflect how the copied architecture from other alpine terrains was shaped over time into representations of early modernism. This work focuses on the untamed areas with no urbanization where only solitary objects – the huts – are built. Alpine huts are lighthouses in the mist. They still fulfil the role of emergency shelters despite becoming a goal of mass tourism. In these times when we are losing excellent architecture and unique environments are vanishing, we would like to highlight the buildings which are not the cover for our activities, but represent the activity itself. We study the huts in the context of architectural development in the region of the High Tatras. We do not claim the log and half-timbered houses as traditional or “the only true” Tatra architecture. It could be some first Tatra architecture, as the region does not have any original settlement to refer to. This paper examines the mapped objects from an innovative point of view. It surveys the new materials, construction methods, durability and weather-resistant features. Together with focus on the arrival of new architectural styles, the work creates a chronological picture of the building process in the High Tatras. The view of the unknown alpine terrains changed since the first researchers and travellers escaped there from the city. They followed the hunting trails and stayed in shepherds’ cottages. At the end of the 18th century, the first settlement was founded. The trigger to build an infrastructure were the healing waters. Another driver was reaching the summits. Despite the great spa potential, the High Tatras were not about to be a tourist centre. They were meant to be a strategic place to defend the northern border and the supply for the trade water canal. The railway changed everything at the end of the 19th century, with attractivity and increased availability, other settlements were founded, followed by arrival of the architects. The network of alpine huts was soon taken over by the Hungarian-Carpathian Association as an authority responsible for building new huts, maintaining and restoring the existing ones and planning hiking trails and access roads. Until the end of the 19th century, the huts were built traditionally, with local materials, mostly without architects. The only exceptions were the first Sliezsky dom house, hut by the Zelené pleso mountain lake and the Téryho chata hut. The paper surveys the architectural conception and analyses how the dialogue with the terrain, weather conditions, local materials and innovative process was applied in designing and building huts. In contrast to the eclectic free choice of the structures in the settlements, huts were excluded from this romantic tradition. The ornament did not climb up, with the only exception being Hrebienok,

where Studenopotocké kúpele spa was built to the image of the half-timbered spa in Tatra settlements. It was also the only location where art nouveau climbed up to the alpine terrain. The beginning of the 20th century brought innovation into interiors, such as electricity and flushable toilets. Building construction returned to the traditional masonry from the trends of half-timbered houses. This type of construction allowed to use the house all year-round. Tourist winter season developed winter centres for leisure and sports. The arrival of modern architecture introduced functionalism, CIAM's ideals, le Corbusier's points, and started to apply Loos's manifesto. The first hut in the young Czechoslovak Republic was built again to defend the border from Polish claims. Later, along with Czech contribution to a large-scale functionalism and Slovak small-scale functionalism alpine huts were forming the Tatra's landscape. They were still loyal to the traditional techniques, even though as they climbed higher, they were increasingly more technically innovative. The topic of thermal insulation started to be a point of discussion since the huts were to be accessible all year-round. Recreation as social invention of the 20th century resulted in extension of the huts and building accessible ways to the peaks. Technical innovation of the cable car made its way into the High Tatras in the 1930s, built as an example of regionalist functionalism which responded to the condition of alpine environments. The traces of ornament were stopped in the lower altitudes with urbanization and accessibility as well as the traces of modernism. The huts in the first half of the 20th century remained independent from the tradition sustained in lower elevations and true to their harsh conditions. The trends in architecture were determined by the possibility of elementary transport, while alpine huts had to calculate with every option of local material as a building material. However, the construction of alpine huts represents more of an innovative modernist idea of spending time in illuminated areas. Alpine environment was the place where building style was determined by the vegetation zone, not the current trends.

## **ROUTE OPTIONS IN INCLUSIVE MUSEUMS: CASE STUDIES FROM CENTRAL EUROPE**

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*Keywords: museum, children, tour route, inclusion, architecture, exhibition, sequence*

Museums play an important role in the society, as they offer valuable experiences of discovery, education, art, play and interaction. This form of education can have a significant impact especially on the younger generation. Museums nowadays should offer quality leisure time for all, regardless of their age, preferences, status and abilities. Information is therefore provided in different ways and types of sensory perception, and at different levels of knowledge. Playful and educational activities can help visitors to understand exhibits, and bring them a valuable experience. Understandable and clear environment supports positive social interaction and relationships, as it becomes a setting suitable for making new friends and spending quality time. To facilitate understanding and support friendly atmosphere and well-being in museums, it is important to structure information, exhibits and spaces in an appropriate manner. Various means of routing systems and space arrangement can significantly influence the resulting experience. The order in which visitors circulate exhibition spaces in a museum is one of the most important architectural and operational characteristics of this type of cultural institution. Several authors also attach especially great importance to designing routes in museums. Some of their concepts and opinions are presented in the theoretical part of the paper along with the findings of the authors themselves. The typology by Ernst Neufert and ideas of Paul von Naredi-Rainer and Angelika Schnell have been given special consideration. Furthermore, the authors also mention and categorize the basic types of exhibition space layouts and connected routing solutions (open plan, linear chaining / directed sequences of rooms / round tour (loop), core and satellite rooms / spatial interpenetration and spatial isolation, labyrinth / matrix-like arrangement of rooms, complex layout, free-form spaces, conversions and extensions of architectural monuments). These forms have been assessed with respect to various aspects, first theoretically, and then on case studies. The focus of wider related research has been aimed at improving museums in Slovakia, particularly museums for children, and this objective also involved observing best practice examples in proximity. Consequently, five case studies from the region

meeting desired conditions have been analysed and evaluated. The results indicate different methods of routing and spatial division applied in practice. The selected museums are VIDA! Science Centre in Brno, Silesian Museum in Katowice, Lower Austria Museum in St. Pölten, Kemenes Volcano Park and Kulturpark in Košice. Other individual specific aspects of each of these museums have been examined as well, because they offer interesting unique local ideas. The case studies show that the concepts of routes in museums and taking children into consideration are currently very topical issues. Different path structures and combinations of routing types can evoke various types of atmosphere and create possibilities for developing distinctive museum solutions. Open plans appear to be the most commonly utilized type and their properties in comparison to other arrangements of spaces are discussed in the paper. The advantage of a free floor plan is its spatiality, possibly also neutrality, and especially its flexibility, the ability to adjust according to the requirements of exhibitions. Nevertheless, multiple suitable ways of composing routes that would meet all visitors' needs and offer them a quality leisure and educational experience from a museum tour are presented. Unique combinations of space sequence and division show practical application of theoretical layout types found in desk research. Various layouts and arrangements of exhibition spaces are analysed in the paper with abstract schemes, diagrams, layout and photo-documentation of the five selected museums. The paper proposes possibilities for future research, too. Potential subjects to study include museum paths and closeness versus openness of exhibition premises. Another interesting issue is a more precise examination of vertical connections and movement versus the horizontal ones. Last but not least, Principles of Universal Design introduced in museum architecture are another subject to be explored further. Finally, guidance of visitors around a museum when they walk through individual exhibition spaces is one of the key factors for visitor experience, wayfinding, but also easy understanding. Inclusive museum routes can thus positively affect the atmosphere and success of the whole institution and meet the needs of all its visitors. Multiple suitable solutions based on aforementioned principles were found in the research of museum routes, often with interesting hybrid layouts. Countless possibilities of combining route arrangement provide an inspiration for architects for creative and innovative museum designs.

## **MICROCLIMATIC FACTORS IN URBAN DEVELOPMENT: THE SETUP OF AN ENVIRONMENTAL OBSERVATORY AT THE FAD STU**

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*Keywords: city, urban heat island, urban microclimate, physical parameters, environmental observatory, sensing probe, FAD STU*

The presented research focuses on energy (im)balance on both global and local scale. Since the second half of the twentieth century, research regarding cities and their climate has focused on various physical properties that affect various physical and chemical processes such as energy absorptivity, reflectivity, emissivity, thermal conductivity, transpiration, evaporation, evapotranspiration, photosynthesis, etc. With respect to meteorology, physical processes that occur on a local scale in the atmosphere near the ground, on the land surface, and in the soil are generally termed microclimatic processes. Due to the long-term consolidation of interactions between microclimatic processes and the relatively low rate of emerging climatic disruptions, microclimatic conditions in natural environment are rather stable and predictable in time (short / long periods) with a high degree of accuracy. In the era of the Anthropocene epoch characterized by human activities with dominant influence on disruptions in the natural flow of energy and matter, the climate has become highly unpredictable on all spatial-temporal scales. Thus, urban climate is one of the most evident examples of inadvertent climate modification caused by humans. Human activities are therefore considered the dominant microclimatic processes within the city and directly linked to microclimate changes. The main emphasis is placed on microclimatic factors directly affecting public urban spaces and related physical processes regarding the city that are closely linked to energy flows and result in the formation of the Urban Heat Islands (UHIs). As they are one of the main adverse effects of human activities, the paper introduces the classification of UHIs by types, describes the basic differences between the surface energy balance of rural and urban areas, and introduces climate-

sensitive urban design as one of the possible ways to mitigate the undesirable anthropogenic impacts on climate change. The authors of the article present their own research, which predominantly focuses on the development of an environmental observatory situated on the rooftop of the building of the Faculty of Architecture and Design STU in Bratislava (FAD STU). They interpret the experimental operation of sensing probe 1 and the first results and measurement data on Global Horizontal Solar Irradiation (GHSI) and their post-processing. In addition, they describe the construction of sensing probe 2, which will provide more data on total atmospheric precipitation, wind speed and its direction, presence of dust particles and carbon dioxide in the air, or spectral characteristics of incident and reflected solar radiation. Finally, the experimental operation of the thermal and micro-camera with fisheye lenses is described. These cameras are essential for measuring the Normalized Difference Vegetation Index (NDVI) as one of the parameters used for the assessment of vegetation vitality, which also plays a key role in the formation of the UHI effect. The creation of an environmental observatory on the grounds of the FAD STU whose operation was experimentally verified by sensing probe 1, along with the future location of sensing probes 2 in selected public urban spaces creates a prerequisite for conducting further research in the field of microclimatic factors affecting urban development. Compared to basic research, the level to which knowledge is implemented in practice in the field of urban microclimate is deficient. Advances in data science have made it possible to process a large number of data (Big Data) using the statistical analysis methods, and thus to gain relevant sources of information that complement the existing ground-based and remote sensing infrastructure. The increasing quality of data, their spatial-temporal density, and shorter response time, with the expected accompanying refinement of forecasting models, improved crisis management, and provision of tools for the retrospective assessment of environmental strategies within the city. The main objective of Climate-sensitive Urban Design (CSUD) is a city that uses resources efficiently in terms of sustainability in order to protect its residents and traffic from severe weather phenomena. The current research conducted at the FAD STU aims to contribute to these sustainable strategies and city management. There are still some specific issues that researchers should address. The first is the development and creation of data prediction models, where the current trend is to increase the complexity of the evaluated microclimatic factors in spatial-temporal detail. Such predictive models and simulations help architects and urban planners understand the interaction of microclimatic factors with the surroundings and allow them to verify the expected benefits of solutions during the design phase. The second is the critical retrospective evaluation of implemented solutions exposed to real conditions not only at the level of architectural and urban design, but also regarding engineering and technical solutions, such as the material composition of surfaces. This approach supports the continuation of the evolution of engineering design. The third is to increase the use of quantifiable parameters to rate the impact of individual and interacting microclimatic factors and to facilitate complex decision-making within the design process.

## **THE IMPACTS OF CLIMATE CHANGE ON URBAN STRUCTURES IN SLOVAK CITIES: IDENTIFYING VULNERABLE URBAN STRUCTURES**

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*Keywords: climate change, urban adaptation, spatial vulnerability, spatial planning, sustainable development*

In the coming decades, our cities will face extreme weather caused by climate change, which they will have to adopt. The most significant impacts on Slovakia are characterized by an increase in the number of tropical days, average air temperature, concurrent heatwaves and droughts, sudden and regional floods, and a decrease in relative humidity. In the urban environment, the increase in the amount of sudden and intense rainfall results in increased demand for infrastructure, rising temperatures, and heatwaves creating urban heat islands, increasing the risk of negative impacts on the quality of the life, health, and safety of the inhabitants. To address these challenges, cities initiate the adaptation process by preparing the ground for adaptation, assessing risk and vulnerability, developing an adaptation strategy, implementing adaptation measures, and by subsequent monitoring and rethinking of the effectiveness of applied measures. Despite the fact that the National Adaptation Strategy of the Slovak

Republic identified the adaptation at local level as essential for urban environment, within the last 8 years since its adoption, only 8 out of 141 Slovak cities in total have elaborated the adaptation strategy for impacts of climate change. This paper thus explores in more depth one of the initial parts of the adaptation process, part of the vulnerability and risk assessment, as an often-overlooked area in the field of spatial planning. The aim of this work is to broaden our knowledge of the two most significant impacts of climate change –heatwaves and floods– on urban structures in Slovak cities and validate the importance of spatial vulnerability analyses as a considerable tool for the expected unified national methodology for developing local adaptation strategies. This study examines the spatial vulnerability analyses of Hlohovec, Kežmarok, Košice – Západ, and Trnava prepared by Karpatský rozvojový inštitút as a part of vulnerability assessment within the framework of adaptation strategies of these cities. The organisation is a leader in adaptation planning in Slovakia and the creator of a unique method of adaptation strategies in Slovakia. These analyses allowed us to compare cities, identify the most vulnerable urban structures and consequently understand the causes of vulnerability of urban structures in Slovakia, which is crucial for further development of the adaptation strategies and the building of resilience in cities. The research outlines the urban structure of the cities examined, provides an exploratory spatial analysis of vulnerability hotspots, and, based on the findings, defines the principles of spatial planning and urban structures resilient to the impacts of heatwaves and floods. In summary, the results show that the structures most vulnerable to both heatwaves and floods are urban structures with a high concentration of inhabitants. Problems lie in the centres of cities with dense public amenities and a historical footprint with large paved and unshaded areas without vegetation and a lack of trees that could help create the suitable microclimate during heatwaves and infiltrate rainfall. From the point of view of heatwaves, the most vulnerable areas, except for the city centres, are the surroundings of kindergartens, schools, train or bus stations, grocery stores, or local centres with amenities. From the point of view of floods, the most vulnerable areas are extensive parking lots with impervious surfaces and the main transport infrastructure, which suffers from the insufficient runoff capacity of the sewer systems. The results confirmed that the vulnerability of cities to floods with the impacts of climate change is no longer only a problem of the waterfronts. The research shows a significant difference between the vulnerability of residential structures. On the one hand, there is the structure of individual or terraced family houses and low-rise apartment buildings with up to 6 floors, which is resilient to the impact of climate change in Slovakia. On the other hand, mass housing structures of prefabricated apartment buildings with 8 to 14 floors are vulnerable to the impacts of heatwaves due to poor technical condition and energy inefficiency of the buildings, leading to overheating of the indoor spaces. Despite the abundant areas of vegetation, their surroundings are also vulnerable to the impacts of heatwaves and surface floods. The findings of this research outlined that the vulnerability of citizens to the physical environment of the city has a great impact on the spatial vulnerability assessment of urban structures and showed how crucial it is to place importance on the form of urban structure as well as its surroundings. Urban structures that are resilient to the impacts of heatwaves and floods are based on the idea of accessibility and short distances, polyfunctional structures, and mixed use within buildings and within the city, which helps to reduce the concentration of inhabitants in one place, and to reduce the need to develop extensive parking areas and transport network, which has proven to be a problem of the existing structures. Overall, these results suggest that spatial vulnerability analyses have the potential to be utilized in the development of national methodology for local adaptation strategies and as part of background analyses for land use planners. Further development of their application within the processes of urban design and planning should also be examined in the nearest future.

## **POP-UP ARCHITECTURE AS A TOOL FOR POPULARIZING THEATRE: PROTOTYPE NO. 1**

**Kristína Boháčová, Alexander Schleicher**

*Keywords: architecture, theatre, pop-up, temporary, prototype*

This article builds on previous research dealing with temporary theatres in the context of Europe and Slovakia, discusses the issue of pop-up pavilions in terms of architecture, their use in marketing and as a potential tool for reviving the theatre scene. Just as temporary architecture can activate neglected areas in the city and bring stimuli for a permanent change, we believe that it can be equally stimulating in the area of theatre. The paper also outlines the potential of pop-up architecture as a popularizer of both theatre and architecture among the general public. The Shed by Haworth Tompkins is one of the examples to demonstrate a possible positive contribution of such designs to a permanent theatre and its surroundings. On the example of the temporary theatre building The Shed from the United Kingdom, which served as an extension to the permanent theatre, we can see the project was a success on several levels. With its four times extended lifespan, it shows acceptance by both the theatre-goers and general public. It enjoyed positive feedback in several articles and recognition of architecture critics. At the time Evelyn Furquim Lima wrote her article *Architecture-event installation, or temporary theatre? A study of the Shed in London*, there was controversy over whether the temporary theatre would become permanent at the request of the London population and would change its name from The Shed to the Temporary Theatre (Lima, 2017). Today we know that it did not happen; on the contrary, the building conformed to its temporary nature and then disappeared, remaining true to its mission. However, it does not change our view on the assumption that even temporary objects have a beneficial impact on their surroundings. Based on the analysis of similar examples and statistical data on the attendance of theatre performances, we decided to design and implement a prototype of a minimal theatre scene, which also provides wide variability and can be used beyond the time dedicated to theatre activities. In the design phase, we examine the limits of variability and explore basics of kinetic architecture. Experiments have always pushed society forward, and it is temporary objects that, with their transient nature, have become the essence of experimentation. We saw an opportunity to test the limits of such object by experimental design of a minimal variable architectural form, which deviates from the typologically traditional arrangement of a theatre. In the second phase after the object is assembled and implemented, the subject of research will be its impact on the environment, the extent of user interaction with the object and the overall functionality of the object. The ambitions of our project do not reach as high as presented in The Shed. The aim was to test the possibilities and viability of a much smaller object, to document the cultural, educational, but also economic benefits, in domestic conditions of Slovakia. Thanks to The Program for the Support of Young Researchers and The PUN Project, the object is currently in production, and later will be moved to the faculty premises, surface-treated and then assembled for the very first time. For possible future needs, we anticipate the designing of furniture such as seating, an information desk or bar counter. It is our first experience with this type of installation, especially in relation to the material, and therefore we need to include extra time in the project timeline. The prototype should be fully available later this year (2022).