Creations of Modern Architecture Corresponding to the Landscape on the Example of Diploma Designs of Students of Architecture

Joanna Gil-Mastalerczyk 1

1 Faculty of Civil Engineering and Architecture, Kielce University of Technology, Kielce, Poland
joanna.gil@onet.pl

Abstract. The paper discusses the examples of architectural solutions related to the natural landscape and building environment that have been presented in students’ diploma designs. In architectural and urban design, it is important to try to give timeless value to created works. This is understood in terms of meeting the needs of the contemporary and future users and paying respect to the tradition. This subject area will be presented on the example of conceptual designs of architectural & urban layouts with service, educational, rest and leisure functions in non-urban areas (Chęciny, Brody, Świętokrzyskie Province, Poland). The subject matter of the paper concerns the quality of architecture and urban planning. In their work, future architects and urban planners must be responsible and socially oriented when creating spaces in the building environment and natural landscape. The designs discussed in the paper demonstrate that modern architecture and natural landscape can both belong to the region’s tradition. Such an approach is both a value and a challenge to the designer and the user.

1. Introduction
When considering modern and future-oriented architecture, we most often mean sustainable environment and sustainable architecture. It is mainly based on the use of environmental energy directly from nature and in consideration of social and economic needs. Sustainable growth requires cohesion and a dialogue of objects with the existing environment. The co-existence of architecture with nature and cultural values is particularly significant in the method of shaping the sustainable environment.

In architectural & urban planning, it becomes particularly important to give timeless value (i.e., the value that responds to the needs of modern and future users) with respect for the tradition and values of the national landscape. This subject area will be presented on the example of diploma designs in engineering of students of architecture of the Kielce University of Technology. They refer to experiments and searches with regard to shaping the architectural and urban form in relation to the natural environment: land, water, greens – in harmony with nature and in relation to space being shared (social and public space).

The undertaken subject area has a very important impact on the quality of architecture and urban planning, because the work of a future architect/town planner requires a highly responsible and pro-social approach to the creation of space both in the urbanised landscape and in the nature landscape. Therefore, the presented designs have one goal in common: to prove that modern architecture and...
natural landscape play their part in the tradition of the region and constitute a challenge both for the designer and the modern user.

2. Architecture related to landscape – an important component of the educational process

Conceptual structures with a leisure, rest and educational function have been located in non-urban areas near Kielce (Chęciny, Brody) in direct contact with the natural environment. Places chosen by students are favourable for active leisure and provide constant contact with nature.

The designs were based on irregular views for the purpose of creating very attractive spaces inside and outside the buildings. The objects are characterised by the landscape distribution of shapes dynamised with sloping green roofs and terraces and the skilful use of different shapes with a modern architectural climate that form cohesive compositions with the landscape [1, 2].

2.1. Integration of architecture and landscape – “Paradise Cave” ("Jaskinia Raj"), Chęciny, Świętokrzyskie Province, Poland

The first work is an attempt to inscribe new architecture with an exhibition & academic function into a place connected with the centuries-long history of the Świętokrzyski Region. The conceptual design presents a spatial layout created by the building of the Exhibition & Academic Centre located near Paradise Cave in Chęciny approx. 10 km away from Kielce. The building has been situated in the middle of the forest, among the exceptional values of the Paradise Cave nature reserve in the southwestern part of the Świętokrzyskie Mountains.

Paradise Cave is one of the most beautiful caves in Poland. Discovered in 1963 and made available to visitors in 1972, it is a small hill with a height of approx. 270 m above sea level that hides an unusual history. It contains almost all cave formations occurring in nature, such as accumulations of stalactites, stalagmites and stalagnates, the view of which is unique on a world scale.1

The exhibition & academic complex was designed as a place to deepen knowledge in field of geology, archaeology and paleontology. In a sense, it has become a supplement to modern buildings erected in the Świętokrzyskie Province in the last few years, such as the Leonardo da Vinci Centre in Podzamcze Chęcińskie or the European Geological Centre in Chęciny.

The building has been designed for the purpose of replacing the existing entrance pavilion to the cave with a new building that would meet current technological, utility and aesthetic requirements.

The location of the building was one of the major aspects in the creation of the conception (Figure 1). The building is surrounded by a large forest. Located among the trees, the modern building integrates people, architecture and landscape. A unique form that unites nature and forms a joint composition with it rather than dominating it has been inscribed into the natural forest landscape and lie of the existing land [1].

---

1 Around 360 million years ago, in the Devonian period, the location of the cave was flooded by the sea, which resulted in the settlement of limestone on its bottom. In the formed limestone rocks, a dissolution process occurred, creating a cave in the Tertiary and Quaternary period. It is believed that the cave was inhabited by cave bears, mammoths, cave hyenas, woolly rhinoceroses, steppe bison, horses and foxes. In addition, remains of a Neanderthal settlement were found near the opening [1, 3, 4].
Figure 1. “Paradise Cave”, Chęciny, Poland. Location, land development plan.

Source: Own work of the author of the project [1].

Design activities led to the creation of a building with a small depth, which ensured better views of the natural environment from any place. The internal courtyard formed in the middle of the body of the building is a cozy sheltered place with the perceptible proximity of nature.

The adopted assumptions led to the design of a building where the main composition elements were green roofs corresponding to tourists’ contemporary needs. They were given a sloping shape and integrated into surrounding hills and the natural differentiation of the land. Available to all users of the building, the green roof was treated as a prolongation of the landscape – the Malik hill – and creates a joint composition together with the surrounding nature (Figure 2, 3).

Figure 2. Stage of formation of the body of the building.

Source: Own work of the author of the project [1].
The architecture of the complex with sculpturing features became the result of the individual answer to the identity of the place. The integration of the body of the building with the landscape was also influenced by the concrete material combined with light glazings that was used on elevations. The transparency of the façade dematerialises architecture and creates a smooth transparent space that enhances the experience of the natural environment (Figure 4).

It must be said that the body of the building serves only as a background for the beauty of the surrounding nature. For these reasons, a large part of the existing land development was left intact. This concerned, e.g., the location of the existing car park in a distance of 250 m from the main entrance to the cave, which ensured the absence of motor vehicles in its immediate surroundings. Access to the cave will be provided along the path leading in the middle of the forest, with the possibility of arrival along the preserved existing road for disabled persons and emergency vehicles. This creates the possibility of immediate contact with nature for all visitors, which is inseparably combined with the architecture and function of the designed centre [1]. In addition, for the purpose of maintaining the natural character of the surroundings, the simplest materials have been proposed for the shaping of public spaces, such as stabilised gravel for paths or local stone.
Figure 4. Creation of the architecture of the building. Views of the entire architectural & urban layout. Source: Own work of the author of the project [1]
When the design of the building of the Exhibition & Academic Centre was under preparation, special attention was paid to the surrounding space. Views from the inside of the building were directed towards the natural landscape through proper shaping of the body (Figure 5).

The spatial & functional structure of the building with the usable area of 2,091.03 sq.m. consists of: the museum function involving the collection and permanent protection of natural heritage assets, the Neanderthal Centre, lecture and exhibition halls, the dining part with a café and the leisure part with a viewing terrace [1]. The raw style of light spacious interiors has been maintained, and they have been designed so as to make it possible to observe the landscape. Their raw finish combined with glazings has become an ideal background for the surrounding nature.

To sum up, we can say that the presented layout forms one space that combines architecture with the landscape and modernity with history. The created harmonious composition is characterised mainly by aesthetic quality and minimum possible interference in the existing values of the natural landscape. Thanks to the economical use of materials, the body was subtly integrated in the natural landscape. And the form of the building and the development of the land stress the most important values of the environment while respecting its natural scenery. The building meets expectations resulting from its intended use, prestige and the need to integrate it in the existing valuable landscape.

2.1.1. “Brody Lake – tourism and leisure zone”, Brody, Świętokrzyskie Province, Poland. The subject-matter of another diploma thesis in engineering is the facility of the tourism and leisure centre located on the island of Brody Lake situated 40 metres away from the shoreline. The island with an area of over 3,000 sq.m. was built at the time of creation of the water reservoir; currently it is undeveloped. The extensive storage reservoir with an area of approx. 260 ha and a length of approx. 4 km is a water sports centre and the main tourist point of the
region. It is the pearl of the local landscape. Near the shore there is a campsite, a harbour and a small beach [2] (Figure 6).

**Figure 6.** “Brody Lake”, Brody, Poland. Location, land development plan.

Source: Own work of the author of the project [2]

The presented layout will be particularly favourable for active leisure in contact with nature. The proposed rich functional & spatial program of the entire complex with terraces, a viewing platform, a walking promenade, a pedestrian path system and a water harbour with a rich offer of water sports will give you the continuous possibility of communing with and admiring nature.

It is assumed that the sports & leisure complex will serve as an all-year-round modern infrastructure consisting of a multifunctional hall, a restaurant, cloakroom & toilet facilities and a set of hotel rooms with a SPA zone. The functional structure and the rich program offer with the total area of approx. 15,000 sq.m. is complemented by the leisure part with a viewing balcony and green roofs available to all visitors and tourists [2] (Figure 7, 8).

Architecture becomes integrated into the natural environment and makes use of modern technologies in an interesting way. The island is connected with the shore with a 40 m long footbridge that also functions as a fire escape route. Because of difficult location conditions, the structure of the building was based on a grid of reinforced concrete posts founded on a reinforced concrete grate and pillar foundations (Figure 7, 8).

**Figure 7.** View of the entire designed layout. Source: Own work of the author of the project [2]
The design included original wooden elements creating an impression of harmony with the environment and contact with raw nature. The dominant elements of building elevations are huge glass façades facing the lake, with glass panes preventing excessive heat thanks to the use of hard-coated solar control glass filtering strong and uncomfortable sunlight. The introduction of transparent external glazings in the form of large glass panes ensured the inflow of large quantities of natural light into the building and opened the body of the building to nature. Elevations of the building created close communication of the interior with the surroundings. The structure of elevations ensured the proximity of nature, and the glass ensured spectacular views of the surrounding landscape.

The distinctly formed roofing of the facility was provided with a green roof system. The use of this solution allowed the facility to become even more deeply embedded in nature, introducing the ecological aspect of the layout (reduction of energy costs – in summer the roof does not heat up and in winter it does not let the heat escape outside; retention of rainwater, protection of the roof membrane; improvement of building acoustics; gaining of extra green space). The elements used are favourable for the integration of human life and nature and improve microclimate values [5] (Figure 9).
To sum up, the presented facility has a modern abstract form that interestingly blends into the natural water landscape. The proper formation of the structure of the building allows visitors to admire constantly the surroundings that consist of the extensive horizon, the sky and the water. All of these things create a peaceful, almost poetic atmosphere. In such context, architecture appears to be a very careful intervention that does not disturb the balance of the place. At the same time, it does not prevent access to the facility and the surrounding nature. The essence of the layout has been to create an impression of harmony and exposure to the surrounding water and the nearby forest, which will allow users to admire the values of the local landscape. Thus, everyone was given the possibility of having access to the landscape around the building and observing it.
3. Summary and conclusions

The reasonable management of space and natural environment is of huge importance for the educational & design process. The awareness of the use of natural conditions in urban planning and architecture becomes highly important. The educational experience shows that learning the skill of composing architecture in harmonious relations with nature in the vicinity of the natural landscape often requires the introduction of various measures or interdisciplinary experiments [6]. For this reason, modern education should lay special emphasis on the development of sensitivity of future architects and urban planners and on precious values of the natural environment.

In presented diploma designs in engineering and the course of work of students of architecture, multi-stage classes began to play an important role. Students began their work with broad analyses and their own field observations. In each case, design decisions were based on individual studies concerning the existing natural context and helped to expand knowledge about the Świętokrzyski Region. A significant part of work was students’ own research conducted for the purposes of the thesis in the form of their own surveys and interviews aimed at recognising the needs of future users of designed facilities. Not less important were detailed consultations with representatives of companies regarding the use of the latest technical solutions and environment-friendly products in designs.

As a result of multi-stage works, buildings under design have been fully integrated with the character of the landscape and adapted to the natural lay of the land.

To sum up, it must be said that architecture should be designed in a comprehensive way as a very important element of the constantly changing space. Apart from requirements of ecology, economy and energy saving, it should also include functions such as rest, entertainment, leisure and education.

The presented student projects (engineering diplomas) undertake current topics reflecting the need to stress unique natural values and become an opportunity to improve the awareness of relations with people and the natural environment.

Acknowledgment(s)

I would like to thank my students (Mr Mikołaj Wieczorek, Ms Karolina Karbowniczek) from the Faculty of Civil Engineering and Architecture of the Kielce University of Technology for their commitment to doing extensive field research and carrying out in-depth location analyses that have become the basis for the elaboration of presented architectural & urban conceptions.

References

[1] M. Wieczorek, Paradise Cave-EXHIBITION and Research Centre in Chęciny. ["Jaskinia Raj" Centrum Wystawienniczo-Naukowe w Chęcinach] (Engineering diploma thesis prepared in first cycle full-time studies. Promoter of the thesis: J. Gil-Mastalerczyk, PhD, Eng. of Architecture. Kielce University of Technology, Faculty of Civil Engineering and Architecture), Poland, Kielce, 2017 (in Polish).

[2] K. Karbowniczek, Brody Lake - A Tourist and Leisure Zone. [Zalew Brody - strefa turystyki i rekreacji] (Engineering diploma thesis prepared in first cycle full-time studies. Promoter of the thesis: J. Gil-Mastalerczyk, PhD, Eng. of Architecture. Kielce University of Technology, Faculty of Civil Engineering and Architecture), Poland, Kielce, 2017 (in Polish).

[3] D. Kukła, M. Winkler, Paradise Cave in Publications. [Jaskinia Raj w Publikacjach] Bibliography, prepared by the Information and Regional Bibliography Section of the Provincial Public Library, published by the Provincial Public Library in Kielce, pdf, Kielce, 2009 (in Polish).

[4] Świętokrzyska Digital Library, http://sbc.wbp.kielce.pl, access: October 2017.

[5] L. Kamionka, Glazed Elevation and Green Roof as Important Elements of Modern City Integration environment of Person's Life and Nature. [in:] The Modern City as a Human Environment Integrated with Nature, (Ed.) S. Wehle-Strzelecka, 2/2015, Kielce University

---

2 See also other works of the author on similar topics [7, 8].
of Technology, *Kielce, pp. 146-152, 2015* (in Polish).

[6] A. Satkiewicz-Parczewska, The Significance of Interdisciplinary Activities in the Development of the Architect of the Future [in:] Works of Polish architects in the context of creative fields in architecture and urban planning in the years 1945-1995, (ed.) Z.J. Białkiewicz, A. Kadłuczka, B. Zin), vol. III, published by the Faculty of Architecture of the Cracow University of Technology, pp. 211-215, Krakow, 1995 (in Polish).

[7] J. Gil-Mastalerczyk, The Green Space of Entertainment in the City – An Important Element of the Issues of Education, [in:] Interdisciplinary research in architecture, BIWA 2, Conference monograph, (ed.) B. Komar, J. Tymkiewicz, v. 4 - Educational projects. Ecological and ergonomic issues, published by the Faculty of Architecture of the Silesian University of Technology, Gliwice, pp. 51-60, 2017 (in Polish).

[8] J. Gil-Mastalerczyk, Conscious approach to urban and extra-urban space restructuring as seen in the designs of Architecture students, (the reviewed paper submitted for publication in the MATEC Web of Conference), "ECCE2018" Opole, Poland, 2017.