The Form of the Objects Presenting Vegetation as an Element of Urban Development on the Example of a Greenhouse Design in the Wroclaw's Botanical Garden

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Abstract

The issue of the palm house or arboretum project in the botanical garden in Wroclaw was directly connected with the need to implement this function for the time, when Wroclaw fulfilled the honorable function of "Wroclaw – a city of meetings " and in 2016 "Wroclaw – a European city of culture".

Existing Wroclaw's botanical garden is an area with much natural beauty, which is one of the major tourist destinations in the town. A large number of visitors, the surrounding nature, numerous trails and water contact possibilities were among the main factors that determined the topic and location of this work.

The aim of this article is the presentation of the discussion on the subject of form of the buildings presenting vegetation in the botanical gardens. During the discussion, I will try to prove correctness of the choice of the amorphous form about the sense of maintaining the form over the function in the case of botanical gardens, or introducing the form as the superior, further defined it as a symbol of the function designed inside of the object.

Key words: *functionalism, formalism, amorphous form, Wroclaw Botanical garden.*

Introduction

The aim of the study is to answer the question about the shape of the new design object of the arboretum located in the existing botanical garden. Second point is to show the creation of the form, which carry a spatial composition of the building. The main problem of this location is the need to look for quality of the form, and functional solutions inside of the building.

The project aims is to present the importance of the exposition of the plants, in the best possible way to the visitors and because of it, increase the number of visitors, as well as the better presentation of the Wroclaw's botanical garden.

It is equally important to show technical, and formal solutions for the building where the plants are shown to recipients. A network of a amorphous forms will be a recognizable part of the botanical garden landscape, which at the macro level will be associated with all garden, while at the micro level will be associated with its use (Jodidio, 2010, 2014).

Methods of research

The study will be presented as a first step – analysis in context of urban planning, architectural, and SWOT with solutions coming from. Next step will be presentation of the inspirations based on world famous examples, and as a following step in more details the study area with analyses, aimed at bringing the issue of the scope of work.

In the next stage of work will be presented description of the research of the form of the building with special focus on the functional solutions use inside of the building.

For the easy understanding of the research method, description has been attached by graphic material, whose job is to bring shown assumptions.

Development completed the presentation of its conclusions.

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Results

As a result of research, a new form of the arboretum building was proposed, remaining in line with the existing image of the botanical garden and informing about the function of exhibition function contained inside of the object.

Trying to interested potential visitors of the garden to see exposition of magnolias, in formal capabilities of this building type and encourage them to similar initiatives arose from my participation some interesting suggestions for adaptation for the new forms in this category. Here is presented a short presentation of these studies.

Location. The location of the greenhouse was planned at the Botanical Garden in Wrocław. The southern side of the Garden was chosen at the intersection of Wyszyński and Hlond streets. The location is very advantageous due to the close location to the center, with Ostrów Tumski with the Cathedral and the Church of St. Krzyża and the boulevard on the Odra River.

The location in this place is also an asset in terms of communication: good access both by car and by tram, the possibility of parking on the other side of the street. However, in the Botanical Garden itself, a part of this area is beneficial due to the only creepers growing there, which can be replanted, thus no need to cut down trees (Fig. 1.).

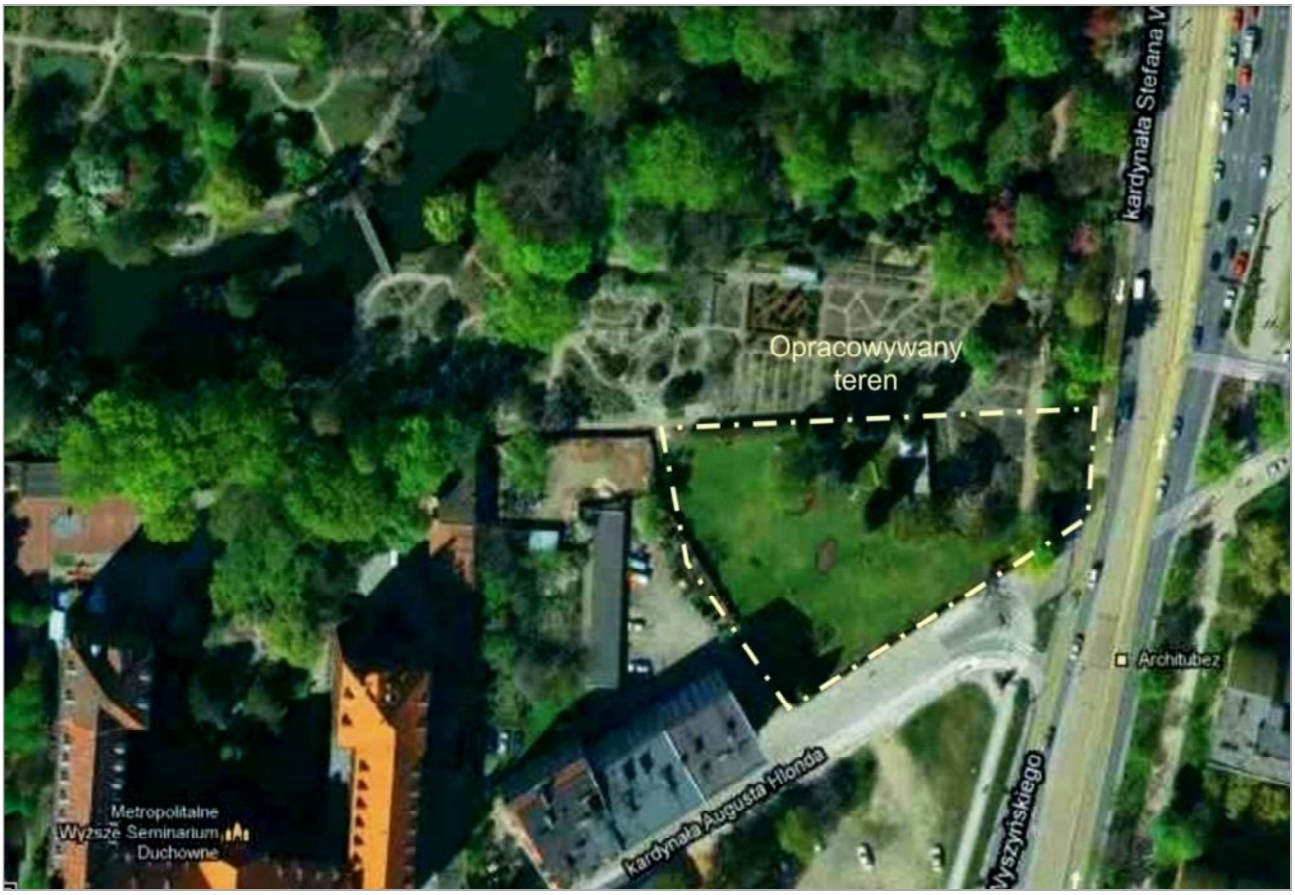

Fig.1. The area is being developed, prepared by Arch. Monika Wiśniewska

Existing terrain conditions – photo inventory. At present time, there is an exhibition of vines with several trees (Fig. 2.).

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Fig.2. Photos of the inventory of the terrain (photo by author)

Analysis. ***Urban planning and spatial.*** The developed area is part of the Botanical Garden, with which it is adjacent from the north and where there is the most beautiful view. Going east of the area is one of the most valuable places in Wroclaw – Ostrów Tumski with the Cathedral. On the south and west side, there is a view of the busy Wyszyński Street and the little-visited Hlond and further on multi-family housing development (Fig. 3.).

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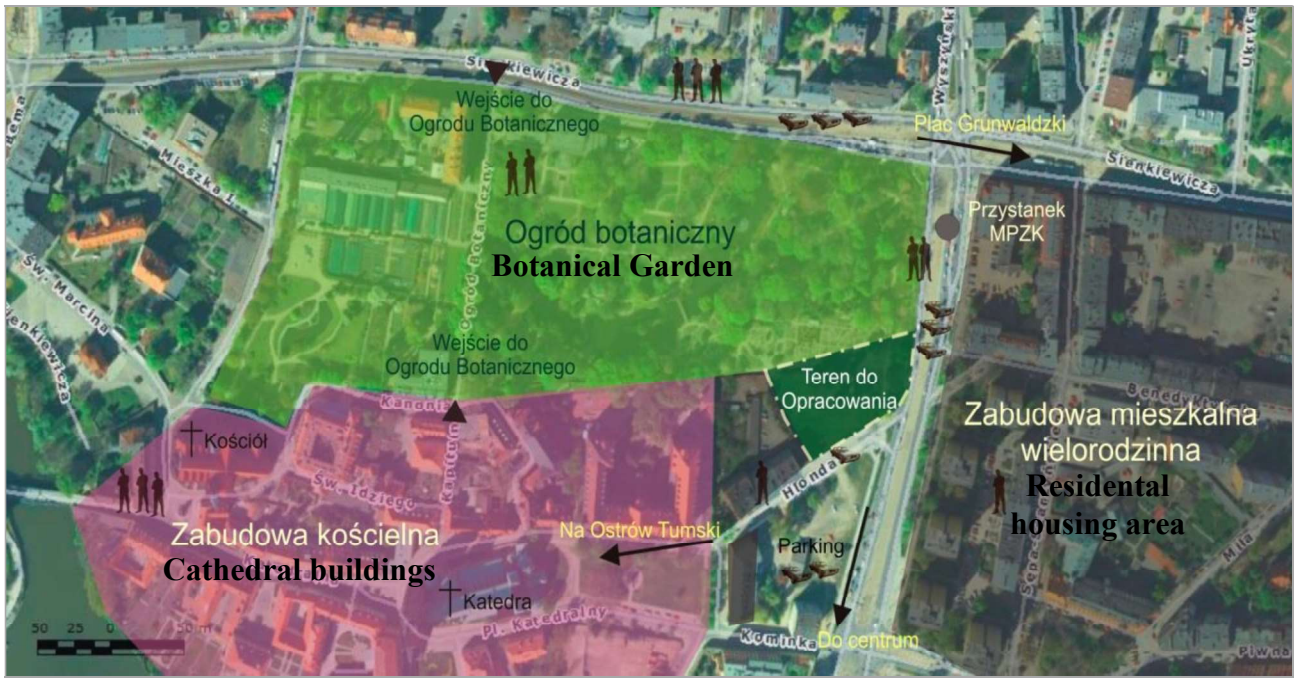

Fig.3. Urban planning analysis (photo by author)

Architectural. The area is very privileged due to its proximity to the beautiful Ostrów Tumski full of sacred monuments. The cathedral located on Ostrów was built in the 14th century in the Gothic style. On the other hand, the buildings around it experienced their flourishing mainly during the Baroque period. Adjacent to the Botanical Garden, the Church of St. Krzyża. The cross was built in the Gothic style, however it was rebuilt many times. On the eastern side, there is also a historic building of the Seminary from the 16th century. To the west of the developed area there is a multi-family housing development, 11-storey built in large-panel technology. On the same side there are desolate tenements that fall into disrepair. Next, there are four- and five-storey apartment buildings (Table, Fig. 4.).

Table. SWOT – Strengths) **W**eaknesses) **O**pportunities) **T**hreats)

Positives	**Weaknesses**
– location in the Botanical Garden, – very good location in the center, near Ostrów Tumski, boulevard on the Odra river, – good communication, – tram stop at Wyszynski street, – emphasizing the need to display the greenhouses in the Local Development Plan.	– relatively weak interest in the Botanical Garden, – lack of development of tourist attractions in the Botanical Garden, – unfavorable surroundings from the south.
Chances	**Threats**
– lack of tourist attractions in autumn and winter, – no palm house in Wroclaw, – lack of new palm houses in Poland, – the need to increase the value of the Botanical Garden, – the possibility of using a large parking lot across the street – the possibility of using the views of the Botanical Garden, – a new facility would attract new customers to the Botanical Garden.	– competition with the Wrocław Zoo offering customers new attractions, – the lack of popularity of such facilities among Poles.

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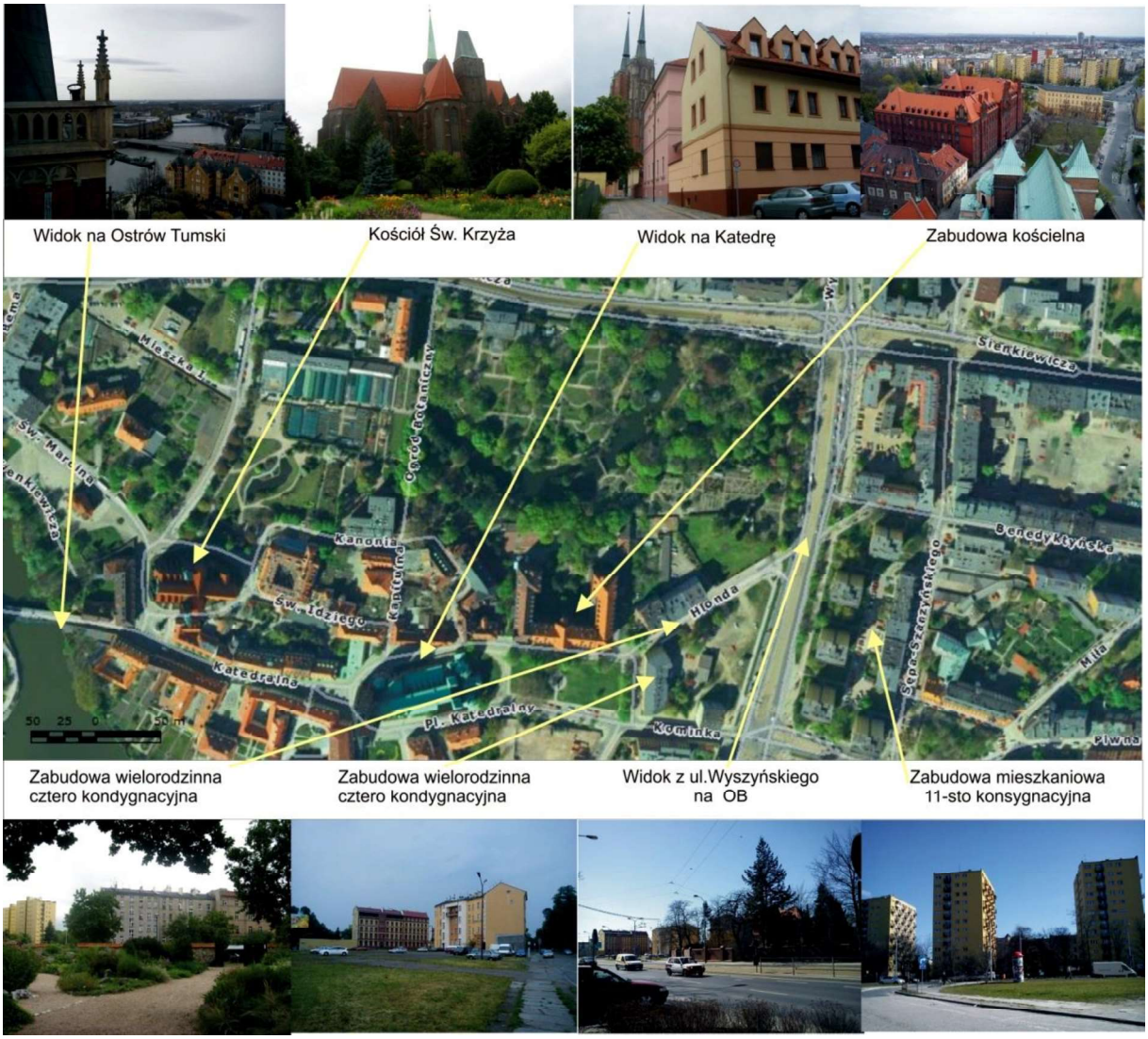

Fig.4. Architectural analysis (created by author)

Inspirations. ***History of greenhouses for decorative plants.*** The greenhouse prototype is the so-called fruit houses for growing trees and shrubs in Ancient Rome. In the Middle Ages pits with plants were used, which were covered with mats for the winter. However, the largest interest in greenhouses for exotic plant breeding falls on the 16th century when interesting species of plants from warm countries began to be imported. Such buildings were called oranges, conservatories, and palm houses .

In the 16th century, the greenhouses were buried in the ground with a glass-covered wooden dome protruding. The main advantage of wood was poor heat conduction, resistance to distortions caused by temperature changes. Later, stone and brick were used, and in the nineteenth century, the use of steel became widespread.

In the 18th century, greenhouses became places for social events, a place for exhibitions. Cafes and restaurants are starting to enter them.

At the beginning of the 20th century, the interest in greenhouses decreased, but now there is interest in greenhouses in the form of small backyard winter gardens, but the creation of larger objects is rather not widespread (Majdecki, 1978) (Fig. 5–8).

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Fig. 5. Photos of the Orangery in Potsdam from the 18th century at the Sanssouci Palace (photo by author)

Fig. 6. Photos of the very interesting example of a modern palm house inspired by the shape of the river; Flowing Garden in China (Architecture Now 7, 2010; AALU Ladscape Urbanism, n.d.)

Fig. 7. Exhibition pavilion of plant compositions in the German city of Koblenz (photo by author)

Fig. 8. Exhibition center for rhododendrons in the German city of Schwerin (photo by author)

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The Form. Taking advantage of the fact that the magnolia plant is the symbol of Wroclaw, the flower of this tree has just become the inspiration for the greenhouse (Zumthor, 2010).

This inspiration was obliterated on the shape of the object, which consists of 6 part/arms, in the shape of petals and the center depicting the inflorescence. Through the building runs a ramp, which is to refer to the branches of the tree. The twig motif was also used in the development of the area, where walking paths were marked in relation to the slipway.

The whole was maintained in white and brown colors, while the illumination of the object even more fully emphasizes the outline of the flower. The interior of the greenhouse is planned for the exhibition of plants from the *Magnoliaceae* and *Rhododendron* families (*Ericaceae*), which results from the specificity of the Wroclaw Botanical Garden (Fig. 9).

Fig. 9. Sketches of magnolia flower (author Monika Wiśniewska)

Pre-drawing drawings and searching for the shape of the object. The shape of the object has been designated not only for the inspiration of magnolia flower, but also the shape of the plot (Fig. 10).

Six petals have been set according to the ordinal axes defined by the center of each side of the border. On this basis, two focal points were also designated at the intersection of the axes.

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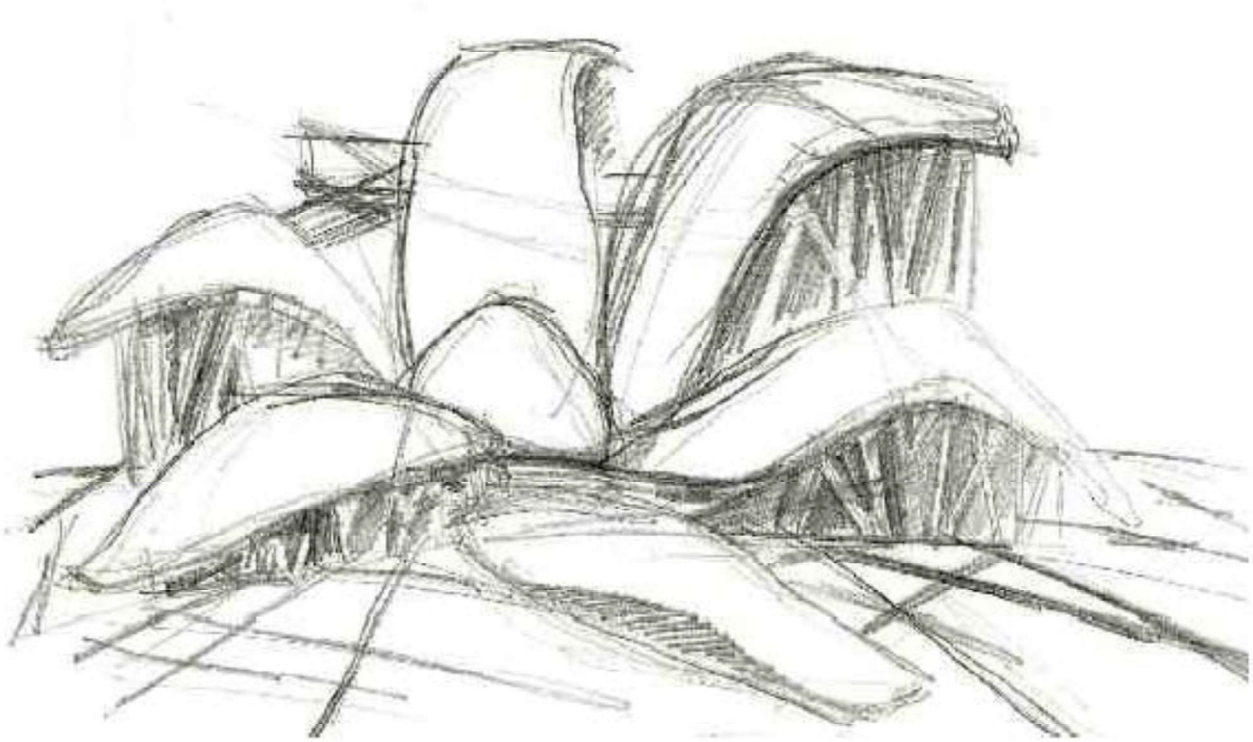

Fig. 10. Sketch of magnolia flower as form of the greenhouse (author Monika Wiśniewska)

Supporting structure. The construction of the building was based on glulam arches made of glued wood, which give the shape of a flower.

Glued wood was chosen for the construction because:

- wood fits the idea of a greenhouse as a magnolia,
- can create interesting shapes from it,
- with regard to the history of greenhouses, they were originally in the form of wooden domes,
- matched wood is suitable for objects with a large span,
- the producers ensure high durability and economic benefits,
- resistance to distortion caused by temperature changes.

Uniform girder sizes have been preserved to preserve harmony and order (Fig. 11.). The girders in cross-section have a dimension of 50 x 30 cm. At the bottom they are fastened to the foundation, while at the top they connect to each other in a ridge made also of glued wood with dimensions in the section of 20 x 50 cm. The ridge gives the individual parts of the object a wavy shape of the petal.

Fig. 11. Construction of the building

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Functional program. The greenhouse has an exhibition function of various varieties of azaleas and magnolias. The main intention was to create a space where visitors can rest and relax. The means to create such conditions was the use of pleasant plants in the smell and view, the placement of water fountains (the sound of water well affects the psyche), many seats in the form of swings and comfortable armchairs, many paths to walk at different heights, a large anti-congestion space and a buffet where you can buy something to eat (Fig. 12.).

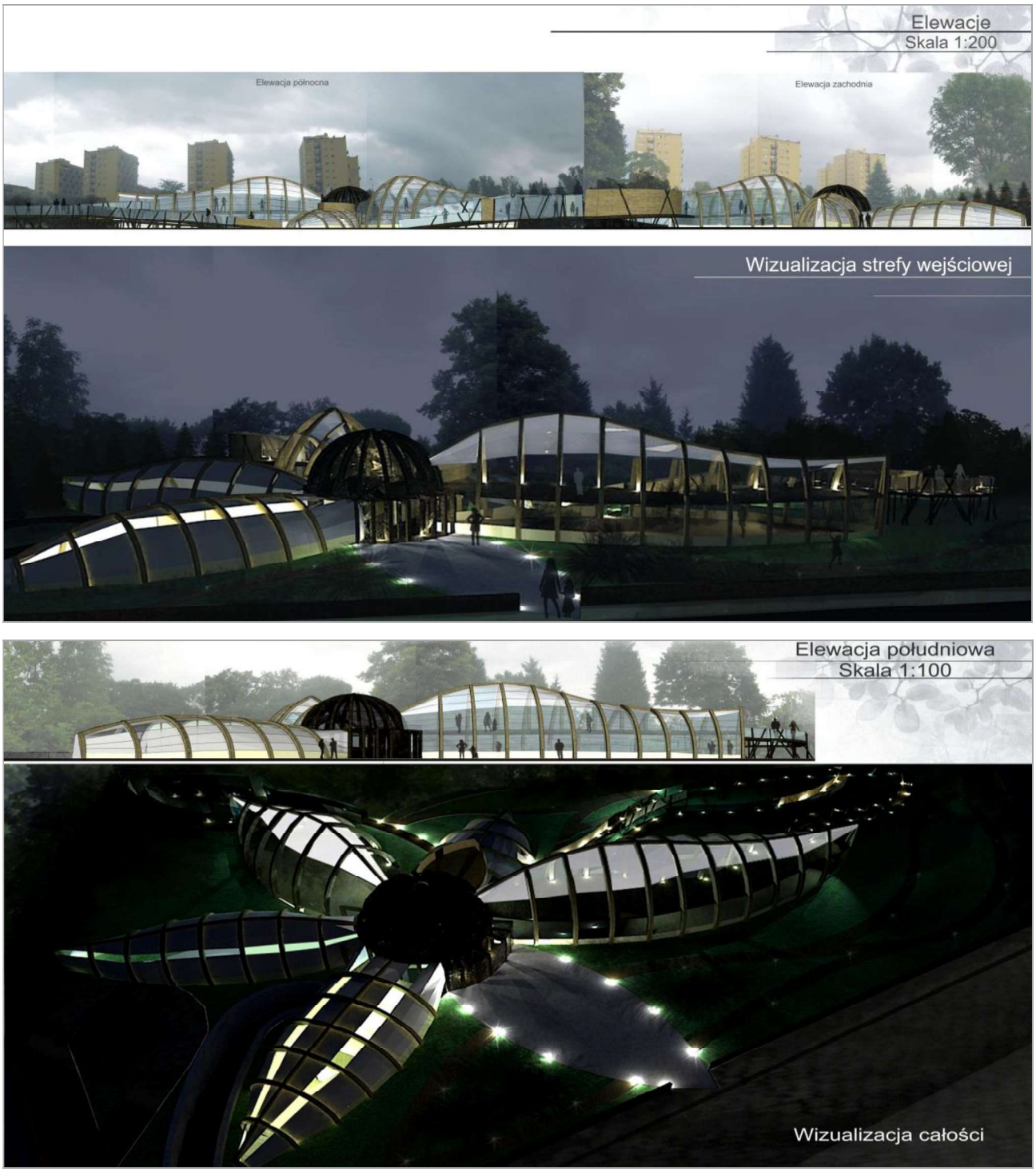

Fig. 12. Sketch of the final form of the greenhouse (author Monika Wiśniewska)

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Conclusions

Even if someone is not interested in architecture, "she" is interested in him or her. It affects well-being, quality of life and many other life matters. By attachment to certain forms, places, "she" builds and anchors the community in space.

In the theory of architecture, it was assumed that the form of the building results from the function it is to perform. This claim is widely accepted primarily by biologists. They admire the desirability of natural phenomena, the functionality of forms of living organisms. Such imagined nature is an inspiration for formalism in design in general, and especially in shaping of the space on various scales, means – architecture.

The sentence "form results from the function" can be made a principle for the design process and reformulated into a postulate.

However, it is not a true claim in relation to nature. Attempting to give the beautiful form of plants will always be not entirely successful, simplified, abstract, in connection with even structural or executive constraints.

In turn, the building's shape / form are considered as a kind of architect's stamp, which determines its uniqueness and individuality of style, aesthetics.

Practically, every architect starts his design work from a solid sketch – he examines formal possibilities in relation to the required function design. The concept evaluates, creating a unique shape. Approximation of the solutions taken in the examination of form, observed in the world of nature, especially in the context of the later use of the exhibition of nature in the designed object is obvious.

Observing the effect of research as a whole, we should see not only the form, but also the functional concept. The incomprehension of this canon often raises disagreements in the views of architects, and ordinary people, too, who happen do not understand "what the author meant."

However, it should be remembered that through the centuries of the evolution of architecture, from the pyramids in Ancient Egypt, to the times of "glass houses", the building's form was, and is, the determinant of the era. It also triggers an additional social dialogue about the shape of the surrounding us space.

Project of the Green house, presenting vegetation, could be a part of the harmony of the Wroclaw's botanical garden landscape and is a very interesting solution.

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