

Chapter 12

Integration of Vegetation With Architecture Forms

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ABSTRACT

One of the most interesting ways of returning nature to the city is green architecture, which embraces hybrid buildings at the base of the coexistence of the natural and building worlds. By definition, green architecture does not have to be green at all. Nevertheless, it takes on a number of hybrid forms integrated with vegetation. Built and natural form in the composition is inseparably “tangled” – one follows other to form a cohesive whole. Green architecture becomes part of a larger green infrastructure system. The idea of green infrastructure leads to passage from passive protection, to the active-present in every aspect of human life. It is a development tool respecting the laws of nature. Architecture enters the world of nature as never before, clings to it through the cooperation of designers with specialists in environmental sciences from cellular microbiology to macro scale processes in ecosystems. This requires designers to be particularly sensitive to the natural world, understanding and accepting its rules.

INTRODUCTION

According to the definition provide by Encyclopedia Britannica, “*Green architecture*” (Wines, 2016), is “*a philosophy of architecture that advocates sustainable energy sources, conservation of energy, re-use of building materials and the concern of safety, and the placement of a building with consideration for the impact it exerts on the environment*”. By definition, what is known as green architecture hardly has to be green at all – or referring literally to plants. Nevertheless, such type of architecture assumes a number of hybrid forms integrated with vegetation. In every composition built and natural forms are inseparably “tangled” - one follows the other in order to form a cohesive whole.

This applies to newly designed buildings as well as to architectural objects that are undergoing modernization, especially in intensive urban areas where shortage of greenery occurs. In such cases, façades and roofs represent a great potential for green technology in terms of EPBD requirements (EPBD, 2010).

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In the context of the study entitled “Design retro-fit nZEB concept - KODnZEB” on modernization and adaptation of two university’ buildings to nearly zero-energy standard (nZEB) that was conducted in 2016-2017 in cooperation between Warsaw University of Technology and the Norwegian University of Science and Technology in Trondheim, author presents a contemporary history of green architecture and attempts to outline directions for its development. The work yields the benefits and potential of green forms in building a healthy, sustainable, friendly and resilient urban environment. The collected and analyzed data was used to carry out research projects on green compositions for two buildings under modernization, namely the building of The Faculty of Building Services, Hydro and Environmental Engineering (designed by S. Jaczewski and J. Reda 1970-ies) and a dormitory house “Muszelka” (designed by Z. Dytkowski 1950).

BACKGROUND

The basis of research work on the vegetation integrated with architecture was to delineate the sources of modern ideas concerning green architecture. Planting greenery on the building surfaces is dictated by, inter alia, the need to improve the quality of the urban environment, concern for biodiversity, the need to combat climate change, etc. Therefore, the next stage in the research was to carry out analysis of functions such as biotic, climatic, hydrological, soil, phytoremediation, social, health and cultural functions of greenery that form the foundations for the contemporary resilient ideas. Afterward, widespread recognition of the problem concerning services provided by the environment in light of the concept of green infrastructure which incorporates buildings integrated with vegetation has become a major aspect of the research (Costanza, et al. 1997, McMahon 2000).

The next phase of the work was the recognition and analysis of the biodiversity in architectural forms and the potential for their application. Polish realizations and possibilities are presented in the context of green architectural forms in connection with particular climatic conditions, especially those to be found in Warsaw. The studies conducted have become the basis for KODnZEB’s research in the field of green composition, which provides an integral part of the case study and the design process.

GREEN ARCHITECTURE IDEAS

Pillars, upon which today’s sustainable design is based, should be sought in the works of eminent designers who created in the second half of the 20th century by their critical development to the modernist order. Their works pointed to the threat of dehumanization the technological society was facing. Ian McHarg’s projects, especially his cohesive spatial development strategy that was described in “*Design with Nature*” published in 1969, gave man a responsible role of the subject consciously influencing the state of the natural environment. It is worth mentioning another theory that is controversial from the point of view of science, yet has the capacity for influencing the imagination to a large extent, namely the 1979 Gai hypothesis put forward by a British ecologist, James E. Lovelock (1979). Another publication that aroused great distress was “*Silent Spring*” (1962). The publicity and controversy surrounding the appearance of the book effectively focused public attention on environmental issues.

One of the first issues to affect the principles and guidelines concerning green building design were issued by The Landscape Institute, UK’s “*Landscape Design with Plants*” (1977), where one of the

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