



## “GREEN ARCHITECTURAL PARADIGM AND ECOLOGICAL CONCEPT IN MODERN ARCHITECTURE”

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**Abstract.** *The concept of green architectural paradigm and ecological design process is one of the architectural paradigms of the 21st century. Green architecture paradigm combines six principles that should work together with the buildings: conserving energy, climate neutral systems, minimizing new resources, respect for the users and creating green architecture that recognizes the importance of the relation between people and nature, respect for the site, where all green principles need to be embodied in a holistic approach to the built environment.*

*Ecological Design in Architecture should be durable, theory based to enable environmentally holistic design approach, which will acknowledge the ecological design as a complex and involve the incorporation of a complex set of green interactions with the environment on a local and global level. General systems framework for ecological design include the concept of developing a theory for ecological design, urban environment as fundamental to the ecosystem concept in ecology, and architectural design as a crucial and essential resolution of the design process.*

*The sustainability conversation, achieves an urgent awareness of the global warming and the effects of climate change, in the extremes of weather and the unexpected flooding in the cities. But architects must think of sustainability in a new way. The green technology paradigm incorporates the concept of livability and the aspect how people can adapt to their environment.*

*One of the leading challenges for architects and urban planners today is how to deal with urban density. Cities have to design, plan, and create buildings for a population that is urbanizing at exceptional speed. Sustainable design should to be firmly grounded to the details of design and integration of ecology and design. The epistemology should rely on the deep interconnections in order to mirror nature.*

*Specific attention in this research will be given to analysis of ecological design process and green architectural paradigm with consideration of their urban context, adequate public access and architectural space. The expected outcome results in this scientific paper is to identify the green design approaches and create application at the international education processes.*

**Keywords:** *green architectural paradigm; ecologic concept; modern architecture.*

### 1. URBANIZATION AS GLOBAL CHALLENGE

The cities nowadays have an exponential growth in their urban development. Urbanization shows that nearly half of the world's population live in urban areas. Cities nowadays are becoming economic hot-spots with nearly 80% of global GDP located in cities. Social problems are concentrated in urban spaces, as centers of environmental degradation.

Urban areas have a crucial role in tackling climate change, and there have been observed that 70% of global greenhouse gas emissions come from cities. Smart urban planning is key to ensuring safe, resilient and sustainable cities.

### 2. ECOLOGICAL DESIGN IN TODAY'S CITIES SHOULD MOVE TOWARDS GREENING OF URBAN ENVIRONMENT

It is very important in cities today to focus towards greening the urban environment. This is important as a preventive measure to create urban climate modification, adaptation and mitigation as a system of measures.

Benefits of the today's green cities include the following principles:

1. Ecological benefits from greening the environment in the cities:
  - Temperature modification – heating/cooling of buildings,
  - Air quality improvements –pollution absorption and oxygen production,
  - Carbon dioxide storage,
  - Storm-water– filtration and absorption of water,
2. Social benefits from greening the environment in the cities:
  - Social aspects on well-being of city residents,
  - Provides a connection to nature and biodiversity,
3. Economic benefits from greening the environment in the cities:
  - Reduction in cooling costs,
  - Regulates sunlight distribution in houses,

- Increase in real estate values,
- Improves the appearance, economic value of cities,
- Reduction in health service costs,
- Improvement in the livability in cities.



**Figure 1.** Sustainable Architecture and Landscape Design Projects in the Cities

### 3. ECOLOGICAL DESIGN PARADIGM IN ARCHITECTURE

Ecological Paradigm is defined by the architectural protagonists Brenda and Robert Vale. According to them architectural practice should focus on low-energy use, from production of materials, to thermodynamics of individual buildings, promoting a holistic approach in design.

Ecological design should be durable and have theory-base approach that will enable the design work to be environmentally holistic:

- we should acknowledge that ecological design is complex
- it specifically involves the incorporation of a complex set of “interdependent interactions” or connections with the environment (both global and local scale)



**Figure 2.** Green building, Nanyang Technological University, Singapore

Ecological Design Paradigm was also analyzed and defined by the protagonist Van Der Ryn. According to Van Der Ryn: “If we are to create a sustainable world, accountable to the needs of all future generations we must recognize that our present forms of architecture, engineering, agriculture, ecology and technology are connected”.

### 4. SUSTAINABLE GREEN PARADIGM IN ARCHITECTURE

Sustainable Green Paradigm in architecture and interior design is often defined as Design in Action. According to the Green Paradigm from the architectural protagonist Van Dyk, green architecture should combine six principles that should work together with the buildings:

1. Conserving energy, (Buildings should be constructed to minimize the need for fossil fuels for buildings' functioning)
2. Working with climate (Buildings should be designed to work with climate and natural energy sources)
3. Minimizing new resources (Building should be designed to minimize the use of new resources)

4. Respect for the users (A green architecture recognizes the importance of people and nature)
5. Respect for the site
6. Holism, all the green principles need to be embodied in a holistic approach to the built environment



**Figure 3.** Living wall composed of individual planting cells on supporting panel system

### **5. REDEFINING ECOLOGICAL URBAN AND ARCHITECTURAL DESIGN RESEARCH**

Architectural design with connection with the environment is one of the fundamental part in architecture. Architects nowadays are becoming a leaders towards the field of environmental design and sustainable architectural research. Applied ecological design in architectural projects reaches a growing number of architectural subjects. It creates concept of evaluating and valuing the tradition in architecture integrated in both wider academic research communities and architectural practice.

Urban Sustainable Environment shifts towards the principles of the ecological design paradigm. Ecological design paradigm and agenda can be defined also in the complex and fragmented architectural design. The design is correlated with the information communication systems in a complex and collaborative design which shifts towards complexity of these projects and their developments.

Urban and spatial planning combine the knowledge and the science in an inter-disciplinary concept, including academia, urban design and planning in a urban simulation systems.

Examples of architectural designing processes and systems can be seen in the urban design in holistic energy strategy for an innovative scheme that straddles the scales of the buildings and urbanism. In these concepts the design of the individual buildings works in urban scale towards incorporating the ideas of ecology, networks and system-based design.

Conceptualizing urban areas as sets of intersecting systems provides basis of architectural study of the organization of sustainable urban systems, in detailed analysis of the terrain configuration, insolation orientation, wind orientation, correlation between the system of buildings in a sustainable approach.



**Figure 4.** Sustainable Architectural Project, Zorlu Shopping Center in Istanbul

One of the main question in architecture remains: How can ecological design be redefined towards more relevant architectural approach?

There is an urgent need for new knowledge which is related to the global and multidisciplinary issue in sustainable design. In the context of sustainable architecture the challenge of building sustainability is addressed by engaging new forms of visual communications. The form of the architectural buildings start to follow energy concepts.

The focus and the need of increased level of documentation of energy, environment and various ideas of sustainability, architects are modeling, simulating and redefining the buildings, according to the energy and performances of the buildings.

During the architectural design process, the form and the shape of the building can be modified several times with advances computer programs towards design that achieves simulation of the maximum benefits of the energy performances of the building, such as solar potential for the solar photo-voltaic systems. The ecological pre-conditions will be a crucial factors in the design process of the architectural buildings.

Important part of assessing the sustainability of the building design is the method towards measuring energy, airflow, carbon production, and material performances, measurements that range form different variables according the values in the simulation models.

**6. ARCHITECTURAL EDUCATION FOR SUSTAINABLE ARCHITECTURAL PROJECT DEVELOPMENT, DEPARTMENT OF ARCHITECTURE, FACULTY OF ENGINEERING, INTERNATIONAL BALKAN UNIVERSITY**

Architectural education for sustainable development is currently very important theme for researching in context of architectural and urban environment

The aim and scope of the presentation from architectural studios and projects developed from students of Department of Architecture, Faculty of Engineering of International Balkan University.

Architectural project - Multicultural ecological center, course: Landscape Architecture, objectives and goal of the architectural projects are:

- To improve educational and cultural opportunities by promoting ecological content
- Education for raising public awareness for nature conservation
- Opportunity to get knowledge directly with biodiversity and natural resources with modern innovative approach
- Improve human action towards natural environment
- Organizing educational visits, eco-actions, eco-exhibitions related to ecology in the neighbourhood, and city in general



**Figure 5.** Sustainable Architectural Project, course Landscape Architecture, IBU



**Figure 6.** Sustainable Architectural Project of Residential Complex, course Architectural Design III, IBU

Architectural Project for the course Sustainable Architecture at consisted of project that implements renewable technologies and green technologies. The title of the project is Municipality building, course: Sustainable Architecture, IBU, objectives and goals of the architectural project are:

- To improve the architectural functioning of the building with implementation of renewable technologies: solar panels, photo-voltaic panels, geothermal pumps, green roof system
- To improve the connection and between public buildings: municipality building by promoting the use of renewable technologies
- To improve educational and cultural opportunities by promoting ecological content and education for nature conservation



**Figure 7.** Sustainable Architectural Project of Modern Municipality Building, course Architectural Design VII Project II, IBU



**Figure 8.** Sustainable Architectural Project of Modern Office Building in Istanbul, course Architectural Design VII Project II, IBU



**Figure 9.** Sustainable Architectural Project of Modern Office Building in Istanbul, course Architectural Design VII Project II, IBU

## 7. CONCLUSION

Redefining Ecological Design research and paradigm shifts in two ways of approaches from the architectural professionals. There are two ways in which architects are responding to the emerging need of sustainable buildings concepts: by bringing new knowledge from outside the profession into the design teams, and secondly by attempting to create the knowledge from within design team in a holistic approach.

The increased focus on documenting energy, environment and ideas on sustainability, architects are modeling, simulating and measuring buildings, energy and performance as a holistic approach. Engineering ecological concept shifts and it incorporates contemporary design as modulation of environments and ecologies. There is an urgent need for new knowledge which is related to the global and multidisciplinary issue in sustainable design. In the context of sustainable architecture the challenge of building sustainability is addressed by engaging new forms of visual communications. The form of the architectural buildings start to follow energy concepts.

During the architectural design process, the form and the shape of the building can be modified several times with advances computer programs towards design that achieves simulation of the maximum benefits of the energy performances of the building, such as solar potential for the solar photo-voltaic systems. The ecological pre-conditions will be a crucial factors in the design process of the architectural buildings.

The current trend for architectural engineers will focus on development of sustainable elements and technologies, 3D multimaterials and synthetic biology processes for different types of new biomaterials designed at micro and nano level to respond to the particular conditions.

The research into sustainability shifts from a technological and innovation process requires contemporary sociocultural and economic transition in architectural design. The research study of the ecological and green design concepts, within the built environment of the design approaches contribute towards interior finishing materials and the surface treatment systems towards interior design from ecological and green design.

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