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## GREEN ARCHITECTURE AS AN OFF-SHOOT OF ECOLOGICAL ARCHITECTURE

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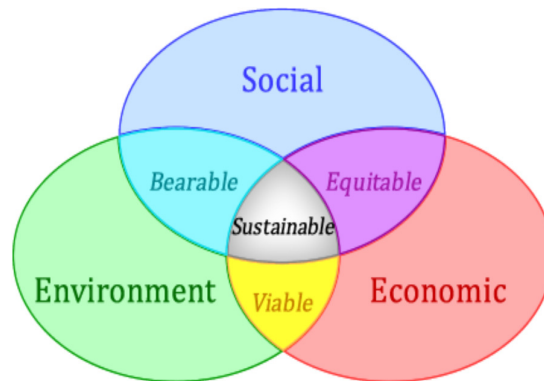
### ABSTRACT

Green architecture, also known variously as sustainable architecture, eco-design, eco-friendly architecture, earth-friendly architecture, environmental architecture or natural architecture became a buzz-word in the annals of the construction industry. This was spurred by the Brundtland commission report in 1987 titled our common future. The report cautioned against the wanton destruction of the natural environment in the exploration of natural resources for material development, in total disregard to the environments ability to replenish and maintain itself for future generations. Green architecture was born as the response of architects to the Brundtland report. A critical review of the goals and principles of green architecture though, align with the philosophy and practice of ecological architecture. The word "ecology" entered public consciousness and architectural discourse in the 1960's and was popularized by Ian McHarg through his publication in 1969, "design with Nature". Standardization and modular design and construction only seemed to have relegated ecological architecture to the background on the altar of construction economics till the Brundtland report reminded humanity of the importance of sustainability. It is clear therefore that green architecture is actually an offshoot of ecological architecture.

### INTRODUCTION

Since the publication of the United Nations publication of Brundtland's Commission report of 1987 titled "Our Common Future", searchlight and greater awareness of the adverse effects modern anthropogenic activities were having on the environment became centre stage. People started realizing that the rate of development needs and consumption of earth's natural resources of the post-industrial world was becoming adversely obvious and that unless there were major changes to Man's thinking and behavior, the future of civilization as known today would become dubious. The commission noted that one of the threats to this future was what it termed "the Urban Challenge", especially in developing nations where population explosion would put pressure on

urban infrastructure and the need for housing, all of which would put more stress on the environment.

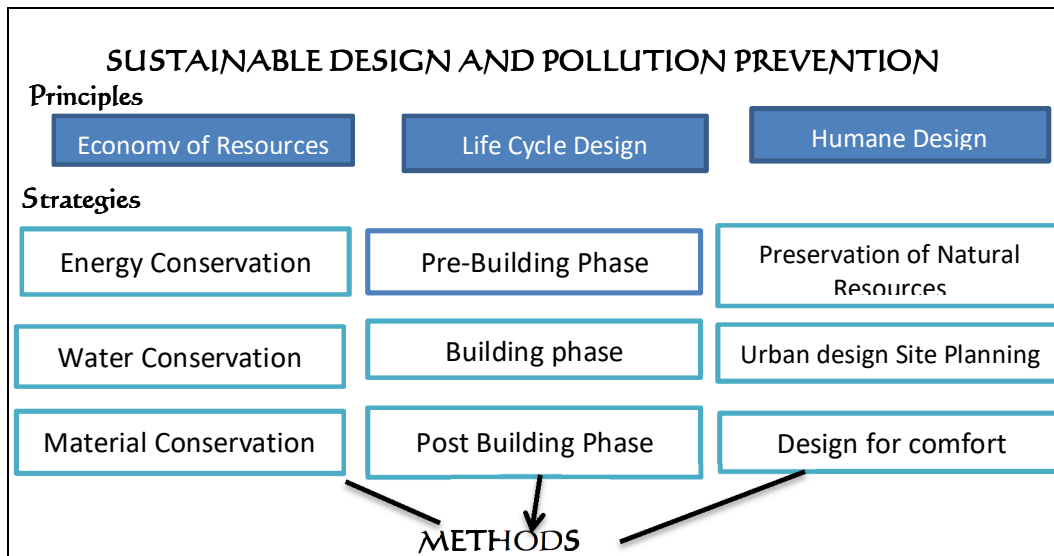


**Figure 1:** Overlapping Themes of the Sustainability Paradigm A depiction of the sustainability paradigm in terms of its three main components, showing various intersections among them. Source: International Union for the Conservation of Nature, 2017.

The Brundtland Report made it clear that while sustainable development is enabled by technological advances and economic viability, it is first and foremost a social construct that seeks to improve the quality of life for the world's peoples: physically, through the equitable supply of human and ecological goods and services; aspirationally, through making available the widespread means for advancement through access to education, systems of justice, and healthcare; and strategically, through safeguarding the interests of generations to come. In this sense sustainability sits among a series of human social movements that have occurred throughout history: human rights, racial equality, gender equity, labor relations, and conservation to name a few (Theis & Tomkin, 2013). Architects thus responded to this with the idea of "Green Architecture" as a concept of sustainability. Sustainability was the central and dominant theme in the Brundtland Commission report. Indeed, it defined sustainable development as the utilization and consumption of earth's natural resources by the current generation in such a way that it doesn't compromise the ability of future generations to do the same. The importance of architecture in a larger context lies in the predictions of the big numbers of our time; more people will need more houses in the next 50 years than the last 100 years. If we are to continue building by prevailing



design standards, we will cast a long shadow on the prospects of all subsequent generations (Orr, 2001). During a building's existence, it affects the local and global environments via a series of interconnected human activities and natural processes. At the early stage, site development and construction influence indigenous ecological characteristics. Though temporary, the influx of construction equipment and personnel onto a building site and process of construction itself disrupt the local ecology. The procurement and manufacturing of materials impact the global environment. Once built, building operations inflicts long-lasting impact on the environment. For instance, the energy and water used by its inhabitants produce toxic gases and sewage; the process of extracting, refining, and transporting all the resources used in building operation and maintenance also have numerous effects on the environment (Kim, 1998).



**Figure 2:** Conceptual framework for Sustainable Design and Pollution Prevention in Architecture. Source: Kim, J. 1998.

As the environmental impact of buildings becomes more apparent, a new field called "green building" is gaining momentum.

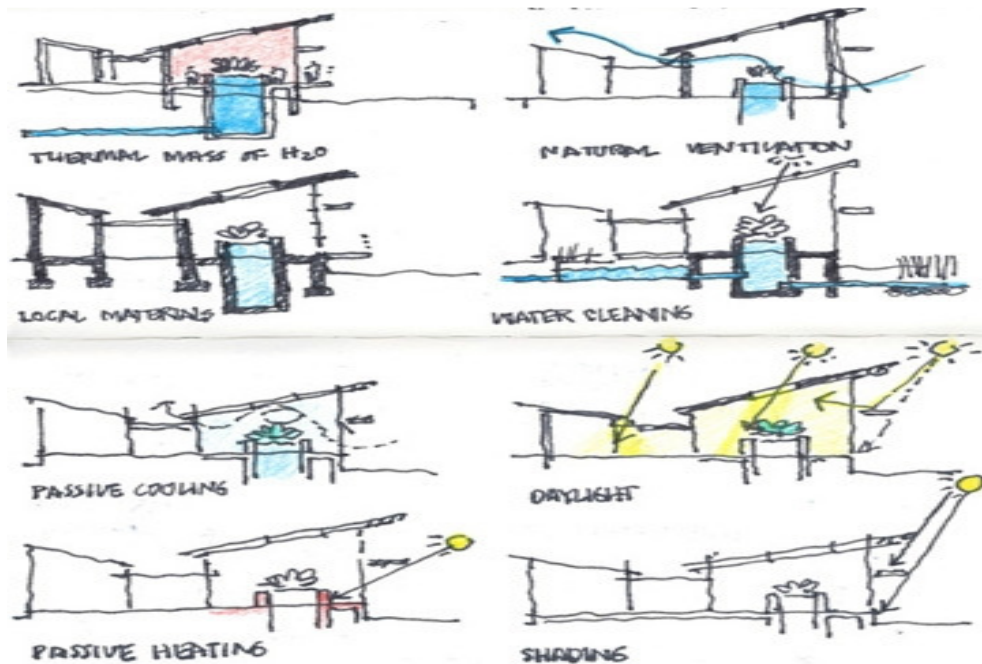
### The Concept of Green Architecture

Green architecture, or green design, is an approach to building that minimizes harmful effects on human health and the environment. Some

goals of sustainable and green architecture are reducing harmful effects on the environment such as carbon emissions, conserving energy, improving livability and reduction of construction waste. The "green" architect or designer attempts to safeguard air, water, and earth by choosing eco-friendly building materials and construction practices (Roy,2008).Green architecture connotes an understanding of environment-friendly architecture under various sub-headings of construction, but with one resolve and purpose for the health of the environment (Burcu, 2015); it may have many of these characteristics:

- i. Ventilation systems designed for efficient heating and cooling
- ii. Energy-efficient lighting and appliances
- iii. Water-saving plumbing fixtures
- iv. Landscapes planned to maximize passive solar energy
- v. Minimal harm to the natural habitat
- vi. Alternate power sources such as solar power or wind power
- vii. Non-synthetic, non-toxic materials
- viii. Locally-obtained woods and stone
- ix. Responsibly-harvested woods
- x. Adaptive reuse of older buildings
- xi. Use of recycled architectural salvage
- xii. Efficient use of space

While most green buildings are yet to achieve all of these features, the highest goal of green architecture is to be fully sustainable. Therefore it is variously known as sustainable architecture, eco-design, eco-friendly architecture, earth-friendly architecture, environmental architecture or natural architecture (USGBC, 2002).Green architecture seeks to promote conservation of natural resources, including: increased energy efficiency, conservation of water, use of renewable energy, minimization of wastes, environmental conservation, reduction in maintenance and operational costs, preservation of history, and even ease of access to public transportation. Central to the construction of green buildings is the selection of building materials and construction techniques.



Sustainable strategies diagram for the omega center for sustainable living, Courtesy BNIM architects, 2017

The priorities of green buildings are different from that of the regular RCC buildings. Their success is measured in terms of health of the people, environment and resource conservation. The success depends on these three factors. Green Design emphasizes on a number of new concerns regarding health of the occupants:

- Harmful materials have to be avoided in order to maintain good indoor air quality
- Non-renewable resources have to be conserved
- Importance to be given to the use of ecofriendly materials to improve human health
- Renewable energy to be harvested on site
- Protect and restore local air, water, soils, flora and fauna.

These concerns have spurred the Leadership in Energy and Environmental Design (LEED) rating systems for the design, construction, operation, and maintenance of green buildings which was Developed by the U.S. Green Building Council. This rating system assesses the Siting and structure design efficiency, Energy efficiency, Water use efficiency, Materials efficiency, Indoor environmental quality

enhancement, Building operations and maintenance optimization, Waste generation reduction and reduced demand impact on electricity grid.

The ratings employ assessment protocols developed by international scientific bodies such as the Fourth Assessment Report (AR<sub>4</sub>) of the United Nations Intergovernmental Panel on Climate Change (IPCC), United Nations Environment Program UNEP works to facilitate the transition to low-carbon societies and The International Federation of Consulting Engineers (FIDIC) Project Sustainability Management Guidelines. Other certificates system that confirms the sustainability of buildings is the British BREEAM (Building Research Establishment Environmental Assessment Method) for buildings and large scale developments. Currently, World Green Building Council is conducting research on the effects of green buildings on the health and productivity of their users and is working with World Bank to promote Green Buildings in Emerging Markets through EDGE Excellence in Design for Greater Efficiencies Market Transformation Program and certification. Green Building Councils have similarly been set up in countries such as South Africa, India, Bangladesh, Germany and Russia. But is the current flurry of environmental concern in architecture new?

### **Ecological Architecture**

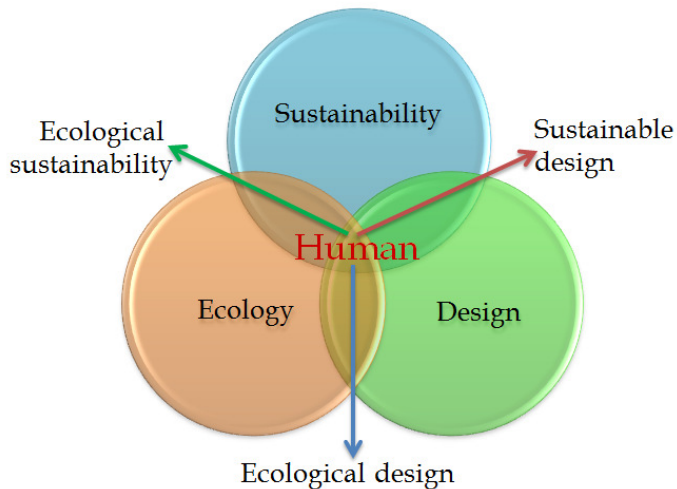
The word “ecology” entered public consciousness it began to be used within architectural discourse in the 1960’s and was popularized by Ian McHarg through his publication in 1969, “design with Nature”. In it, he defined what ecology was thought of then and offered architecture as “the science of the relations of organisms and the environment, integrative of the sciences, humanities and the arts – a context for studies of man and the environment” (McHarg 1969). The word “ecological” is frequently used in architecture in similar ways to sustainable and green, although it is not always defined in the same way as sustainable or green. Ecology can be understood to mean an ecological conception of nature as composed of interconnected yet differentiated elements, which are dynamically evolving and changing over time as a result of their relationship (Chojecka, 2013).



Ecological Design by contrast uses the scientific definition of ecology. Van der Ryn and Cowan (1996), caution against thinking of nature as “out there”, and emphasize that nature and culture are interconnected. Prominent ecological architects like Ryn and Cowan (1996), defines ecological design as “any form of design that minimizes environmentally destructive impacts by integrating itself with living processes”. This definition is similar to the definitions of sustainable and green architecture but there is a greater emphasis on the integration of architecture or design into environment. In the 1970’s Van der Ryn founded the Farallones Institute, which helped to create national awareness of “ecologically integrated living design”. Frank Lloyd Wright was a symbol of the biggest resistance and a rare innovator, works of whom shaped the basic principles of architecture harmonization with context. This impressive genius can also be considered as a predictor of the environmentalist movement since the very beginning of the 20<sup>th</sup> century, long before the word “Ecology” was commonly use. Generally, the categories that characterize eco-friendly architecture can be defined as follows:

- Merging architecture in landscape,
- Combination or link of the object with the garden space or the environment,
- Use of nature symbolism to create relations between architecture and its cultural context,
- Environmental technology studies which create ecologically responsible and sustainable architecture basis,
- Environmental design and construction techniques that support the acceptance of the new “green architecture” and integrating objects in the context,
- Longsighted architectural and urban planning ideas which give an imagination of the future, based on general social and political changes which may influence construction art and environmental policy, etc (Jashari-Kajtazi, 2009).





The relationship between ecology, sustainability and design. Courtesy Filiz Çelik, 2013.

Ecology explains how the natural world is and how it behaves, and design is also the key intervention point for making sustainability in ecology. . The knowledge gained from ecology can influence architects and planners in design. Ecology, sustainability and design are different fields, but they have been merged together in recent years. This is because human lifestyle is having an increasingly negative impact on the surrounding environments. Many architects have projected and given notions to buildings representing impressive models of ecological principles, contributing the eco-friendly design and a high level of aesthetic engineering. In such cases one can understand that environment is equally important as the building, perhaps more so, because the building should breathe in the surrounding space.

## CONCLUSION

From the foregone discourse, it is easy to deduce that the emergent field of “green architecture” is actually an off-shoot of ecological architecture that has its roots in at the turn of the 20<sup>th</sup> century, industrialization and its resultant effects on the environment and its ecological systems noticed early on in the period of the industrial revolution. Since both the normative and scientific uses of the word “ecology” carry a new understanding of nature as capable of change, green architecture represents this dynamic in the current milieu.





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