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Himmat Bhatia
Professor, Lovely Professional University, Phagwara, Punjab, India

Manoj Jain
Professor, Bhagwan Mahavir College of Architecture, Surat, Gujarat, India

Rohit Nath
Student LSAD, Lovely Professional University, Phagwara, Punjab, India

Corresponding Author:
Manoj Jain
Professor, Bhagwan Mahavir College of Architecture, Surat, Gujarat, India

Biomimicry in architecture

Himmat Bhatia, Manoj Jain and Rohit Nath

Abstract
As a highly interdisciplinary field, architecture is being influenced by many subjects of natural and social sciences. While many subjects hold an indisputable effect on architecture, biological sciences are currently dominating the era. It is totally comprehensible for architects to observe, learn and copycat the natural phenomena on behalf of a better living. This biological framework evolved and shifted towards different approaches, especially with the advancements in the computer technologies and as a cause of this a better understanding of the nature's production methods. Especially, for the last 10 years, as many literatures published and many studies done, this subject becomes more popular amongst architects. This paper aims to understand these design methods under the name of biomimicry and biomimetic architecture by reviewing the literature and research work done and examines these approaches under three categories like; bio morphological design, biomimetic design and bio design as pointing out the differences between each approach.

Keywords: Influenced, productive, efficient, sustainable

Introduction
Creative methods and innovative techniques in architectural education are continuously developing. Widening the scope of vision of the students in architectural design studios gives them the chance to think critically, evaluate and develop. Designers are usually inspired from different sources to address challenging design problems. One of the methods is to study Nature and comprehend the ways it has developed to address environmental challenges. Looking at Nature and finding solutions are valuable for designers. By choosing the most appropriate material for design, providing recycling and solutions according to local conditions, Nature is an immense factory which is durable and aesthetic. There are these paper approaches towards definitions of design, concept, benefits of biomimicry architecture.

Research Methodology
This paper discusses the type of research used in this study comprises of examination of the latest researches relating to Biomimicry in architecture. The study investigates the how and why various designers applied Biomimicry methods into their projects. Close attention has been paid to the eco system level because it holds the most potential to produce buildings that are not only highly sustainable but also regenerative. Doing so will show how biomimicry is and has been applied to architect and provide an insight on the possible ways to expand and delve deeper into the design approach.

Objective number 1: The definition and concept of biomimicry
About: Biomimicry is an innovation method that derives inspiration through the study of natural designs, systems and processes to resolve human problems. Nature can teach us about systems, materials, processes, structures and aesthetics. By studying how nature solves problems which we are facing today, as could be extracted and explored appropriateness solutions and new directions for our built environments.
There are many attempts to achieve sustainability through new designs and ideas or using smart materials and energy-saving. There are many attempts to develop global standards for achieving sustainability, but so far not all truly sustainable architectural practices. According to leading biomimetic thinker Bill Reed1 (who co-chaired the development of LEED standards from the outset), we could "have a world full of LEED platinum buildings and still destroy the planet".

These greener designs, though progressive, often stick too close to the existing standard in a way that is simply "less bad". He states that our designs need to be Regenerative, meaning that we need to contribute to biodiversity with our own designs.

Nature as inspiration: Nature is the most important sources of creativity and inspiration in Architecture. There is no doubt That the natural environment is the most important source of inspiration for the creative architect. Whether endless formations or how wonderful adaptation between ecosystems and organisms. In modern times, there is some evidence which refers to inspire some architects for their architectural ideas from the natural environment, comes to the fore, Frank Lloyd Wright, and through the study of the natural environment and laws. He was able to realize how to derive from the environment form structural configuration of the structure of buildings. An example, Frank Lloyd Wright used the structural principles of the mushroom for the design of the interior pillars in the administrative offices of Johnson Wax, Racine, Wisconsin, USA, 1936-1939.

Methods of dealing with the sources of creativity

a. Copying: Such as imaging
b. Abstraction: Is innovation, a hierarchical form is a abstraction of the mountain
c. Inspiration: Reflects the creative ability to create the principles of composition, for instance shells construction inspired by seashells.

Result

Nature is the most important teacher, can teach us about systems, materials, processes, structures and aesthetics. Biomimicry can become a mean for the integration of architecture product with the environment, Besides the attempts to preserve the environment by rationalization of energy resources and reduce pollution to become part of the architectural product of the ecosystem of the environment.

Conclusion

There is no Enough studies to a conclusion and devise solutions from Nature. Attention to Biomimicry not only to search for new sources of inspiration form But also to find new ways of building, The results of this trend is high efficient buildings, sustainability and the rationalization of the energy and materials. By use Biomimicry can design whole cities operating like complex ecosystems, processing water and waste while generating energy. Communities in desert regions will be designed to maximize the ability to collect water, like the plants of the desert retain and conserve that water.

Objective number 2: Application of biomimicry in modern building: When biological knowledge influences human design, the collaborative design process is initially dependant on people having knowledge of relevant biological or ecological research rather than on determined human design problems. Nature has inspired built space since antiquity, when natural proportions were borrowed for aesthetic purposes. Mimicking biological morphology is one of many conventional applications of biomimetics in the field of architecture, and the subjects of this mimicry are not exclusively single organisms or organisms per se, but also the products of their biological behaviour, such as nests. In modern architecture, the geodesic cupolas introduced by the architect Buckminster Fuller are one example of biomimetics application, as is the art nouveau style, in which biological structures were frequently mimicked.

The First Level: Nature is the inspiration for the formation

Bird's Nest Stadium in China: Project Description: The Swiss office "Her Zog et De Mevron" developed the Bird's Nest Stadium together with the Chinese government. The stadium took this name because the iron bars are like a bird's nest. It was designed by simulating birds' shelters which consist of organic material such as branches and grass. The structure of the Bird's Nest is innovated on the grounds of structural systems and the way of how to distribute loads. Designers of the Bird's Nest used the simulation technique (CFD) so as to simulate temperatures, wind power, and humidity inside the structure of birds' nests, and to give the audience the opportunity to enjoy light.

The Success of Design in Achieving Sustainability

- The use of simulation in designing the Bird's Nest to develop a strong structural system.
- Unique architectural formation which achieved aesthetic values Moreover, not to ignore simulating natural ventilation and lighting systems helped to rationalization of energy, this in turn helped in reducing operating costs.
- Reducing pollution emitted from the building as a result of the rationalization of energy consumption.

The Second Level: Mimicry of how an organism behaves

Hydrological Centre Project: Project Description: The project is inspired by the Namibian beetle's ability to capture fog to quench its thirst. The beetle's behaviour has been developed in designing the project, was designed to pick water from fog over the building roof to provide all the building needs of water. needs of water. Fog harvesting by a desert beetle.

The Success of Design in Achieving Sustainability:

- The project succeeded through simulating the beetle's behaviour toward compatibility with the surrounding environment where fog was heavy.
- Reducing operating costs by provide all the building needs of water. 6.2.2. East Gate Project Description: East Gate designed by the architectural Mick Pace, simulation of termite’s mounds by using the negative Ventilation technology and control the temperature and create thermal stable environment., Termites in Zimbabwe build mounds that must be kept at exactly 87°F, while the temperatures outside range from 35°F at night to 104 °F during the day. The termites achieve this remarkable feat by constantly opening and closing a series of heating and cooling vents throughout the mound over the course of the day., East Gate building which designed by the architectural Mick Pace Simulator for termite’s mounds, consume energy less than 10% than traditional building, which make the rent reduce by 20% than around building.

Conclusion

In the recent application of biomimetics to urban design, innovative information technologies facilitate understanding of the complex mechanisms of ecosystems and also the mimicry of such systems in urban planning and management. In this light, an ontology to connect different knowledge(s) and terminologies in biology, ecology, and engineering is required. Information technologies can contribute further to the social implementation of biomimetics based on a proper ontological platform. For further innovations, an additional analysis of organisms, biodiversity and ecosystems in terms of functions and processes based on scientific knowledge from biology and ecology, and also rooted in local and traditional knowledge, can contribute to the development of biomimetic technology. This local and traditional knowledge includes the wisdom of sustainable lifestyles, known before the era of dependence on fossil fuels. A method of extraction of appropriate local and indigenous knowledge that can help develop ideas and tailor technologies based on that knowledge has also been proposed. Social science research on local and traditional knowledge should also continue, and its lessons should be applied in biomimetic design. The results of this research can be combined with those of advanced interdisciplinary research on biomimetics, in order to develop and implement biomimetic technologies for the sustainable management of cities and architecture.

References

1. https://www.researchgate.net/publication/328726155_Biomimicry_Levels_as_an_Approach_to_the_Architectural_Sustainability/link/5bde1e0b92851c6b27a59 24e/download
2. https://www.researchgate.net/publication/323724124_Application_of_biomimicry_in_buildin g_design
3. https://www.sciencedirect.com/science/article/pii/S2090447919300188
4. http://aej.spbgasu.ru/index.php/AE/article/view/197