

Biophillic design of cities, the need of an hour:- To tackle urban climate and environment at global level.



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Author: Nikhil Mittal

Biography:

Nikhil Mittal is post-graduated in Urban Environment Management and Law from National Law University, New Delhi and graduated in Architecture. He has worked on various urban rejuvenation policies in India like Heritage City Development and Augmentation Yojana (HRIDAY), Namami Ganges, Swachh Bharat Mission etc. He has also assisted various government & PSU Departments in India, for Infrastructure and Sustainable development projects.

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Introduction:-

A rapidly increasing population and unmanaged urbanization have severely degraded the city's urban climate and environment, resulting in a dense urban area with little or no open spaces, narrow roads, and a lack of adequate greeneries and green spaces. With this purpose in mind, visions of desirable future cities started to develop and spread among city planners and strategists across the world, some of them called biophilic, sustainable, and others smart.

Biophilic design is a technique that integrates many of nature's qualities and functions into buildings, cities and human lives. Day lighting, a biophilic design technique, brings nature inside cities, buildings and homes. Nature in urban areas vitally contributes to the quality of urban life, and subsequently the recognition of the importance of restoring and inserting nature within cities is increasing worldwide. Humans have the innate inclination to affiliate with nature. Recognizing this inherent human need to connect with nature, biophilic city design theory suggests integrating nature into the design, planning, and management of a city through various biophilic urban design strategies that range in scale from buildings to regions.



Ecosystem Services Provided by Biophilic Urbanism:-

Biophilic design that integrates nature into urban environments can deliver a wide range of ecosystem services, which include air quality, CO₂ reduction, microclimate benefits, flood control and water quality, food production and economic benefits.

- **Air Quality**

A biophilic planning approach can directly affect local air quality. Green infrastructure can substantially reduce the impact of air pollution in cities. One study found that trees annually remove 312.03 Mg of air pollutants in the city. Another found that planting vegetation in street can reduce street-level pollution concentrations in those by as much as 40 percent for nitrogen dioxide (NO₂) and 60 percent for particulate matter (PM).

- **CO₂ Reduction**

Nature in cities can contribute to climate change mitigation as urban vegetation removes CO₂ from the atmosphere and stores carbon as biomass. Further, urban vegetation can offset anthropogenic CO₂ emissions in cities. Calculated that urban forests, offset 18.57 % of the annual carbon emitted by industrial enterprises through sequestration, and stored a carbon equivalent of 1.75 times the amount of annual carbon emitted by industrial energy users within the city.

- **Microclimatic Benefits**

A biophilic planning approach can help decrease land surface temperature and mitigate urban heat island effects. It is found that extensive green roofs reduced pedestrian-level air temperature by 0.4–0.7°C, and intensive green roofs by 0.5–1.7°C. The cooling effects were not restricted only to rooftops, but also extended to the ground to improve neighbourhood microclimate. It is found that urban trees reduced streetscape temperatures by up to 2°C during the summer and improved human thermal comfort.

- **Flood Control and Water Quality**

Urban green infrastructure can mitigate flooding by reducing run off peak flows and volumes. Many green infrastructure practices such as rain gardens, vegetated swales, green roofs and porous pavements filter or remove stormwater pollutants, which leads to improvement of water quality in cities.

- **Economic Benefits**

Economic benefits from biophilic design include higher workplace productivity, improved health and healing, increased retail potential, less crime and violence, increased property values and employee attraction, and increased liveability in dense areas. For example, improving the aesthetics of the local landscape.

Apart from this, An important study concludes that populations with greater exposure to green space experience lower mortality and that green space exposure can help reduce health inequalities. The presence of nature, moreover, is associated with improvements in positive mood, cognitive performance and even creativity. Cities and urban environments contain a variety of ecological and green assets, from parks to trees to rivers and riparian habitats, and increasingly, efforts are being made to further enhance the green elements and features of these living and work environments.

The emergence of a biophilic design on cities:-

There is increasing interest on the part of architects, planners and urban designers in biophilic design and much new writing and literature appearing in the last several years. Biophilic design holds that good design, at the building, site, city and regional scale, must include nature and natural elements. It is based especially on the concept of biophilia, popularized by Harvard myrmecologist and socio biologist E.O. Wilson. Wilson argues that humans have co-evolved with nature and that we carry with us our ancient brains and our need to connect with and affiliate with nature, to be happy and healthy. Wilson defines biophilia as —the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature. To Wilson, biophilia is really a —complex of learning rules developed over thousands of years of evolution and human-environment interaction. Some of the world's best **biophilic infrastructure** example are:-

1. **Forest City or Biophilic City, Malaysia**
2. **Eco City, Masdar (Abu Dhabi)**
3. **Windy City, Chicago USA**
4. **Khoo Teck Puat Hospital (KTPH) , Singapore**



Challenges & Facts About Biophilic Design:-

Biophilic design is still at the bleeding-edge of green building design and hasn't taken off yet. The obstacle may be the lack of data on the impact of biophilic design on health and well-being. Or perhaps it's because there still hasn't been that one model site that makes current practice irrelevant. Other possible reasons: "collective ignorance" or a "lack of imagination." The actual practice of biophilic design involves the application of diverse design strategies. These include three ways of experiencing nature in the built environment: the direct experience of nature, the indirect experience of nature, and the experience of space and place. There are obstacles presented by the prevailing short-term centered political and economic decision making mechanisms. Short term economic cost may be an impediment, for instance, in installation of green neighborhood or project features, such as green walls and green roofs, though the long term savings almost always dwarfs these short term costs.

But there are challenges ahead and much work still to be done. There are considerable obstacles that remain in making cities more natural and nature-full. Some of these obstacles are social and cultural, while others are economic and legal. In many cities, for instance, many examples of biophilic urban design and urbanism are prohibited or made difficult by existing codes (e.g., prohibiting the disconnecting of residential downspouts and more localized and natural forms of storm water management). The risk of specifying specific strategies of biophilic design is the potential to encourage their piecemeal and disconnected application. Biophilic design should instead be applied only when diverse applications mutually reinforce and complement one another resulting in an overall integrated and coherent whole. Some resistance to a more biophilic urban realm, then, may actually come from urbanites themselves.

Conclusion:-

There are also other important ways in which cities could be biophilic. For instance, one notion of a biophilic city is a city that learns from, mimics and is modeled after natural systems in its functioning. Increasingly, it is recognized that a city that strives for more local and regional sourcing of material inputs, and an urban metabolism that is more circular in nature, will be more sustainable and resilient. Cities might also be viewed as more biophilic if their buildings and built environments reflect the shapes and forms of nature, attributes that may deliver important emotional and social benefits. There are still many important research and policy questions to be answered in moving cities toward biophilic urbanism.

References:-

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