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REVIEW

Redefining Urban Spaces with Natural Elements: Biophilic Architecture

Redefiniendo los Espacios Urbanos con Elementos Naturales: Arquitectura Biofílica

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ABSTRACT

Objective: the aim of the article is to examine how to connect people with nature through biophilic architecture, based on the idea that proximity to nature can improve health and well-being, promoting a balance between urban and natural environments. It also seeks to analyze the physical and emotional benefits that these spaces can provide to those who inhabit them.
Method: an exhaustive narrative review of the existing scientific literature was carried out. Databases such as Scopus, Scielo and Scispace were consulted using terms related to "architecture", "design", "biophilic" and "emotional". The search period covered publications from 2020 to 2024, and less empirical manuscripts such as letters to the editor or theses were excluded.
Results: the review identified a total of 86 articles initially, of which 10 were selected that addressed biophilic architecture and its impact on well-being. The results suggest that biophilic architecture can improve cognitive function, reduce stress, and create a calmer environment in built spaces. It also underscores the importance of opportunities to experience nature within urban environments.
Conclusions: the article's conclusions highlight that biophilic architecture is an innovative approach to integrating nature into architectural design, improving human well-being and fostering a deeper connection with the natural environment. The implementation of natural elements in built spaces not only improves occupant comfort and health, but also promotes sustainability and urban biodiversity. Overall, biophilic architecture presents an effective strategy for creating more pleasant and healthy environments for living and working.

Keywords: Urban Spaces; Natural Elements; Biophilic Architecture.

RESUMEN

Objetivo: el objetivo del artículo es examinar cómo conectar a las personas con la naturaleza a través de la arquitectura biofílica, basándose en la idea de que la cercanía a la naturaleza puede mejorar la salud y el bienestar, promoviendo un balance entre los entornos urbanos y naturales. También busca analizar los beneficios físicos y emocionales que estos espacios pueden proporcionar a quienes los habitan.
Método: se llevó a cabo una revisión narrativa exhaustiva de la literatura científica existente. Se consultaron bases de datos como Scopus, Scielo y Scispace utilizando términos relacionados con "arquitectura", "diseño", "biofílica" y "emocional". El período de búsqueda abarcó publicaciones desde 2020 hasta 2024, y se excluyeron manuscritos menos empíricos como cartas al editor o tesis.
Resultados: la revisión identificó un total de 86 artículos inicialmente, de los cuales se seleccionaron 10 que abordaban la arquitectura biofílica y su impacto en el bienestar. Los resultados sugieren que la arquitectura biofílica puede mejorar la función cognitiva, reducir el estrés y crear un ambiente más tranquilo en los espacios construidos. También se subraya la importancia de oportunidades para experimentar la naturaleza dentro de los entornos urbanos.
Conclusiones: las conclusiones del artículo destacan que la arquitectura biofílica es un enfoque innovador para integrar la naturaleza en el diseño arquitectónico, mejorando el bienestar humano y fomentando una conexión más profunda con el entorno natural. La implementación de elementos naturales en los espacios construidos no solo mejora la comodidad y la salud de los ocupantes, sino que también promueve la sostenibilidad y la biodiversidad urbana. En conjunto, la arquitectura biofílica presenta una estrategia efectiva para crear entornos más agradables y saludables para vivir y trabajar.

Palabras clave: Espacios Urbanos; Elementos Naturales; Arquitectura Biofílica.

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INTRODUCTION

Biophilic design is an architectural approach that seeks to connect people with nature within built spaces, using natural elements such as trees, rocks, and landscapes in architectural environments. This style is based on the premise that humans have an innate affinity with nature and that proximity to it can significantly impact health and well-being.[1] However, throughout history, humanity has used various architectural styles that considerably impact people's well-being. Architecture must consider spaces that promote mental health and create environments conducive to a healthy lifestyle.[2] Moving away from nature can complicate stress reduction and affect productivity.[3]

In this context, biophilic spaces benefit the biological well-being of those inhabiting them, even in Arctic areas, as they help reduce stress and anxiety and improve mental performance.[4] By integrating these natural elements in built spaces, such as natural light, plants, and organic materials, we can improve our quality of life and strengthen our connection with nature. This creates an environment that promotes both physical and mental well-being, as being in contact with nature reduces stress and allows us to live in a more harmonious and balanced way with the environment, increasing satisfaction with our surroundings.[5]

In Malaysia, Muhamad[6] proposed that designers consider natural influences when planning a space, with effective daylighting design promoting a healthy and sustainable environment while providing comfort to those who inhabit it. Meanwhile, in the Netherlands, Zhong[7] promoted the idea that "green pockets" facilitate the integration of diverse natural experiences into buildings and promote sustainable architecture. In Poland, Jóźwik & Jóźwik[8] propose converting an old paper factory in Nanterre into a university campus, exposing the factors that influence the emergence of biophilic forms. In Brazil, Gabriel[9] proposed that "vegetated walls" can reduce conductive heat by up to 83 % on summer days, significantly reducing the external surface temperature. This sustainable design strategy contributes to creating more comfortable and efficient buildings, while in Peru, Escamilla & Rodríguez[10] proposed that people benefit from personal development in accessible and comfortable spaces that focus on caring for, promoting well-being, and providing comfort to users.

This narrative review on biophilic architecture examines how to connect people with nature based on the idea that humans have an innate connection with it. Being close to nature can significantly improve health and well-being, promoting a balance between urban and natural environments. It also seeks to analyze how these spaces can provide physical and emotional benefits to those inhabiting them.

METHOD

A comprehensive narrative review was conducted to explore the existing scientific literature, consulting the following databases: Scopus, Scielo, and Scispace. To refine the search, the following terms were used: "architecture," "design," "biophilic," and "emotional." In addition, the Boolean operators AND and OR were used to refine and broaden the search scope, and the search period was extended from March to April 2024, considering articles published between 2020 and 2024 for review. This search covered texts written in any language, specifically excluding manuscripts that were case reports, interviews, letters to the editor, or theses due to their less empirical nature or specific focus. Within the aforementioned databases, 86 articles were initially identified using the search thread designed. Of these, 10 corresponded to the database on biophilic architecture, environmental architecture, biomimetic architecture, climate architecture, emotional architecture, and biophilic design.

RESULTS

URL	AUTOR(ES) / AÑO	OBJETIVO	RESULTADOS PRINCIPALES
https://doi.org/10.18280/ijdne.170105	Anjali Sadanand, Sheeba Chander, Monsingh Devadas (2022)	Estudiar el lenguaje arquitectónico de Laurie Baker centrándose en el papel que juega el muro, creando múltiples experiencias	Se observo la importancia de la luz natural y las formas orgánicas, así como la conexión entre los entornos construidos y naturales, para promover un diseño sostenible y ecológico.
https://doi.org/10.13135/2384-8677/5104	Farhan Asim, Shreya Rai, VenuShree (2020)	Analizar las estrategias y desarrollos del diseño biofílico.	Las estrategias de modernización y diseño biofílico pueden mejorar la función cognitiva, disminuir el estrés y crear un ambiente más tranquilo en espacios construidos.
https://doi.org/10.3390/LAND9050162	Johan Colding, Asa Gren, Esteban Barthel (2020)	Los factores que impulsan este fenómeno, sus efectos sobre los servicios de los ecosistemas y sus consecuencias para la planificación de la resiliencia.	Es crucial que las ciudades den a las personas la oportunidad de experimentar naturaleza constante y saludable para compensar la pérdida de espacios verdes.

https://doi.org/10.1016/j.buildenv.2022.109773	Tarlan Abazari, André Potvin, Claude MH. Demers, Luis Gosselin (2022)	Establece un marco esencial de bienestar que incorpore las necesidades térmicas y fotobiológicas.	Se propone un enfoque de bienestar que favorezca conexiones positivas entre el interior y el exterior en edificios ubicados en el Ártico.
https://doi.org/10.54028/NJ202221203	Songpol Atthakorn (2022)	Evaluar estudios como Bangkok para descubrir elementos atrios.	Se encontraron correlaciones sobre el diseño para edificios con atrios educativos semiabiertos en los trópicos con la ganancia de calor y el factor de la luz natural
https://doi.org/10.30880/ijscet.2022.13.02.021	Jamaludin Muhamad,	Se aplico un enfoque para brindar una iluminación natural eficiente al edificio sin comprometer el máximo confort visual.	Examinar la conexión entre las experiencias de los pacientes y del personal con su entorno físico, centrándose en el papel de la luz natural para mejorar la recuperación de los pacientes.

Figure 1. Characteristics of the included studies

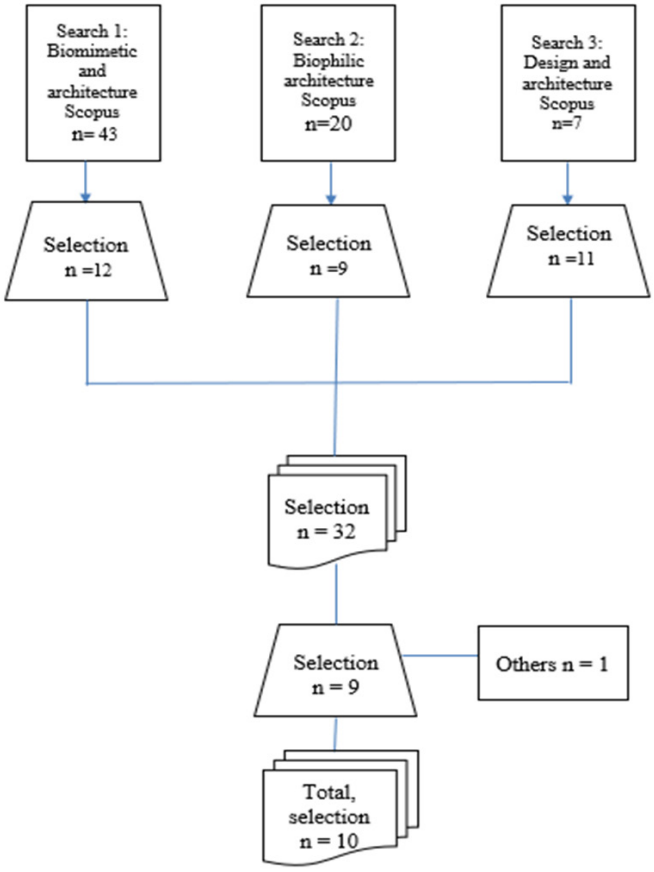

Figure 2. Flow chart of study selection

Studies suggest that, in Asia, the importance of natural light and organic forms makes the connection between built environments more natural, thus promoting ecological design.[1] On the other hand, Atthakorn[5] says that semi-open tropics allow for efficient use of natural light, thus reducing the need for artificial lighting. Muhamad[6] agrees that light reduces stress levels and improves circadian rhythms. Spaces lit with natural light are more welcoming, warm, and comfortable, which helps create an environment conducive to healing. In context, natural light is a source of illumination from the sun that significantly impacts the design of built environments, as it influences the quality of spaces and the well-being of the people who occupy them.

Natural light can improve productivity, mood, and overall health in work environments, homes, educational institutions, and healthcare facilities. Colding[3] also agrees that natural light can be harnessed through careful location planning. This maximizes the amount of light entering interior spaces, reducing the need for artificial lighting and promoting energy savings, thereby helping to

improve the quality of life for everyone in our environment.

Providing natural light, "green pockets" are areas of vegetation in and around buildings. In addition to integrating natural experiences into urban environments, they promote more sustainable architecture by reducing the heat island effect and improving natural light and air quality. In biophilic architecture, green pockets are visible and accessible to building occupants, allowing them to enjoy the benefits of being close to nature. Furthermore, they have unique spatial characteristics, such as perspective and shelter, which offer safety and protection. The organized complexity of these green spaces, with elements such as plants and natural forms, adds visual and tactile richness to buildings. In contrast, the natural danger and mystery can evoke a sense of adventure and curiosity in those who experience them.[7]

For Gabriel[9], green walls involve the use of plants to cover the walls of a building, either inside or outside. These green walls provide multiple benefits to built environments, improving air quality by filtering pollutants and increasing humidity. They help reduce the heat island effect in urban areas by providing an insulating layer that lowers temperatures. Green walls can contribute to energy efficiency in affordable housing and other buildings by maintaining a more constant temperature within spaces, reducing the need for heating and cooling systems. They also offer aesthetic and psychological benefits, creating more pleasant and natural environments for occupants.

For Asim,[2] modernization and biophilic design strategies can positively impact built spaces by improving cognitive function, reducing stress, and creating a more peaceful environment.

Biophilic design integrates elements of nature into indoor and outdoor environments, such as plants, natural light, and natural materials. Biophilic features such as green walls or large windows with views of nature can improve people's concentration and productivity in work or educational environments. In addition, natural elements can help reduce stress and promote relaxation, creating calmer and more pleasant environments for occupants.

According to Colding,[3] cities must provide people with opportunities to experience nature consistently and healthily, especially given the decline of green spaces in urban environments. Experiencing nature means interacting with the natural environment and enjoying its benefits. This can include spending time outdoors, observing natural landscapes, or even incorporating natural elements into built environments, such as plants, natural light, and organic materials.

In an urban environment, experiencing nature can be more challenging, as green spaces may be limited. However, cities can offer opportunities for people to connect with nature through parks, community gardens, waterfront walks, or urban trails. Access to nature benefits physical and mental health, as it helps reduce stress, improve mood, and foster a sense of overall well-being.

Jóźwik & Jóźwik[8] argue that the transformation of the former paper mill into a university campus with biophilic design can include the incorporation of green areas, gardens, and outdoor study areas, providing students and faculty with a more inspiring and healthy environment. Reusing the existing structure also contributes to the project's sustainability by reducing the need for new construction. In addition, this type of campus can offer unique educational opportunities by integrating the site's history into the design, showing how a site with an industrial past can be transformed into an innovative and environmentally friendly learning space.

Studies at the Artico focus on well-being, favoring positive connections between the interior and exterior of buildings to create environments that promote occupants' well-being and quality of life. To achieve these positive connections, the design of natural light entrances can be considered; given that days are short in winter, it is important to maximize natural light to improve the well-being of occupants and help regulate circadian rhythms.[4] By incorporating natural elements such as wood, stone, or plant fibers, furniture becomes more welcoming and warm and contributes to a sustainable approach by using renewable and biodegradable materials. Using fractal geometries and natural elements in design gives a unique aesthetic, highlighting beauty and originality while also providing a connection to nature and patterns inspired by it, which can evoke a sense of calm and well-being.[10]

CONCLUSIONS

Biophilic architecture offers a novel approach by combining nature with architectural design to improve human well-being and strengthen the connection with the natural environment. Spaces built with this approach seek to increase the comfort and health of occupants, promoting a healthier lifestyle and favoring environmental protection.

By integrating natural elements such as natural light, vegetation, water, and organic materials, "biophilic architecture" creates more harmonious environments that can improve mood, reduce stress, and promote a sense of calm. These spaces can also contribute to sustainability by reducing energy and water demand and promoting urban biodiversity. In conclusion, biophilic architecture is an effective strategy for designing spaces that benefit people and the environment, offering more pleasant, healthy, and sustainable places to live and work.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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