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Natural Landscapes and the Psychological Impact of Environment on Architecture: Examining the Synergy Between Nature and Spatial Design

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ABSTRACT

One of the most important characteristics of architectural art is the quality and type of connection it establishes with nature. Nature has a historical depth spanning hundreds of millions of years, having been shaped, evolved, and grown over time. It presents a structured and regulated form, within which a profound harmony can be observed in its diverse components. This homogeneous and dynamic structure has created a coherent language, which requires an understanding and decoding of this symbolic language to establish an interactive and constructive relationship with nature. This research examines the connection between natural landscapes and the psychological impacts of the environment on architectural design. The main objective of the study is to analyze the synergy between nature and designed spaces, investigating how this interaction can affect the quality of human life. The results indicate that the presence of natural elements in living and working spaces reduces stress, increases satisfaction, and improves mental health. Additionally, sustainable design that considers environmental principles and human needs can lead to the creation of spaces that provide a sense of tranquility and pleasure for users. Despite the economic and cultural challenges in implementing these approaches, collaboration among designers, engineers, and local communities is essential. Ultimately, this paper emphasizes the importance of considering the psychological impacts of the environment and the necessity of creating spaces that promote the synergy between nature and architecture.

Introduction

In the modern world, where urban life is rapidly expanding, the relationship between humans and nature has become a vital topic. Natural landscapes not only contribute to the beauty of the environment but also have profound impacts on human psychology and the quality of life (Khakzand et al., 2010). Nature is that part of the world that is not man-made. With this definition, nature becomes a very extensive realm encompassing not just the sky and the earth but also water, air, light, animals, trees, flowers, and plants, as well as humans. Humans are also a part of nature, and it is for this reason that due to their natural instinct, irrespective of any belief, they experience a pleasant feeling of peace when connected with nature (Noghrehkar et al., 2017). Research has shown that the presence of natural elements in living spaces can lead to reduced stress, increased creativity, and improved mental health. Consequently, architects and space designers are increasingly seeking solutions to effectively implement this synergy between nature and design (Ching, 2023), (Hensel, 2013). One of the most important characteristics of architectural art is the quality and type of connection it establishes with nature. Nature has a historical depth of several hundred million years, having been shaped, evolved, and grown over time. It presents a systematic and structured form in which a deep harmony can be observed among its diverse components. This homogeneous and dynamic structure creates a coherent language that cannot facilitate an interactive and constructive relationship with nature without familiarity and decoding of this metaphorical and symbolic language. An architect can only establish an appropriate and constructive connection between their work and nature if they recognize this language and utilize that same linguistic structure to materialize their ideas.

This article examines how natural landscapes influence architecture and spatial design, seeking to analyze the complex relationships between nature and environmental psychology. By looking at successful examples and existing challenges in this field, our goal is to provide insights that can enhance the quality of human living spaces. Ultimately, this study will show how the effective integration of natural elements in design can elevate user experience and create a calming and inspiring environment. Environmental psychology studies the interaction between humans and their surroundings, examining the reciprocal effects of the two.

1. Research Methodology

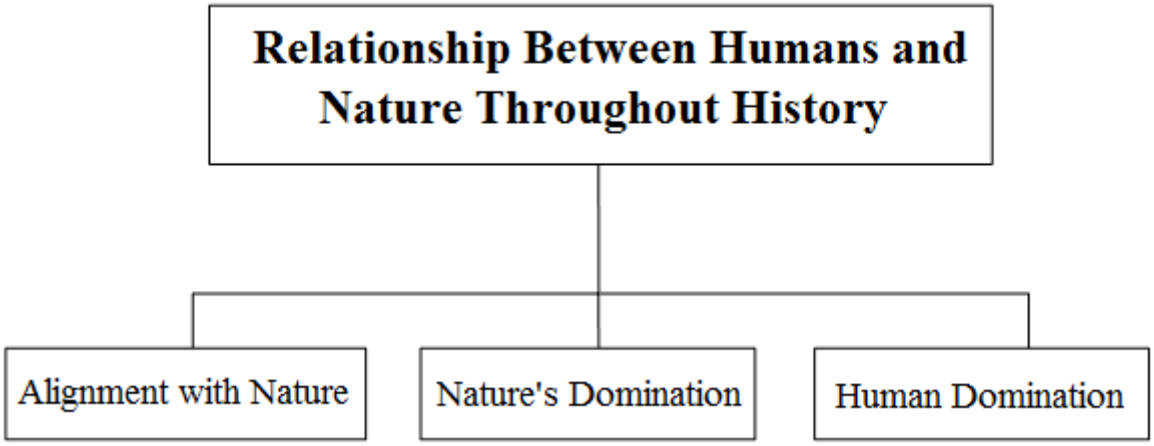
The aim of this research is to examine and analyze the impact of natural landscapes on environmental psychology and architectural design. This study seeks to uncover the synergy between nature and designed spaces and its effects on human quality of life. This research is qualitative and delves deeply into individuals' experiences, feelings, and opinions about interacting with natural environments and architectural design.

2. Relationship Between Humans and Nature

Nature holds a very important place in worldview and is considered a factor in relation to the metaphysical and the order of the universe or logos (Shibata, 2022). Furthermore, nature has always served as the primary model for artists in expressing beauty. The cultural definition of nature is: "A part of the world that is not made by humans, such as plants, animals, forests, seas, mountains, and deserts; it is defined as the world." In contemporary views, nature refers to what humans do not interfere with in its creation, and it is the product of the dialectic between the human mind and the objective world. In this modern perspective, nature encompasses the entire universe, including all beings and humans, the Earth minus human creations, and natural elements within or outside of living environments (Bitbol, 2021), (Frampton, 2020).

Nature, as a refuge and sanctuary for humans, has always been of great concern, and humans have utilized nature in various ways. Sometimes, it has been transformed into a source of inspiration and a model, while at other times, it has been exploited for their comfort. Therefore, the subsequent discussion explores the relationship between humans and nature throughout history.

Figure 1: The Relationship Between Humans and Nature Throughout History



Source: (Fathi & Aravish, 2012)

Table 1: A Brief Description of the Relationship Between Humans and Nature Throughout History.

Era	Description	Conclusion
Nature's Domination Over Humans	In this era, humans lived deeply immersed in nature, and their lifestyle and environmental impact were not significantly different from other animals. Human intervention in nature did not exceed the compensatory impact of nature; thus, any gap created by human perceptions of nature was quickly resolved by the actions of natural forces.	This period includes times when humans were completely submissive to nature and could not intervene in it. Even if humans had minor occupations in the environment during this period, such occupations did not harm the environment, which easily tolerated, compensated, and restored these encroachments.
Human Domination over Nature	This era marks the development of industrial civilizations, changing the relationship between humans and nature due to advancements in machinery and the establishment of small and large factories. Although access to advanced technologies made life easier for humans, misuse and excessive exploitation of resources have led to deadly consequences.	In this period, humans were able to disrupt ecological interactions in nature, leading not only to environmental destruction but also to pollution. The reckless discovery and extraction of natural resources, including fossil fuels, jeopardized the rights of future generations and caused significant pollution of water, soil, air, and seas.
Awareness, Interaction, and Coexistence of Humans and Nature	This era is characterized by coexistence between humans and nature. The expansion of environmental pollution led to incidents aimed at preventing environmental pollution, first in some advanced and industrialized countries and then globally.	The 1960s and beyond should be regarded as a period of awakening and awareness in the environmental field. Humans realized the alarming signs threatening life on this planet and understood that the destruction of life on Earth does not require military conflicts or the use of destructive weapons; rather, if humans do not change their methods of living, production, and consumption, it will lead to a rapid demise.

Source: (Fathi & Aravish, 2012)

2.1 Natural Landscapes in Architecture

Natural landscapes in architecture refer to the integration of natural elements such as plants, water, light, and soil into the design and construction of buildings. This approach aims to create spaces that are not only beautiful and functional but also harmonious with the environment (Turner, 2012). The aesthetic impacts of this approach include landscape design that utilizes plants, trees, and water features, which can enhance the visual appeal of a space. Furthermore, designing windows and openings to allow natural light to enter the building increases feelings of warmth and comfort. This type of design also contributes to improving quality of life. Connection with nature can help reduce stress and anxiety, and green spaces can serve as places for rest and recreation. Parks and public green spaces also provide venues for social gatherings and cultural activities (Downton & Downton, 2009).

On the other hand, natural landscapes in architecture also pay attention to sustainability and environmental

protection. The use of rainwater collection systems and the design of rain gardens can help conserve water resources. Choosing environmentally friendly materials, such as wood and stone, also reduces negative impacts on the environment. Green architecture, through sustainable design techniques such as proper insulation, the use of renewable energy, and climate consideration, can help reduce energy consumption. Additionally, vertical gardens and green roofs contribute to increasing green space in urban areas and provide good thermal insulation for buildings. Sample projects like Central Park in Manhattan, USA, demonstrate that designing green spaces can create areas for relaxation, exercise, and cultural activities. Moreover, green roofs in urban buildings help reduce temperatures and improve air quality. Ultimately, natural landscapes in architecture not only enhance the beauty and appeal of spaces but also contribute to improving quality of life, mental health, and environmental sustainability (Matheou, 2023), (Xeumei, 2024). Given today's environmental challenges, integrating nature into architectural design is a necessity that must be considered.

Figure 2: Central Park, Manhattan, USA.

2.2 Effects of Environmental Psychology on Human Behavior

The effects of environmental psychology on human behavior is a broad and important topic that influences our emotions, thoughts, and behaviors in various ways. Our surroundings include physical, social, cultural, and economic factors, each of which can impact our psychological and social states. Physical factors such as light and color in the environment can affect individuals' moods and energy levels (Mousavian, 2021). For example, natural light can enhance feelings of vitality, while low light may exacerbate feelings of lethargy and depression. The design of living spaces, whether at home or in the workplace, can also affect individuals' comfort and tranquility.

Social factors, including the type of human interactions, play a significant role in shaping self-esteem and feelings of belonging. Positive and supportive relationships can lead to increased life satisfaction. Culture, with its values and beliefs, can influence individuals' behaviors and attitudes. Economic factors also have a considerable impact; economic conditions can negatively or positively affect stress levels, mental health, and quality of life. Additionally, environmental factors such as pollution and air quality can impact physical and mental health. Connectivity with nature and green spaces generally leads to reduced stress and increased feelings of happiness.

Finally, technological influences, especially social media, can affect self-confidence, social interactions, and mental health (Tam & Milfont, 2020). Understanding these effects helps us create healthier and more positive environments for ourselves and others. Overall, our surroundings play a key role in shaping our behaviors and emotions, and paying attention to this can improve quality of life.

The relationship between nature and spatial design addresses the reciprocal effects of these two areas on each other. Spatial design involves creating environments that meet human needs, while nature serves as a source of inspiration and tranquility for humans. Some aspects of this relationship are outlined in Table 2, demonstrating that the combination of nature and space design can lead to the creation of healthy, sustainable, and inspiring environments. Emphasizing this relationship not only contributes to improving individuals' quality of life but also aids in environmental preservation.

Table 2: Effects of Environmental Psychology on Human Behavior

Psychological Effects	Nature can have positive effects on mental health. Green and natural spaces like parks and gardens provide feelings of calm and reduce stress. Designing spaces that incorporate natural elements such as plants, water, and natural light can help improve quality of life.

Sustainable Design	Space design should consider environmental preservation. Using natural and sustainable materials, reducing energy consumption, and creating spaces that harmonize with the local ecosystem are important principles of sustainable design.
Visual Connection	Integrating natural elements into space design, such as using large windows for natural views or employing colors and patterns inspired by nature, can create an enjoyable visual experience for residents.
Air Quality Improvement	Designing spaces with plants and trees can help improve air quality and reduce pollution. Plants not only purify the air but also bring freshness and vibrancy to the environment.
Community Enhancement	Public spaces that include natural elements can enhance social interactions. These spaces provide locales for gathering and establishing social connections.
Cultural Influences	Nature and space design are influenced by various cultures. Each culture pays attention to specific natural elements and designs that may reflect the cultural identity of that community.

3. Synergy Between Nature and Spatial Design

The synergy between nature and spatial design refers to creating harmony and positive interaction between natural elements and built environments (Frick, 2007). This approach in architecture and landscape design seeks to utilize natural features to enhance quality of life, increase aesthetic appeal, and promote environmental sustainability. Some key aspects of this synergy are highlighted in Table 3. In the modern world, the relationship between nature and spatial design has become a key topic in architecture. This synergy not only impacts the aesthetics of spaces but also has profound effects on the mental health and quality of life of their inhabitants. This study will analyze various architectural projects that effectively incorporate natural elements.

Table 3: Synergy Between Nature and Spatial Design

Sustainable Design	Using natural materials and sustainable construction methods can help reduce negative impacts on the environment. This includes the use of wood, stone, and recycled materials that are environmentally friendly.
Integration of Green Spaces	Designing green spaces such as gardens, parks, and green roofs can enhance biodiversity and improve air quality. These spaces also provide places for relaxation and recreation.
Natural Light	Utilizing large windows and openings to bring natural light into buildings increases feelings of warmth and comfort while reducing the need for artificial lighting.
Ecosystem Preservation	Paying attention to local ecosystems and incorporating them into design can strengthen biodiversity and minimize negative environmental impacts.
Multifunctional Spaces	Designing spaces with multifunctional capabilities can enhance social interactions and contribute to the creation of more sustainable communities.
Psychological Effects	The presence of nature in built environments can help reduce stress and anxiety. Research has shown that connectivity with nature has a positive impact on mental health.

In conclusion, the synergy between nature and spatial design not only improves the quality of human life but also emphasizes environmental protection. This approach can serve as a model for a more sustainable future in design and architecture.

4. Case Study Examination

A) The Green Point Center, Australia

The Green Point Center in Australia is recognized as an interesting and notable location. This center is typically dedicated to environmental activities, education, and promoting environmental protection (Australian Bureau of Statistics, June 28, 2022). Various programs and workshops are held at these centers to raise public awareness about environmental issues, recycling, and sustainable use of natural resources.

Figure 3: The Green Point Center in Australia


- **Principles of Designing the Green Point Center, Australia**

The design of environmental centers like the Green Point Center is usually based on specific principles aimed at enhancing environmental awareness and promoting sustainability. Below are some of these design principles:

1. **Sustainability:** Utilizing sustainable materials and technologies that have a lower impact on the environment, such as recycled materials, renewable energy sources, and water management systems.
2. **Carbon Footprint Reduction:** Designing the building in a way that reduces energy consumption and incorporates renewable energy sources, such as solar panels.
3. **Attention to Local Ecology:** Design must take into account the local ecosystem and biodiversity to minimize harm to the environment.
4. **Green Spaces:** Creating green spaces and gardens that contribute to biodiversity preservation and provide areas for relaxation and recreation.
5. **Use of Natural Light:** Designing spaces to maximize natural light, which helps save energy and creates a more pleasant environment.
6. **Accessibility and Interaction:** The design should ensure easy access for all individuals, including those with disabilities, and encourage social interactions.

B) Kew Botanical Gardens, UK

The Royal Botanic Gardens, Kew, commonly known as "Kew Gardens," is a collection of greenhouses and gardens covering an area of 121 hectares. It is located in southwestern London and houses "the largest and most diverse collection of plants and fungi in the world." Established in 1840 (1219 in the Solar Hijri calendar), Kew Gardens is situated in Kew Park in Middlesex, England. It features living plant collections, including some 27,000 plant species, managed by the Royal Botanic Gardens, Kew (Three series of A Year at Kew, 2007)

Figure 4: Kew Botanical Gardens, UK

- Principles of Architectural Design at Kew Botanical Gardens, UK

Kew Gardens in the UK is one of the most important and beautiful botanical gardens in the world. The architectural and landscaping design at this site is influenced by specific principles that contribute to biodiversity conservation and the aesthetics of the space. Below are some of these principles:

1. Biodiversity: Garden design should promote and preserve the diversity of plant and animal life. The use of native and rare species is significant in the design.
2. Harmony with Nature: The design should be compatible with the natural environment and draw from natural landscapes, utilizing forms and patterns found in nature.
3. Use of Green Spaces: Creating diverse green spaces and gardens, each representing different climates and habitats.
4. Education and Research: Designing areas for education and research in botany, ecology, and environmental conservation, including laboratories, libraries, and educational centers.
5. Public Access: Providing suitable paths and spaces for visitors so that individuals can easily explore and interact with the garden.
6. Sustainability: Employing sustainable methods in maintenance and design, such as rainwater harvesting systems and the use of renewable energy.
7. Aesthetics: Focusing on the visual appeal of spaces and designing attractive landscapes that can convey a sense of tranquility and pleasure to visitors.
8. History and Culture: Preserving the history and culture of the garden, including historical buildings, statues, and artworks that represent the garden's identity.

C) Nature Conservation Planetarium Center in Germany

The Nature Conservation Planetarium Center in Germany is recognized as an important educational and scientific institution in the fields of astronomy and environmental conservation. These centers typically aim to promote astronomical knowledge, raise awareness about environmental issues, and encourage nature conservation. They serve as a bridge between science and society, helping to enhance public awareness in scientific and environmental realms. Below are some features and activities of such centers:

1. Astronomical Shows: Offering programs about astronomy, planets, stars, and galaxies using advanced visual technologies.
2. Education and Research: Organizing workshops and training courses for students and the general public on topics related to astronomy and the environment.
3. Conservation Activities: Promoting awareness about environmental issues and encouraging nature conservation through educational programs and campaigns.
4. Development of Sustainable Technologies: Introducing innovative and sustainable technologies that can aid in environmental preservation.
5. Collaboration with Organizations: Partnering with universities, research institutions, and NGOs to conduct joint projects in environmental conservation.
6. Interactive Spaces: Providing areas for visitors to engage with scientific and environmental topics, such as exhibitions and hands-on experiences.

Figure 5: Nature Conservation Planetarium Center in Germany

Source: (Kontakt, September 22, 2022)

➢ Principles of Design for the Nature Conservation Planetarium Center in Germany

Architectural design for centers like planetariums requires attention to several key principles that can enhance visitor experience and optimize space functionality. Below are some of these principles:

1. Space Functionality:
   - Logical Division: Spaces should be organized logically so that visitors can easily access exhibitions, workshops, and other activities.
   - Flow of Movement: The design should facilitate visitor movement and prevent overcrowding.
2. Visual and Spatial Experience:
   - High, Open Ceilings: Using high ceilings and large windows can create a spacious feeling and connect visitors with the sky.
   - Circular Design: Employing circular or curved forms can foster synergy and harmony within the space.
3. Use of Technology:
   - Advanced Equipment: The space should be designed to seamlessly accommodate advanced astronomical equipment and multimedia displays.
   - Digital Interaction: Creating interactive areas utilizing digital technologies for educational and entertainment purposes.
4. Environmental Conservation:
   - Sustainable Materials: Choosing sustainable and eco-friendly construction materials.
   - Natural Light: Designing to maximize the use of natural light, helping to reduce energy consumption.
5. Adequate Acoustics:
   - Sound Control: The design should manage unwanted noises effectively, providing a good auditory experience for visitors.
6. Accessibility:
   - Access for All: Ensuring that all spaces are accessible to individuals with specific needs.
7. Creating a Connection with Nature:
   - Green Spaces: Developing green areas or indoor gardens to enhance the sense of connection with nature.
   - Sky Display: Designing spaces that allow for the observation of the night sky, such as open courtyards or balconies.

6. Challenges and Barriers in Sustainable Design

Sustainable design, as a modern approach in architecture, faces numerous challenges and barriers that can hinder the achievement of environmental and social goals. One of the most significant barriers is economic; the high initial costs of sustainable materials and technologies may not be attractive to investors, and the long payback period from energy savings can lead to reluctance in investing in this area (Ahn et al., 2013). On the other hand, there are technological limitations as well. Lack of access to modern technologies in some regions and the need for specialized training for designers and engineers can impede the effective use of sustainable methods. Additionally, cultural and social challenges also affect sustainable design. Communities may resist new changes, and the acceptance of sustainable design can vary depending on cultural contexts (Leal Filho et al., 2017), (Rahla et al., 2019).

Legal and regulatory barriers are also noteworthy. Strict regulations and complex permitting processes can prevent the implementation of sustainable projects. Furthermore, environmental impacts resulting from climate change and habitat destruction present additional challenges that must be addressed. Finally, the psychological effects of design on users should not be overlooked. Striking a balance between nature and technology in design can be difficult, but addressing the psychological needs of users is crucial.

Through collaboration among designers, engineers, local communities, and governments, it is possible to create spaces that have synergy with nature while also meeting human needs. Recognizing these challenges and striving to overcome them can help realize natural visions and positive psychological impacts on architecture (Xie & Gou, 2020). Thus, understanding these challenges and working to overcome them can aid in fulfilling natural visions and achieving positive psychological effects in architecture. In Table 4, the existing challenges are briefly summarized.

Table 4: Challenges and Barriers in Sustainable Design

Economic Limitations	- **High Initial Costs:** Using sustainable materials and modern technologies typically incurs higher costs, which may not be attractive to investors. - **Return on Investment:** A long payback period from energy savings and maintenance costs can lead to reluctance in investing in sustainable design.
Technological Barriers	- **Lack of Access to Modern Technologies:** In some regions, access to green and innovative technologies is limited. - **Need for Training:** Designers and engineers may require specialized training to utilize sustainable methods and materials.
Environmental Challenges	- **Climate Change:** Instability in weather conditions can affect the design and performance of buildings. - **Habitat Destruction:** In some cases, efforts to create green spaces may result in the destruction of natural habitats.
Cultural and Social Challenges	- **Resistance to Change:** Communities may resist new changes in design and construction. - **Cultural Differences:** Understanding and acceptance of sustainable design may vary across cultures, requiring time and effort to shift attitudes.
Psychological Effects	- **Neglecting Users' Psychological Needs:** The design of spaces should consider the psychological impacts of the environment on users, but this is sometimes overlooked. - **Balancing Nature and Technology:** Finding the right balance between utilizing nature and technology in design can be challenging.

7. Conclusion

This research examined the synergy between nature and spatial design, analyzing the impacts of natural landscapes on environmental psychology and human experience in architecture. The results indicated that a close connection with nature can improve mental health, reduce stress, and enhance satisfaction with living and working spaces. Sustainable design, based on environmental principles and human needs, not only aids in the preservation of natural resources but also creates spaces that provide a sense of tranquility and comfort for users.

Given the challenges in implementing sustainable designs, including economic, cultural, and legal barriers, it is essential for designers, engineers, and decision-makers to work collaboratively to find solutions that mitigate these obstacles. Additionally, educating and raising awareness within local communities about the benefits of sustainable design can play a significant role in the acceptance of these approaches. Ultimately, paying attention to the psychological impacts of the environment on users and creating spaces that promote synergy between nature and architecture can lead to a more sustainable and humane future. This approach not only positively affects individuals' quality of life but also contributes to the protection of the environment.

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