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The Prerequisites of Sustainable Architecture for the Psychological Well-Being of the Older Adults: A Case Study of Inclusive Tourist Destinations

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Abstract

Every personal encounter, every setting visited, and everything seen or observed all have an impression on the behaviour of individuals. Architecture has a significant impact on how people behave unconsciously. The interaction of humans with their surroundings gave birth to the discipline of Environmental Psychology, further subdivided into the fields of architectural psychology and ecological psychology.

This paper focuses on the impact of architecture on the psychological wellness of older adults, specifically in tourism settings, the factors contributing to it positively and negatively, and finding ideal solutions to cater to the psychological and physical well-being. With the growing tourism among the elderly and the lack of tourist destinations to gratify them, the architects have to shoulder the responsibility of bringing creative solutions.

An extensive review of the literature, including analysing case studies and naturalistic observations, is used to bridge the gap between architectural psychology and the psychology of well-being. This study highlights the significance of improving built-in spaces by applying both architectural and psychological parameters to the built environment; and their prolonged effect on the general wellbeing and human requirements. Furthermore, the selected design parameters, which are sick building syndrome, specifically indoor air quality, accessibility, perception, ease of approach, engagement with the environment, relationship with the surroundings, etc., are applied to the Miris Garden project developed by Inspireli Awards competition to draw a conclusion.

According to the research, the practices that can help promote the physical and psychological well-being of senior citizens is sustainable architecture: economically, socially, and environmentally.

Keywords: Sustainable architecture; inclusive architecture; psychological well-being; biophilic design; universal design

1. Introduction

Every decision an architect takes helps to create a particular atmosphere. For every building that is designed, the materials, the constructions, the types of windows, the inside, and the roof all transmit a certain image and purpose. When designing, architects combine form, surroundings, human character, and function to express the mood and goal their client wants.

Social norms vary greatly depending on the setting, with offices significantly different from performing arts theatres. Architects employ their expertise so that you can tell what a building might be used for and how to behave just by looking at it or entering it. Buildings impact our behaviour and reveal information about the people who stand behind them and what is within them. A building's inside determines a large part of this. While offices with doors demand more solitude, open spaces promote collaboration and communication. The presence of numerous windows and natural light might improve one's attitude. An architect can create a design that will have the intended impact when a structure does not always have it.

With the number of green practices going on around the world, including and not limited to Bio-mimicry, Wabi-Sabi, Kintsugi, and Bio-philia; it is within the means to come up with innovative and practical solutions. Sustainable Tourism is no longer foreign to nations around the globe. But putting it into practice not only for the environment but also for the benefit of the users is somewhat still under wraps. When it comes to the well-being of society, whether physiological, psychological, or environmental, the one aspect which never got the light of day is the elderly citizens. The settings of tourist locations and how it affects their psyche with the amenities or facilities, which might only be for the young, can significantly impact how they behave and interact with that environment.

2. Impact of architecture on Psychological well-being

Sustainability was a relatively new idea, but with the increasing awareness and development of research on the subject, sustainability has roots in Social justice, environmental protection, internationalism, and other long-standing movements. Sustainable development is a collection of environmental, social, economic, and cultural sustainability. Cultural sustainability is a relatively new field that is gaining popularity because of its direct effects on the psyche of human beings (Bouronikos, 2022).

A study by Maheshwari, Werd, and Lipman (Maheshwari et al., 2022) explored the proposition that a consciousness-based architecture could improve workplace well-being by dealing with wholeness and the establishment of the building parts in relation to the whole. The results showed an eight percent improvement in subjective well-being upon relocating to the MVA building. Architecture also can impact on human well-being through using natural element in their designs. Over the last few years, great progress has been made in elevating the architectural industry's awareness of the value of daylight and view in buildings, with some nations now enacting voluntary or statutory guidelines to assure consideration of health and welfare criteria. (Lee et al., 2022). Some researchers attempt to study the effects of psychology and physiological behaviours of dwellers on environmental sustainability by providing an integrated framework that blends psychology and sustainable design aspects to reduce environmental impacts (Barakat andAboulnaga, 2022). Research indicates that architectural features such as natural light, air quality, noise levels, temperature, design, and space can all influence a person's mental and physical health. Architects and designers who are aware of this influence have the opportunity to create spaces that promote health and well-being, rather than harm it, ultimately creating more vibrant and engaging places for individuals to inhabit and enjoy.

2.1 Sustainable development Goals

The Sustainable Development Goals Report 2022 (The-Sustainable-Development-Goals-Report-2022, 2022) elucidates how close the 17 Objectives are to being realized. According to the millions of data points subsidized by more than 200 countries and regions, it is a joint attempt between the Department of Economic and Social Affairs and more than 50 international and regional organizations. It exposes several plunging and traversing catastrophes seriously jeopardizing the 2030 Agenda for Sustainable Development. Conflict, COVID-19, and global warming are the most common. This paper will focus on the two main goals among the 17 mentioned.

The first is the third goal on the list, health and well-being, and the second would be the eleventh goal on the list; sustainable cities and communities (The-Sustainable-Development-Goals-Report-2022, 2022).

The health and well-being of humans at any age are connected directly or indirectly to their psyche, especially during their most vulnerable stages ranging from childhood through old age and mortality. And the environment plays a significant role in human beings' psychological, physical, social, and socio-economic development.

The idea that we begin powerless and finish nearly where we began may not be entirely incorrect. The comparison between old age and infancy can be observed through consciousness and life span occurrences. The average human infant is helpless at birth. Still, they have a few essential reflexes, such as the Babinski (Planter) reflex, swimming reflex, and rooting reflex that are indispensable owing to their early survival. These impulses disappear during the primary several months and are swapped by specific acquired behaviours. The child has numerous important “lapses” at this period, including poor response time, impaired vision, taste, smell, hearing, and tactile senses; delayed thinking; requisite for assistance with walking and standing; a straightforward outlook on life; and decreased self-awareness (Kippand Shaffer, 2013).

Social and environmental interactions have a significant positive impact on cognitive development. And it is the cause of physical and psychological development or deterioration in late adulthood. Every stage of human life is important and has different characteristics that we must respect, protect and acknowledge the demands and needs that accompany it. The correlation of physiological and psychological life events adequately demonstrates the significant similarities between old age and childhood. From slow reaction time, lack of support for standing and walking, the ability to travel only short distances, the loss of neurons, the inability to reason abstractly, a lower cardiac output, decreased stamina, an undefinable hairline, the need for assistance with simple tasks, a decrease in “fluid intelligence”, poor enactment on multifaceted cognitive tasks etcetera. Both childhood and aging eventually take different trajectories; although the first leads to independence, complexity, and maturation, the other leads toward reliance and demise (Ayalon andTesch-Römer, 2018). The surroundings and environment play a key part in the matter. The correlation and interaction amid humans and their surroundings extend beyond how much an individual adapts with age. The experience of the physical environment and its effect on the perception and minds of people is what leads to the psychology of the environment.

3. Environmental Psychology of built environment

Social norms vary greatly depending on the setting, with private residential spaces significantly different from temporary and permanent settlements. Architects employ choice architecture principles to ease navigation and wayfinding. The built environment has an impression on the wellbeing and behaviour of individuals. The exterior and interior architecture of buildings and urban spaces reveal information on how to use and behave in the surroundings.

Environmental psychology investigate as to how people’s experiences, behaviours, and well-being are influenced by their surroundings and how individuals’ actions affect the setting. It also looks at how to encourage pro-environmental behaviour. Environmental psychology is a relatively “young” area of psychology that has been documented as a discipline since the late 1960s (Altman, 1976), (Proshansky, 1970), (Stokols, 1978). Brunswick (1903–1955) and Lewin (1890–1947) are best regarded as the “founding fathers” of environmental psychology (Gifford, 1996). Their theories influenced numerous future investigations on human-environment communications, including the interaction between the physical environment and psychological processes and the study of human behaviour in natural settings rather than artificial ones (Steg et al., 2013). Architects must design specifically green or sustainable buildings to lessen the overall adverse effects of the built environment on both human health and the environment. This leads us to the need to understand architectural psychology.

3.1. Architectural Psychology and Wellbeing

Architectural psychology is a branch of ecological or environmental psychology. It is concerned with how individuals and their surroundings engage. This includes spatial awareness, orientation-related behaviour, everyday living demands, and satisfaction. Architecture, when used correctly, generates spaces, facilitates all

human activity, and offers stability, service, and joy. (Janetius, 2016). To aid people build households structured for healthier dwellings, architectural psychology is a noteworthy multidisciplinary field that ties traditional psychology, architecture, engineering, domestic planning, and other fields connected to the living experience. Studying further about how humans interrelate with their built environment enables designers and engineers to concentrate on the occupants' prerequisites and agronomy.

Systematic research in common physical environments and psychological processes gradually augmented in the late 1940s and early 1950s. With some ground-breaking investigations of, for instance, Human factors in work performance (Mayo, 2003), Child conducts in usual settings (Chapman and Thomas, 1944), and Home illumination (Sean et al., 2020) (Barker and Wright, 1954). Architectural psychology was used to distinguish this research from more conventional psychological research because the majority examined how diverse settings affected people's perceptions and behaviour. The way constructed physical environment (i.e., architecture, technology, and engineering) has impacted social interactions, and well-being received extensive study during this early period of the environmental psychology discipline (Bechtel and Churchman, 2002).

Psychological well-being is somewhat identical to pleasant mental states like happiness or satisfaction. According to the American Psychological Association, the terms best suited for this case are Hedonic and Eudaimonic well-being. Eudaimonic well-being is a Greek word that translates to "happiness". Simply put, it is the sense of happiness one derives from self-actualization. Hedonic well-being is characterized by one's surroundings and environment (Diener, 2000), (Ryffet al. 2004), (Ryffand Keyes, 1995), (Chandola et al, 2008).

Architectural psychology and wellbeing is the study of how the design of a space like Smart buildings make sustainable structures sensitive to user behaviour and needs to improve human wellbeing by bridging the gap between people and their built environment (Assem et al. 2023). It examines how different aspects of a building's design, including the layout and structure of the space, the materials used, the level of natural light, the size and placement of furniture, and the amount of crowding or overcrowding, structures and vertical spaces can affect how people perceive and interact with their environment (Mahmoud et al. 2023), (Song et al. 2023). Furthermore, it looks at how even subtle features of a design, such as colour, texture, and scent, can influence our moods and behaviours (Elnesr and Said, 2023). For example, in tourism, the design scheme and construction of buildings can impact the behaviour and experiences of tourists by stimulating multiple sensory stimuli (Tran-Ha and Agapito, 2022). By understanding the principles of architectural psychology and wellbeing, architects and designers can create environments that are conducive to the mental health and overall well-being of those who use them.

3.2 PERMA Plus (+)

In early 60s, Abraham Maslow was a pioneering psychologist to define "well-being" in terms of the traits of a self-actualized individual. The PERMA model defines traits of a thriving individual, and the notion of self-actualization makes reference to wellbeing theory. In 1998, in his inaugural presentation to the American Psychological Association, Dr. Martin Seligman shifted the emphasis away from investigating mental illness and pathology towards studying what is good and positive in life. Since then, theories and research have focused on well-being definition, measurement, creation, and positive psychology interventions that make life worth living. PERMA stands for:

- Positive emotions: these can be conjured depending on the surrounding environment.
- Engagement: or interaction both with people and the environment.
- Relationships: stands for creating connections not only with the people but also with places.
- Meaning: finding purpose by participating in creative activities or things to connect with.
- Accomplishments/Achievements: The sense of setting smart goals, this might not be a part of architectural psychology, but it plays a major role in the mind-set of individuals.

But it is important to carefully consider how these criteria can be applied to architecture and the design parameters that have been applied in this research, like sick building syndrome, air quality, accessibility, and

inclusive design in tourism destinations that accommodate all age groups. Since the architectural environment reveals its qualities. Architourism is a direction for the production of tourism that meets postmodern tourists' expectations.

3.3 Elderly and Architectural psychology

The architectural environment is primarily planned to satisfy the requirements of an adult at an ambiguous age with complete control over their cognitive and functional abilities. The ultimate goal of any architectural realization is still encapsulated by the bi-millennial triangle of firmitas (firmness), utilitas (commodity), and venustas (pleasure) in architecture. Albeit age is a consideration in several architectural commissions: It's of utmost importance when designing for children or young adults, namely in educational settings like kindergartens, primary and secondary schools, colleges, dorms for students, or universities. Although it is debatable whether age per se or potential frailties associated with the aging process is in focus for the design, it is problematic when multi-use architectural design is meant to make room for older individuals (Andersson, 2011).

The population of the world is aging. Nearly one in five persons in several industrialized nations is over 65. Gradual changes in vision, hearing, balance, coordination, and memory occur as people get older. Movement time and the reaction time in the elderly decline with age and the body's protein reserves naturally diminish. Protein catabolism is far more common, and protein utilization is more difficult in elderly persons. This can result in a protein shortage, which eventually results in the deterioration of muscles. Increased frailty is associated with a lack of protein. It is a collective term encompassing weakness, exhaustion, weight loss, and impaired mobility (Langendorfer, 2011), (Beasley et al. 2010).

Similarly, the reaction time in the elderly is connected to cognitive mechanics that include difficulty performing tasks, detection or perception, problem-solving, judgment, memory, deteriorating language skills, and so on. In the first few years of life, the brain creates more than a million new neuronal connections per second. The brain enlarges to roughly 90% of its volume in maturity by age six. The brain begins to shrink in our 30s and 40s, and by the time we reach our 60s, the shrinking rate has increased even more, like the grey hair and wrinkles that first show up later in life. Neurons die as the brain matures, and cells generate a substance called amyloid-beta. Alzheimer's disease is frequently linked to amyloid beta. It can also be discovered in an aged person's brain (Fried, 2021). Henceforth, to satisfy the needs of individuals of all ages, products, communication tools, and the physical environment must be deliberately developed (Farage et al. 2012).

The knowledge of age, space, and spatial behaviours is tacit in architecture practice. It is a component of the "reflection in action" process that distinguishes professions in which theoretically obtained knowledge is applied to solve practical problems. To accommodate the needs of disabled individuals and older people, space adaptations can be made in either general architecture (such as regular residences, public spaces, and workplaces) or in buildings explicitly developed for those purposes, such as sheltered homes, domestic care homes, and other exceptional types of buildings) (Andersson, 2011).

Every built environment has a direct effect on the psyche of the users. The spaces designed specifically for the elderly are proposed to keep them at a comfortable level. Many techniques can be applied in the field of architecture to accommodate the needs of the residents. But creating an environment that caters to the needs of the elderly without compromising the integrity of the built environment needs to be established. The provision of ideal living settings for older people, particularly concerning cognitive health, has significant problems as a result of the world's aging population and growing urbanization. Although brain intervention strategies have shown that maintaining or enhancing cognitive vitality in older age is possible, and animal studies emphasize the advantages of enriched environments for cognition, our understanding of the features of our external environment, which are supportive of cognitive aging, is lacking (Canter and Craik, 1981).

4. Temporary settlement Architecture for older citizens

There is a noticeable shift in the global demographic toward an older population. This change opens up numerous possibilities for providing senior-friendly goods and services, including travel goods and services

(Lee and King, 2016). According to the United Nations report 2022, the population of the elderly and older age group is expected to see a sharp rise in the coming years as shown in figure 1, which brings us to the immediacy of creating places suitable for all ages, but especially for the elderly. Although technological developments are more evident, cultural changes have an equal impact on the architecture industry and the structures we build.

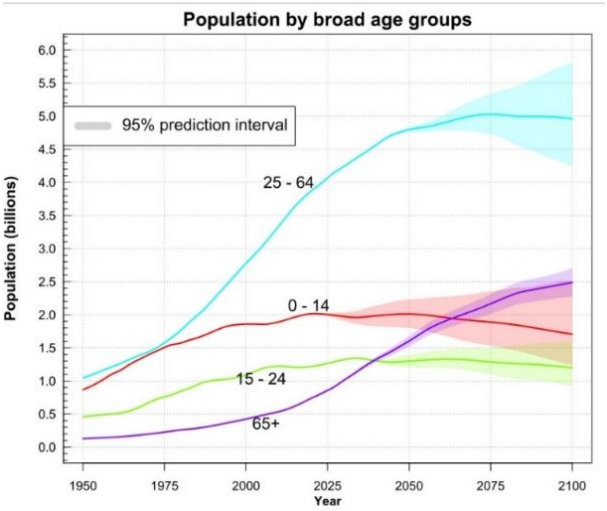

Figure 1 Department of Economic and Social Affairs - United Nations. Demographics of world population by age

4.1 Community-driven architecture

Community is a significant fundamental source of social, economic, and service support. It is necessary for the existence of the vast majority of individuals. Within the framework of architecture, when talking about the elderly, it is natural to consider medical treatment, hospital design, and accessible cities. However, this ignores a growing and severe issue: societal alienation and loneliness. Community driven Architecture's conceptual framework is based on the principle that the built environment is most effective when the individuals living there are actively involved in its construction and everyday administration. By creating community-driven designs, architects may help combat loneliness and improve the quality of life for a segment of the population that is frequently alone. There should not be any inequalities among society's members in regard to their abilities to explore. To address this social issue elderly should be able to access and participate in social activities outside their homes (Aydoğan et al. 2020). This approach to elderly design comprises light, modern, and extremely carefully designed properties - the polar opposite of the classic image. Making homes acceptable to occupants regardless of perceived or customary inclinations is part of the solution. Living in modern retirement communities allows people to maintain their independence while providing opportunities for involvement and social contact (Usher, 2018).

A new emerging trend among the masses of retirees and elderly is taking retirement on cruise ships, according to an exclusive report by CNBC (Kaufman, 2022). The elderly preferred less stressful modes of transportation and vacation destinations. Therefore, the elderly should not be excluded from the tourism sector, which is part of many societies' social and cultural activities (Bulgan, 2016).

Three ideas—globalization, sustainability, and development—are crucial to the understanding of new tourism. These three ideas quickly merge into one - interchangeable and powerfully influencing First World geographical imaginations. Given that there isn't a single, undisputed, all-inclusive definition that everyone agrees on, a method that is more appropriate than coming up with definitions is to look at and evaluate tourist activities according to whether they meet a variety of sustainability criteria for sustainable tourism (Mowforthand Munt, 2008).

Environmental preference studies revealed that people preferred natural settings because they helped people recuperate from stress and attentional exhaustion (Kaplan and Kaplan, 1989). Sustainability and Tourism explain how we might better understand and cope with the quickly transforming new global order by critically

examining and challenging development, globalization, and sustainability. These have become the most important universal geopolitical rules of the past fifty years (Mowforthand Munt, 2008).

There are several tourist destinations around the world, such as accessible amusement parks, accessible cruises, beaches, and National Parks (Bell, 2021) for all ages. But creating a place exclusively for the elderly tailored to their physical and psychological needs is yet to be determined (Liew et al. 2021). The human psyche is at the core of both sustainability and architecture. When it comes to the built environment, it is essential to consider its impact on the environment and human well-being, both physically and psychologically. Comprehensive research covering the building, its surroundings, and its occupants, as well as determining the relationships between them, is required in order to develop healthy buildings.

4.2 Architecture and Building Biology

Buildings today are created outside in a polluted environment using materials manufactured by an artificial process involving numerous users and a wide range of expectations for new functionalities. The most fundamental purpose of the building—to provide its occupants with a healthy environment for a healthy life—has been compromised by the complicated interplay between the human, the building, and the environment (Balanlı, 2011). In developed countries, indoor air quality is one of the long-standing public issues of concern. Due to outside air pollution and unfavourable climatic circumstances, indoor air has traditionally been viewed as more dependable than outdoor air. But the poor indoor air quality causes discomfort and serious health issues. Acute health problems that building inhabitants encounter are referred to as “sick building syndrome” (SBS) (Joshi, 2008).

Sick building syndrome (SBS) not only causes physical discomfort but also psychological discomfort. Allergies, a cold or the flu-like symptoms, hoarseness of voice, headache, dizziness, nausea, eye, nose, or throat irritation, dry cough, dry or itchy skin, difficulty concentrating, exhaustion, sensitivity to odours, increased frequency of asthma attacks, and personality changes are all related to sick building syndrome (Joshi, 2008). Although many factors contribute to the sick building syndrome, this study focuses specifically on indoor air quality, its adverse effects on the occupants, and the solutions that can be developed to eradicate the problem.

5. Analysis & Discussion

According to the published literature in journal articles, books, and other research, the factors that contribute most to the user's quality of life are their surroundings and built-in environment. Lengthy research into sustainable development has already been established to achieve better results. Understanding the psychology of the user and meeting their needs and demands, the architecture field has come a long way. The analysis of existing sustainable developments in accordance with an all-inclusive universal design indicates that green psychology is not enough to achieve desired results. Green psychology refers to examining the human mind from a viewpoint characterized by its mental faculties, feelings, attitudes, and perceptions about adopting environmentally friendly behaviours that promote sustainability.

5.1 Green Psychology

The second phase of environmental psychology’s rapid expansion occurred in the late 1960s when people began to become aware of environmental challenges. This led to studies on environmental concerns, i.e., studies on analysing and modifying adverse human influences on the biophysical environment and the detrimental effects of these issues (such as pollution and noise) on human health and well-being. The early investigations in this field concentrated on air pollution (Groot, 1967), the evaluation of environmental sustainability (Appleyardet al. 1973), and metropolitan racket (Griffiths and Langdon, 1968), (Steg et al. 2013).

Green psychology emphasizes improving the technologies for the built environment to promote mental health in a positive way. However, this is not only limited to permanent settlements. This discipline has to be observed in tourist destinations as well. Nations around the world are working tirelessly to engage in green tourism and promote healthy touristic destinations. Some of the parameters of green psychology can also include the PERMA factors. From positive emotions formed by the green practices, the relationship and engagement of users with their surroundings, to conjuring meaning from the built-in environment, to partake in creative

activities and establish a connection with the environment. That leads us to universal design. The main objective of universal design is to increase usability for people with a wide range of characteristics. Universal Design adheres to principles intended to maximize access for everyone, regardless of whether we discuss instructional methods or physical space.

5.2 Universal design principles – an architectural approach for design

It is critical to remember that excellent design for older individuals is often clever design for all: these accommodation criteria are consistent with Universal Design principles, which encourage accessibility and equity for people of all abilities, regardless of age (Gassmann andReepmeyer, 2008).

Universal Design is the key to success. Products that adhere to Universal Design principles do not separate but rather unify groups of customers, significantly expanding a company's target markets. This chapter emphasizes Universal Design's economic potential and demonstrates how Universal Design may be executed within any society. A successful implementation requires the following steps: (a) defining an effective Universal Design, (b) establishing adequate processes, (c) designing the products correctly, and (d) marketing the products appropriately to clients. Table 1 below describes the seven universal design principles.

Table 1. Universal Design Principles - Adapted from Gassman&Reepmeyer, (2008). Universal Design - Innovations for all ages. In: F. Kohlbacherand C. Herstatt (Eds.), the Silver Market Phenomenon. Chapter 9 (pp. 125-148). Berlin and Heidelberg: Springer

PRINCIPLE	EXPLANATION
Equity	People with a wide range of talents will find it useful and appealing. Everyone uses it in the same or similar way. No one is separated or stigmatized.
Flexibility	Allows for a wide range of choices and abilities
Simplicity	Allows for a variety of methods of application; improves accuracy and precision. It adapts to the needs and pace of the user.
Perceptibility	It is simple regardless of prior experience, knowledge level, language abilities, or degree of attention. It is consistent with consumers' expectations. Removes complexity while providing clues, reminders, and feedback.
Error recovery	Reduces dangers and unexpected consequences, makes useful materials accessible and sequesters or eliminates dangerous elements. Warning signs are not dependent on alertness and are included as fail-safe features.
Low effort	It can be used easily and with little effort or tiredness
Accessibility	Reduces the use of force, persistent effort, and repetitive acts. Necessitates neutral body positions

It is necessary to assemble design ideas that improve people's quality of life. Even though in today's world, the design idea of universal design is essential; it has sparked a debate. One common approach between universal design, PERMA plus (+), green psychology, and biophilic design are that they create accessible, simple-to-use solutions and an environment that promotes health on all levels (Karama and SELÇUK, 2021).

5.3 Biophilic Design

Biophilic design is an architectural approach that aims to bring building occupants closer to nature. Natural lighting and ventilation, natural landscape features, and other components are used in biophilic-designed buildings to create a more productive and healthier constructed environment for people. Keeping in mind the

project at hand, Biophilic design is a design strategy that can meet these criteria. The biophilic design approach provides a sustainable design strategy considering human-natural environment interaction.

Biophilic design aims to create a natural-based habitat by incorporating nature, natural materials, and natural shapes into space. The biophilic architecture may influence the reduction of dementia in older people aged 60 to 85. It will be an excellent implementation in any building function to increase the human quality of life, which boosts human memory (Meyer, 2017), (Felly and Susanto, 2020). Biophilic design can be considered a holistic approach to healthier buildings. In addition to improving mental health, biophilic design frameworks can improve indoor air quality by increasing ventilation and using less harmful materials in construction (Norbäck andSmedje, 2000). In terms of sustainable housing, biophilic design paves the way for healthier and more appealing settings. It has the potential to mitigate the drawbacks of residing in what are all too frequently inadequate and depleted living spaces.

Some interesting case studies from around the world using the biophilia design are by architect Stuart Bagshaw, Blue Reef Cottages 2002 in the Isle of Harris, Outer Hebrides, Scotland. Eco-friendly cottages blend in with the natural landscapes and have grass-topped roofs and ancient and stone exteriors. The idyllic Isle of Harris has an unrivalled natural beauty: heather-clad hillsides, wildflower plains, and golden, sandy beaches.

5.4 Green Buildings

A green building's various elements work together and support one another, by reducing environmental impact, protecting natural resources, using less energy and water, producing less pollution and greenhouse gas emissions through designing and building simply with less. By moderating the number of building materials utilized open spaces can be preserved and safeguarded which in turn protects natural resources. Building into or around the landscape rather than levelling it to minimize site disturbance and earthwork, a building system will be much energy efficient by minimizing the use of heave machinery and its detrimental effects on the environment ((Firm), 2009).

The proper planning and designing of a green building increase its water and energy efficiency, decrease its reliance on natural resources, and lessen its adverse effects on the environment. Natural ventilation techniques are frequently used in green buildings to deliver fresh air without using the main HVAC system, which lowers energy costs and usage. A green building uses techniques like water-saving plumbing fixtures, drought-tolerant landscaping, and water-saving irrigation systems like drip irrigation and low precipitation rate spray heads and bubblers to drastically reduce water usage compared to a typical building. Grey water collected from building is utilized for hydrating the green walls and plant system throughout the landscape. HVAC (heating, ventilation, and air conditioning) and lighting systems are particularly energy-efficient in green buildings ((Firm), 2009).

The use of prefabricated construction can as well speed up, improve the quality, and efficiency of buildings. The DSF can be utilized for existing structures to enhance their thermal comfort and energy effectiveness. The building's sustainability can be improved with an increase in Energy efficiency achieved by using less mechanical ventilation, which lowers the demand for electricity(Reza and Suleiman, 2021).

5.5 Hybrid Architecture

A hybrid architectural approach is incorporated; socially inclusive architecture and private space architecture, offering natural lighting by constructing open communal spaces, clear and unobstructed paths, providing ramps alongside stairs and trams for easy commuting, and durable resting areas. Everyone, especially the elderly, feels more comfortable with ergonomic support. It offers easy access to public spaces, bathrooms, shopping, and social and cultural events.

5.6 Communal Architecture (Humanizing)

The humanization of architectural built structures could be sensed in the presence of areas such as gardens, open cooking areas, the removal of barriers or visual obstructions, the use of warm materials (such as wood instead of cold and aseptic metals), the presence of colours and comfortable furnishings, and views of green spaces. A reception area similar to a hotel lobby where information can be obtained (with plants, paintings, and other

decorative furnishings). Environmental preference studies revealed that people preferred natural settings because they helped people recuperate from stress and attentional exhaustion. According to a large body of scientific literature, the residents of healthcare facilities can benefit from natural lighting and views of the outdoors regarding their health. Green places, such as parks, gardens, indoor plants, or images of natural landscapes, can be used to create healing environments that support regeneration experiences. In various experimental research on the characteristics of indoor plants conducted in the US setting, psychological advantages, such as stress reduction and enhanced pain tolerance, had been documented (Veronica et al, 2017).

5.7 Case Study: Miris Gardens – Croatia

The site is close to the Croatian settlement of Starigrad, which is close to the well-known tourist destination of Zadar. Traditional Croatian village Starigrad has a rich history and provides a range of lodging, dining options, sports, and recreational activities. The location is surrounded by a variety of native plants and vegetation and is located in Croatia's rich and varied coastal scenery. With 90,000 tourists per year, the location is surrounded by a variety of native plants and vegetation. The site is approximately 200,000 sqm, with eight zones dedicated to different functions assigned by the Inspireli Awards competition. The master plan's fundamental goal is to create an engaging place for people that brings together the community and guests of all ages in a lively atmosphere.

The climate of Zadar is Mediterranean, with warm, dry summers and pleasant winters. The summer highs reach 19 to 28 degrees Celsius, and the winter lows plunge to 11 to 12 degrees Celsius (Climate and Average Weather in Croatia, 2022). There are many outdoor activities in the county itself. Most of these activities are only for young adults, such as windsurfing, kite surfing, bungee jumping, cycling, trekking, safari, rock climbing, sailing, caving, and diving. The project of Miris Gardens is required to provide activities and amenities suitable for all ages and not just for young adults. Hence, using the universal design principles, the place can be designed to facilitate activities for older adults, and biophilic design can promote psychological well-being, which is the precursor of the basics of PERMA plus, as discussed earlier. A healthy environment is a precursor to a healthy mind and healthy body. The challenge is to "Develop a model of a socially and environmentally sustainable year-round holiday resort for the twenty-first century!"

The design strategy was turned up a notch by aiming to turn the resort into a tourism destination designed specifically for elder citizens and people of determination that accommodate their needs and necessities. Due to the lack of tourists' destinations that caters to this vulnerable part of society. The concept is to articulate and integrate with nature in our daily life and live alongside nature respectively.

5.7.1 User's demographics: Active older residents

This minority group includes individuals who can navigate the facility without staff assistance, although with effort. Additional support will be required on a regular basis because objects cannot be carried about (complicated). The goal of design should be to eliminate or minimize practical obstacles while mitigating psychological ones (Torrington, 1996).

The master plan is organized into zones based on land use, specified criteria, and laws. There are a total of eight zones.

- ZONE 1 Apartment buildings with four stories
- ZONE 2 Three-story apartment structures.
- ZONE 3, Hotel and Parking
- ZONE 4, Commercial District
- ZONE 5 Private villas
- ZONE 6 (Marina)
- ZONE 7, elevated waterfront walkway, and public beaches

- ZONE 8 Camp (not part of the design competition)

5.7.2 Analysis Parameters

The various parameters, such as wayfinding, activity programming, social interaction, engineering, lighting construction, and maintenance, can only be combined into a cohesive design that benefits everyone over the long run through communication, collaboration, and cooperation. There is no one-size-fits-all approach because every project site is different. Green planning, however, enables a project to be developed that complements the entire site and the surrounding ecosystem by making the most of all the free resources provided by that land. “Site gifts” do less by locating freebies on the site and incorporating those gifts into the project design. Solar energy and interior natural lighting can be provided by the sun. The wind can aid natural ventilation.

It is important to work along the natural terrain of a site, design, plan, and construct the structures and pathways along with the site's natural topography. The less land is used for buildings, roads, and parking, the stronger the existing ecosystem remains. The less infrastructure is required (lowering project costs), the more land is available to take in storm water, refill underground aquafers, prevent heat islands, and provide athletic and recreational facilities. The topography of the site can help segregate buildings and community uses, highlight a certain building function, or promote storm water control. Currently, existing shade trees may aid heat island abatement, storm water management, beautification and aesthetically enhance the project identity.

Orientation

Building orientation can be employed to let in as much natural light as possible, which will significantly reduce the use of artificial lighting required in the buildings and minimize both the initial project cost and ongoing running costs. Similarly to this, proper building orientation can make the most of the prevailing breeze to assist natural ventilation, reducing the need for an HVAC system and, consequently, both the original and ongoing expenditures. The orientation of a green building maximizes the effects of wind and sunshine (natural daylighting, warmth in winter) (natural ventilation). Exterior walls are shaded by landscaping, which lowers the requirement for heating and air conditioning during winter and summer. The criteria for a green interior environment include the building’s orientation for natural daylighting as well as outdoor views, high indoor air quality (inside plants) to rejuvenate the physical and mental health (indoor plants can improve the BP and cardiovascular health among the elderly), decent acoustics, and a suitable temperature. Devices for external shade to reduce solar heat gain on the southern façade can be used.

The buildings in zone 1 and zone 2 are located northeast of the site. The main façade faces southwest. Whereas all the other zones on the site face south.

Construction Materials

The construction of a green building uses sustainable building materials like steel with a high recycled content, quickly renewable materials such as bamboo and cork, and products like paint and glue that do not “off-gas” the harmful volatile organic compounds that are frequently present in traditional building materials. Building materials containing recycled content are particularly crucial to a green building because they are produced with less energy and natural resources than conventional materials. At the end of their useful lives, materials should be chosen based on how easily they can be recycled. Purchase construction supplies from locations 500 miles or less away from the project site. The construction materials used for zone 1 are the wooden shading devices, zone 2 uses natural clay bricks, wood, stone, and parquet flooring for construction, whereas zone 3 and 4 uses double skin facades to reduce noise pollution and admittance of natural lighting. Zone 5 and 6 used reinforced polyurethane boards, acrylic Plexiglas, and ETEF panels, respectively. Different colours are used to differentiate between places. Solid colours are used for flooring to deal with impaired vision and easy way finding.

Natural lighting

A green screen along the building’s western façade is used to reduce the heat island and the amount of interior heat absorption. A green screen is a metal lattice covered in vines and/or climbing flowers. The building will benefit from warmth and sunlight during the chilly winter months by placing trees along the south façade, which

will provide shade and heat reduction in the summer. By choosing deciduous trees that lose their leaves every autumn, the building will use less heating and artificial lighting and pay less energy costs. All zones have well-lit interiors with wooden shading devices and green screens.

Ventilation

First, by greatly reducing heat islands, landscape architecture may reduce the need for and expense of HVAC. Ventilation is an important aspect of this design, all the zones have semi-open or open communal spaces and or use traditional wind towers to better circulate the air. Zones 2 and 3 have wind catchers built within the structure to improve ventilation.

Landscape Architecture

Landscape architecture is one of the most crucial economic instruments for developing a green building or project. The mechanical systems, building supplies, and infrastructure previously utilized to cool and insulate buildings and reduce storm water runoff are far more expensive than trees, flowers, shrubs, hedges, and native grasses. Asphalt and other dark, non-reflective surfaces found on roofs, sidewalks, roads, and parking lots act as heat islands by absorbing solar heat during the day and slowly releasing it at night, which can increase the temperature of the area nearby by up to 10 degrees. Buildings near heat islands become hotter, requiring more electricity and air conditioning.

Analysis of Zone 1 – Four storeys residential buildings

A maximum of 6 apartments, an enclosed above-ground parking garage, and a common swimming pool is included in each building. Each unit consists of a private balcony or patio with views of the ocean. From the finished floor level, a building may only reach a maximum height of 11,5m. Landscape design can be utilized to reduce noise and hide unsightly objects like dumpsters and mechanical equipment (Torrington, 1996). Table 2 shows the analysis of zone 1 based on mentioned criteria. The seven four storeys residential buildings can be observed in figure 2 below.

Figure 2A Lumen 3D render of four storeys Residential buildings

Table 2. Analysis of Zone 1 – residential buildings based on mentioned parameters

Parameters	Analysis
Location/ Orientation	The building is located on the northeast of the site. The main façade faces southwest.
Dimension / Area	29,530sqm
Landscape	Natural landscape used surrounding the building

Supportive facilities	Gym, sauna, communal areas, roof swimming pools and gazebos, roof garden
Building Type	Seven Four storeys residential buildings
Building Form	Oval geometry, linear connection
Construction Materials	Concrete, steel, and wood for shading devices
Circulation	Linear
Ventilation	Well ventilated with open-air corridors and bridges between buildings
Natural Lighting	Open communal spaces with wooden pergolas to create semi-open shaded spaces
Acoustics	Vertical shading devices to minimize noise pollution
Flexibility	Facial recognition for security, automatic sliding doors
Perceptibility	Easy-to-access facilities
Accessibility: Ease of approach	Easy access to the main highway; amenities available in each building for easy access
Relation with outdoors	Direct connection to the commercial center, tram station connection
Parking lots	underground parking lot

Analysis of Zone 2 – Three storeys residential buildings

The maximum construction height from the finished floor level is 8.5 meters. The old rural modular stair architecture inspires the form intended to construct the apartments. The building's angles are modeled to ensure that all balconies have sea and mountain views. The building's organic modular form bio-mimics the beehive structure by applying the concept of swarm intelligence. It also incorporates biophilia by adding green walls. The building's modular system is formed by connecting standard units (modules) to create larger compositions. The units can be used and restructured according to the needs and functions. Table 3 shows the analysis of zone 2 based on mentioned criteria. The three storeys residential buildings can be observed in figure 3 below.

Figure 3A Lumen 3D render of three storeys Residential building

Table 3. Analysis of Zone 2 – residential buildings based on mentioned parameters

Parameters	**Analysis**
Location/ Orientation	The building is located on the northeast of the site, a level below zone 1. The main façade faces southwest.
Dimension / Area	60,960 sqm
Landscape	The natural landscape used surrounding the building
Supportive facilities	communal areas, swimming pools, roof gardens, walkway
Building Type	Three storeys residential buildings
Building Form	Stepped modular geometry, linear connection
Construction Materials	Natural clay bricks, wood, stone, parquet flooring, green wall as a shading device

Circulation	Linear/ Vertical
Ventilation	Wind catchers, well ventilated with open-air corridors and bridges between buildings, wide windows to south
Natural Lighting	Open communal spaces with wooden pergolas to create semi-open shaded spaces
Acoustics	Vertical shading devices to minimize noise pollution
Flexibility	Elevators
Perceptibility	Easy-to-access facilities
Accessibility: Ease of approach	amenities available in each building for easy access
Relation with outdoors	indirect connection to all zones, four tram stations connection, pedestrian bridges
Parking lots	Outdoor parking lot

Analysis of Zone 3 – Hotel

The idea of the hotel project is a combination of rectangular shapes presenting different cultures and ethnicities coming together. A two-way grid system creates an extension toward the ocean view. The parking lot's heat islands are reduced by placing trees and arbors in the surroundings, which shades the area while creating a welcoming site. The site harvest and recycle rainwater to be used for plant irrigation. Table 4 shows the analysis of zone 3 based on mentioned criteria. The hotel building can be observed in figure 4 below.

Figure 4 A Lumen 3D render of the hotel building

Table 4. Analysis of Zone 3 – the hotel building based on mentioned parameters

Parameters	**Analysis**
Location/ Orientation	The building is located on north of the site. The main façade faces south.
Dimension / Area	8,850 sqm
Landscape	The natural landscape used surrounding the building
Supportive facilities	The on-site clinic, communal areas, swimming pools, walkway, SPA-Wellness-Fitness center, yoga hall, Children's play area, cosmetics procedures, hairdressers/barbers
Building Type	Hotel accommodation
Building Form	Square geometry, linear connection

Construction Materials	Concrete, bricks and steel, double skin façade
Circulation	Linear/ Vertical
Ventilation	Wind catchers, well-ventilated terraces and bridges between buildings, wide windows to south
Natural Lighting	Open communal spaces on terraces, terrace gardens,
Acoustics	Vertical shading devices to minimize noise pollution, double-glazed windows
Flexibility	Elevators, automatic sliding doors
Perceptibility	Easy-to-access facilities
Accessibility: Ease of approach	Easy access to the main highway; amenities available in the building for easy access
Relation with outdoors	Indirect connection to the commercial center, tram station connection
Parking lots	underground parking lot

Analysis of Zone 4 – Commercial Center

The commercial center is the heart of the site. Native plants that can withstand dryness for the landscape architecture design are used. Plants wouldn't need much irrigation once established, which will conserve water. Additionally, they will require extremely minimal upkeep, lowering the project's long-term operational costs. Table 5 shows the analysis of zone 4 based on mentioned criteria. The commercial center can be observed in figure 5 below.

Figure 5 A Lumen 3D render of the commercial centre

Table 5. Analysis of Zone 4 – the commercial center based on mentioned parameters

Parameters	**Analysis**
Location/ Orientation	The building is located on the north of the site. The main façade faces south.
Dimension / Area	7,512sqm
Landscape	The natural landscape used surrounding the building
Supportive facilities	Services, restaurants, cafes, children's playground
Building Type	Commercial center
Building Form	oval geometry, circular connection
Construction Materials	Concrete, bricks and steel, double skin façade
Circulation	Circular/vertical

Ventilation	Clerestory windows
Natural Lighting	Skylight atrium
Acoustics	None
Flexibility	Elevators, automatic sliding doors, indoor tram station
Perceptibility	Easy to access facilities
Accessibility: Ease of approach	Easy access to the main highway; amenities available in building for easy access
Relation with outdoors	Interconnected to all zones, tram station connection, bridges
Parking lots	outdoor parking lot

Analysis of Zone 5 – Residential villas

The villas are elevated from the ground to minimize the building footprint and keep the original landscape and ecosystem undisturbed. Landscape is used to connect the villas to the other zones. The terrace landscape pathways are private to the villas and connect them all, while the ground landscape provides access from neighboring zones. These pathways are used as trekking routes for the elderly with resting shaded areas and as view observation points. Table 6 shows the analysis of zone 5 based on mentioned criteria. The residential villas can be observed in figure 6 below.

Figure 6 A Lumen 3D render of the residential villas

Table 6. Analysis of Zone 5 – the residential villas based on mentioned parameters

Parameters	**Analysis**
Location/ Orientation	The building is located on the northeast and northwest of the site. The main façade faces south.
Dimension / Area	310, 440 sqm
Landscape	Natural landscape used surrounding the building

Supportive facilities	Services, restaurants, cafes, children playground
Building Type	Commercial center
Building Form	curvilinear geometry
Construction Materials	Steel pillars, reinforced polyurethane boards, acrylic Plexiglas
Circulation	Circular / vertical
Ventilation	Clerestory windows
Natural Lighting	Acrylic sheets, large windows
Acoustics	None
Flexibility	Elevators, automatic sliding doors, indoor tram station
Perceptibility	Easy-to-access facilities
Accessibility: Ease of approach	Easy access to the main highway; amenities available in the building for easy access
Relation with outdoors	tram station connection
Parking lots	No parking lot

Analysis of Zone 6 – Marina

Articulating with nature. Aiming to integrate nature into our daily life and live alongside nature, respectively. Attempting to build a small simplified community and designing the experience on a familiar ground bases while keeping indirect restrictions. Table 7 shows the analysis of zone 6 based on mentioned criteria. The marina area can be observed in figure 7 below.

Figure 7 A Lumen 3D render of the Marina

Table 7. Analysis of Zone 6 – the Marina based on mentioned parameters

Parameters	**Analysis**
Location/ Orientation	The building is located on the south of the site on the seashore. The main façade faces south.
Dimension / Area	10, 950sqm
Landscape	landscape used surrounding the building
Supportive facilities	Restaurant, Coffee shop/ice-cream kiosk, Open air Community farm/ with counter working stations, Lounge, Fishing area, Boats deck, BBQ area, Fire pits, Walking/ Running tartan tracking lanes, Yoga & tai chi studio, Tram for easy transportation, Ducks & swans' pond, Games café
Building Type	Commercial

Building Form	Organic circular geometry, circular connection
Construction Materials	ETFE panels, Concrete, and steel
Circulation	Floor lighting, Color coded areas, Benches for resting
	Unobstructed pathways
Ventilation	Open terraces
Natural Lighting	Skylight dome
Acoustics	None
Flexibility	Elevators, open circulation, ramped bridge
Perceptibility	Easy-to-access facilities
Accessibility: Ease of approach	Easy access to the commercial center; amenities available in the building for easy access
Relation with outdoors	Two tram station connection
Parking lots	No parking lot

Analysis of Zone 7 – Waterfront and Public Beach

This was a formal investigation into the structure and load-bearing capacities of tree-forming algorithms within the massing recreations required by the location. It was discovered that the galvanized steel framework was made of tubular tubes wrapped with cushions made of ETFE. The canopy uses the structural qualities of the tree branches in addition to mimicking their look. The addition of curvature to the steel lattice structure and columns provided a more efficient structural behavior, reducing material consumption and building costs. Finite element analysis was employed to help optimize the form. Table 8 shows the analysis of zone 7 based on mentioned criteria. The waterfront area can be observed in figure 8 below.

Figure 8 A Lumen 3D render of the waterfront and public beach

Table 8. Analysis of Zone 7 – the waterfront and public beach based on mentioned parameters

Parameters	**Analysis**
Location/ Orientation	The building is located on the northeast and northwest of the site. The main façade faces south.
Dimension / Area	19, 810 sqm
Landscape	None
Supportive facilities	Fishing farm, swimming pools
Building Type	Commercial
Building Form	Flexible, dynamic structure, non-linear connection
Construction Materials	-----
Circulation	-----
Ventilation	-----
Natural Lighting	-----
Acoustics	-----

Flexibility	-----
Perceptibility	Easy-to-access facilities
Accessibility: Ease of approach	Easy access to the commercial center; amenities available in the building for easy access
Relation with outdoors	Two tram station connection
Parking lots	No parking lot

6. Conclusion:

Existing in an inhumane built environment impacts human lives and lifestyles in various ways, specially their health from reduced exercise levels to the consumption of non-nutritious fast food and processed sea water. The spaces most of the population call homes nowadays are so far from being a safe nurturing environment, the places we work at, to social public spaces. We take refuge from the external elements such as extreme weathers, wild animals and natural-disasters to be faced with human made slow killing machines. Our relationship with nature is non-existing, all city dwellers are so desperate for a breath of fresh air. Architecture influences not only our physical environment but also our psychological well-being. This research emphasizes the long-term effects of the built environment on the physical and psychological well-being of humans, specifically older adults. Sustainable practices in architecture embrace natural lighting, ventilation, respect for nature, and the reusability of construction materials, which contribute to the ecological environment, and help promote social, economic, and cultural sustainability.

Green architecture endorses green psychology to craft beneficial environments to both physical and psychological well-being. By incorporating sustainable practices along with universal design principles and biophilia it is possible striking resemblance between to construct a hybrid yet communal architectural structure that caters to the emotional and physical wellness of the users. According to the research by Covey, old age is often considered a second childhood (Covey, 1992). The most children and elderly people is that they both require assistance and care from others, they might rely on someone to help them with something as basic as getting around. Hence, creating a design that can not only aid the user visually and physically but also psychologically is the ultimate goal of this research.

The case study of Miris Gardens uses biophilia in designing building structures that are healthy and sound for both users and space. Natural lighting, ventilation, green construction materials, optimal orientation, shading devices, ease of approach, flexibility, perceptibility, connection with nature, and communal spaces for activities are all created to provide users with an ideal environment to dwell in.
Creating an optimum built environment to facilitate all varied users is the ultimate goal of all architects and designers. Coming up with innovative design solutions that help cater the variety of needs of users can be met by furthering the research on considering the development of surroundings and expansion of the city. These design solutions can be implemented in major cities around the world as a guideline and a matrix for the future dwellings.

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