

Application of Biophilic Design for Human Wellbeing in Resorts

**Sharon Iretomiwa AGBOOLA
LCU/PG/002803**

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Environmental Design and Management, Lead City University, Ibadan, Oyo State, Nigeria**

**In Partial Fulfillment of the Requirements for the Award of Master Degree (MSc) in
Architecture**

Certification

This is to certify that, Sharon Iretomiwa AGBOOLA with matriculation number LCU/PG/002803 carried out this research work titled ‘Application of Biophilic Design for Human Wellbeing in Resorts’ in the department of Architecture, Faculty of Environmental Design and Management, Lead City University, Ibadan, Oyo State, for the award of Master Degree (MSc) in Architecture. The thesis is an outcome of an independent and original work. I have duly acknowledged all the sources from which the ideas and the extracts have been taken. The project is free from any plagiarism and has not been previously submitted to any other institution.

.....
Dr. (Arc) Oluwatosin D. Ayanleke
(Supervisor)

.....
Date

.....
Dr. (Arc) Adedire Funmilayo
(Head of Department)

.....
Date

Dedication

This thesis is dedicated to God and my mother, who has always been an inspiration to me.

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Acknowledgement

I am grateful to the management of Lead city university for giving me the opportunity to carry out this research and providing an enabling environment to learn.

I want to sincerely thank God for the success of this Thesis. It has been an arduous trip, but I am grateful to my supervisor, Dr. Oluwatosin Ayanleke, for her mentoring, support, and motherly care in ensuring the success of my thesis, research, and design of the proposed Destination Resort.

I am grateful to my father and brother for listening to all of my ideas and supporting my aspirations and objectives. I also thank the members of the Department of Architecture, particularly the Department Head, Dr. F. Adedire, and all of my lecturers, for their contributions to my program.

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Abstract

The recognition of our innate connection to nature is the basis of biophilic design. Its popularity has increased as a means of promoting sustainable development and improving our overall well-being. However, advancements in technology have led to a disconnection from nature. To counteract this, it is essential to incorporate natural elements into our built environment to reap the benefits of nature. This research analyzed the impact of biophilic design on human health, productivity, and overall well-being in selected resort facilities through literature and case studies. A resort facility was designed using biophilic design principles and elements to enhance human wellness. The proposed resort facility included features such as natural lighting and ventilation, weather, plants, natural landscapes, ecosystems, and the existing natural water body on the site. The study concludes that biophilia is a vital aspect of the built environment and should be prioritized in design and construction.

Keywords: Biophilia, Biophilic Design, Resort, Sustainability, Nature

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Chapter One

Introduction

1.1 Background to the Study

One of the human needs that brings joy and contentment is being close to nature, as it allows us to appreciate beauty and transformation. As a need for presence and a strong desire for life, it is crucial to the health and improvement of humans. (Ouf, 2019). Nature has been thought to be beneficial to healing for thousands of years (Nicolás & Gomez, n.d.), and it has been incorporated into the human environment in the earliest man-made structures, and cultures all over the world have found ways to bring nature into homes and public spaces (Ryan et al., 2014).

The natural human desire to associate with nature is called biophilia. Biophilia means 'love of nature', the term suggests a deep, innate affinity between humans and nature. Biophilic design is the theory, science, and practice of bringing buildings 'alive', recognizing and improving bonds with nature. It is a process that provides a sustainable design strategy that includes reconnecting people with nature in response to the human desire to re-establish our contact with nature within built environments (Brown et al., n.d.).

While biophilia is the theory, the biophilic design focuses on human adaptations to the natural world that have improved people's health, fitness, and well-being over time, through the incorporation of natural building materials, natural light, vegetation natural views, and other natural world experiences into the modern built environment (Downton et al., 2017).

Biophilic design is not a modern phenomenon, but with societal trends such as urbanization, new building styles, and lifestyle, there has been a decrease in human interaction with nature in the modern world; therefore, individuals seek out parks, gardens, and outdoor recreational facilities because they understand the personal health and wellbeing benefits that arise from 'contact with nature' (Wanjugu, 2020). Biophilic design is concerned with establishing strong

connections between natural and man-made environments, which can benefit health and well-being. Its primary goal is to address the shortcomings of contemporary building and landscape practice by establishing a new framework for a satisfying experience of nature in the built environment (Berkebile & McLennan, n.d.).

Until modern times, buildings were like living organisms in that they evolved in response to climate and topography, changing form and composition as needed, to protect what was inside from the elements while regulating temperature and humidity to the greatest extent possible. This evolution resulted in vernacular forms that differed from place to place just as plants and animals vary from biome to biome (Berkebile & McLennan, n.d.). We lost the ability to distinguish between practices that were harmful to environmental health and those that were not as a result of new design freedoms enabled by technologies such as insulated glass, air conditioning, and central heating systems.

Biophilic design has gained prominence in recent years as a means of achieving sustainable development and enhancing human well-being (Asadzadeh & Ahmadchali, 2018). Technology should not be a barrier. Rather, it should provide us with critical information (both locally and globally) as well as the tools we need to constructively develop the built environment and efficiently analyze more options (Berkebile & McLennan, n.d.), a concept that recognizes humans' innate connection with nature,

1.2 Problem Statement

As designers, we have the ability and responsibility to influence the fundamental ways people interact with space. We can achieve this by designing facilities that combine natural elements into the overall experience (Wanjugu, 2020). Unfortunately, the positive benefits of being in nature are often blocked by modern culture. What is most concerning is a growing disconnection from nature, which is sometimes seen as either a resource to be exploited or as a beautiful but unnecessary recreational luxury. Modern agriculture, manufacturing, education,

healthcare, urban planning, and architecture are all increasingly detached from nature (Kellert, 2022).

Many Recreational facilities are expected to provide an environment where people can benefit both physically and mentally because they aim to isolate people from the digitalized world by focusing on nature and outdoor activities (Wanjugu, 2020).

While many resorts provide a recreational experience through activities, little attention has been paid to the actual design features that can enhance this goal; encouraging the use of natural systems and processes in the design of the built environment. As a result, to maximize the psychological and physiological results of exposure to biophilic indoor and outdoor environments, we must pay attention and design with these biophilic concepts in mind.

1.3 Aim & Objectives

This project aims to investigate the use of biophilia in achieving the healing and well-being of people in a resort center.

The specific objectives of the design are:

1. To investigate the approaches used to incorporate biophilia in resort design
2. To investigate the positive influence of biophilia on healing and human well-being.
3. To design a resort in Eleyele, Ibadan, using the biophilic approach to create a healthy and restorative environment.

1.4 Research Questions

This paper seeks to answer the following questions:

1. What positive influence does biophilia have on the health and well-being of humans?
2. How can biophilia be effectively incorporated into resort design
3. How can a resort be designed to create a restorative environment through the use of biophilic design?

1.5 Significance of the Study

This research project is aimed at improving the human experience within the built environment by creating a facility that incorporates the principles of biophilic design, to produce restorative and healing effects for its users, while enjoying relaxation and comfort.

The researcher will also gain more knowledge on biophilic design, its impacts on human health, and how it can be incorporated into the built environment

1.6 Limitations of the Study

1. This research is only focused on the Eleyele area of Ibadan city.
2. The concepts and approaches that will be used in this design will be suited to the Nigerian tropical climate.

1.7 Scope of the Study

This research shall focus on organic architecture, incorporating natural building elements, with an emphasis on spatial organization, landscaping, and site planning to produce an environment that promotes human well-being in recreational and restorative facilities.

1.8 Definition of Terms

Biophilia: This is a human beings' tendency to interact with other living creatures

Biophilic design: This is an approach used to increase human connection to the natural world

Human Wellbeing: The state of being comfortable, healthy and happy

Resort: a place to which people frequently or generally go for relaxation or pleasure, especially one providing rest and recreation facilities for vacationers.

Restoration: This is improvement of cerebral functions and mental stress through exposure to nature.

Restorative environment: This is positive nature-rich environment such as scenic views, natural water bodies, flora and fauna that enhances the restoration of humans

Chapter Two

Literature Review

2.1 Conceptual Review

This chapter provides an in-depth review of a resort, highlighting its definitions, history, classification, types, characteristics, and other relevant information regarding biophilic designs and strategies. It also examines previous studies by many other researchers in this area of study and analyzes some of the existing literature to determine how the studies were conducted conceptually and theoretically.

2.1.1 Resort Definition and Brief History

A resort, as defined by Gb Das, n.d., is a full-service accommodation establishment that provides access to a variety of amenities and recreational activities to highlight leisure experiences. (“A History and Features of Resorts,” 2007) describes a resort as a carefully thought-out holiday destination whose goal is to draw in, keep, and satisfy tourists so they return often and/or spread the word about the establishment. A management approach that can work with a range of target markets and scales is needed to accomplish these goals; however, it must always focus on creating valuable experiences.

According to Haarhoff & Gany, (2017), the resort idea is established by offering high-quality lodging, food and drink, entertainment, recreational activities, and health services in relaxing and peaceful settings. (Gee, 1996) further informs us that resorts are the main providers of the visitor experience; they frequently offer services for meetings or business and are typically situated in vacation-oriented environments. In the traditional sense, a resort's sole purpose is to provide guests with a place to unwind or recharge from work and daily life stresses.

Resorts have been a part of travel and tourism for a long time. Their beginnings may be traced to the Roman era when ideas spread over Europe as a result of their advancing legions. Their conventional design evolved from the straightforward beginnings of public baths and healing

mineral springs into "an atrium encircled by recreational and sports attractions, restaurants, lodgings, and shops." The revival of the hot springs in Bath, England, which played a significant role in the English royal court circuit in the seventeenth century, is an example of how the basic medicinal aim of resorts was augmented and ultimately superseded by social and political objectives ("A History and Features of Resorts," 2007).

The benefits of resorts are no longer limited to the rich since the development of industry and trade has made such pleasures accessible to the general public. The resort idea has steadily evolved throughout the age, yet certain constants have existed among the changes. These constants have contributed to the resort's continued existence as a particularly sustainable tourism product and activity. They frequently reflect the continuation of the original model created by the Romans.

Resorts are frequently created to highlight a primary activity, such as a beach, golf course, or historical site, and complement it with important lodging, dining, and shopping options. Its popularity has fluctuated since the beginning of resort construction, but it has endured the test of time by adapting to meet new conditions and preferences to emerge as a new force in today's generally stable and wealthy times ("A History and Features of Resorts," 2007).

2.1.2 Classification/Types of Resorts

The requirements and benefits that resort to or derive for their guests, that is, the purposes for which they were designed, are often used to categorize them. They are typically found distant from popular tourist destinations, providing travelers with peace and time alone in beautiful natural settings (*RESORTS: DESIGNING AND MANAGEMENT Structure*, n.d.).

According to Gb Das, n.d., resorts can be classified as follows.

Destination Resorts: These establishments are considered real resorts. They are the key reason people visit a location and consistently provide excellent levels of service. Throughout a guest's stay, the property provides most or all facilities and access to significant recreational or leisure

areas. Properties usually have meeting/business facilities that satisfy the minimal resort criteria, as well as: Four signature/anchor perks, fifteen or more distinct subsidiary recreation/leisure/entertainment(RLE-E), three or more food and beverage outlets, spa/health/wellness amenities, multiple shopping outlets.

Intermediate Resort: These properties may be the primary reason for a guest's visit to a location, although travelers may have additional reasons for visiting the resort. This property frequently provides access to significant recreational and leisure areas and is located away from large population centers. Except for a restricted range of hallmark or anchor amenities, they are similar to destination resort hotels. These hotels satisfy the minimal resort standards while also offering: two signature/anchor facilities, ten or more distinct secondary recreation/leisure/entertainment (RLE-E), two or more food and beverage outlets.

Intermediate-Access Resorts: These homes are often found in tourist locations or heavily inhabited places. They are often grouped and have access to regionally significant trademark facilities (ex. ski, beach). Although properties are not the major draw for travelers, they provide appropriate recreation/leisure/entertainment events to keep guests engaged during their stay. These properties must fulfill the resort's minimal standards and provide two signature/anchor facilities and ten or more distinct secondary recreation/leisure/entertainment (RLE-E) outlets: two or more food and beverage outlets. Make direct access to external recreation or leisure experiences available.

Specialized Resort: These hotels may be located everywhere and provide a targeted experience centered on a unique feature or anchor attribute. Properties are often smaller in size and focus on the visitor experience around the principal element or attribute. These assets may be the main attractions for visitors or supplements to the destination. These properties must fulfill the following resort minimums: Offer one hallmark amenity or anchor feature. Offers five secondary recreation/leisure/entertainment (RLE-E) amenities. A minimum of 25 rooms or other

accommodations (except for properties with two signature amenity/anchor amenities). Highlights a leisure or retreat-related experience.

2.1.3 Characteristics of a Resort

2.1.3.1 Activities and Recreation

The most distinctive aspects of resorts may be their nice surroundings and diverse selection of recreational activities. Resorts are frequently located in less densely populated regions; therefore, they provide an escape from pollution and traffic.

Outdoor activities are regularly held in resorts to take advantage of the beautiful weather and the surrounding desert or tropical settings. The resort's capabilities are determined by its location and season.

These recreational facilities have been renovated by combining suitable greenery, room layouts, attendants, and food and beverage outlets to provide guests with comfort and flexibility.

2.1.3.2 Amenities

Another distinguishing feature of resorts is the number and range of facilities offered.

2.1.3.3 Services

Resorts provide a wide range of recreational and cultural activities, and tourists must use these services to participate in these activities.

2.1.3.4 Seasonally

The resort operations were seasonally defined. It is climate-driven and often involves a wide range of weather conditions. The high season is the most appealing because it brings moderate temperatures, little rain, and plenty of sunlight, allowing tourists to enjoy the various activities in the resort area.

2.1.3.5 Memorable Experiences

Depending on the visitor, the notion of a "Memorable Experience" can take different shapes and forms. The resort's capacity to go above and above in terms of activities and services remains consistent. The willingness to respond creatively to visitor demands or concerns, exceeding guest expectations, and understanding that this is a special time and experience for their guests are all necessary factors in producing a "Memorable Experience."

2.1.4 Biophilic Design Concept

German psychologist Fromm initially used the term "biophilia" in his writings in 1973, defining it as "the intense love of life and everything alive." The phrase has Greek roots (bios is for life and philia is for love), and American scientist Wilson popularized it in 1984 (Asim et al., 2021). According to Chen, the biophilia theory suggests that people have an innate predisposition to identify with natural systems and processes, lending validity to the description of biophilia as "the desire to associate with other forms of life." The foundation of biophilic design is the conceptualization of the theory of biophilia within the contexts of architecture, urban design, landscape design, and sustainability. (Asim et al., 2021).

The knowledge of the importance of interaction with 'nature' as seen in Zhong et al., (2022) was transferred into the realm of architecture to explain a variety of difficulties with the integration of 'nature' in architectural design on the theoretical foundation of various environmental psychology ideas. Following this, the notion of biophilic design arose.

Biophilic design entails a global process of offering a sustainable design approach that incorporates re-linking humans to the natural world. Buildings and towns may be made more effective and hospitable by using a design strategy called biophilic architecture, which highlights how naturally connected humans are to nature (Ouf, 2019).

The development of "biophilic architecture" is an effort to bridge the gap between current design and people's desire to interact with nature(Sharifi & Sabernejad, 2016). The manifestation of natural components is not all that biophilic design is(Zhong et al., 2022). Biophilic design is a cutting-edge strategy that places a strong emphasis on the preservation, improvement, and restoration of meaningful experiences related to the use of nature in the built environment(Sharifi & Sabernejad, 2016). As a result, its primary purpose is to provide an effective environment for humans as biological entities living in contemporary structures, landscapes, and communities(Chen, n.d.).

In general, biophilic design is an endeavor to carefully comprehend the human desire for connection and solidarity with the natural world and how that need affects the creation of habitats that are suitable for life. Kellert (Sharifi & Sabernejad, 2016) viewed the Biophilic design as a new example of environmentally friendly building with the potential to reintegrate people with nature.

2.1.6 Basic Elements of Biophilic Design

Biophilic design is based on the conceptualization of biophilia theory from the perspectives of architecture, urban design, landscape design, and sustainability. It depends on the following key elements: natural ventilation, natural lighting, organic shapes (which exist naturally), and natural scenery. These characteristics increase the links between people and their surroundings(Asim et al., 2021).

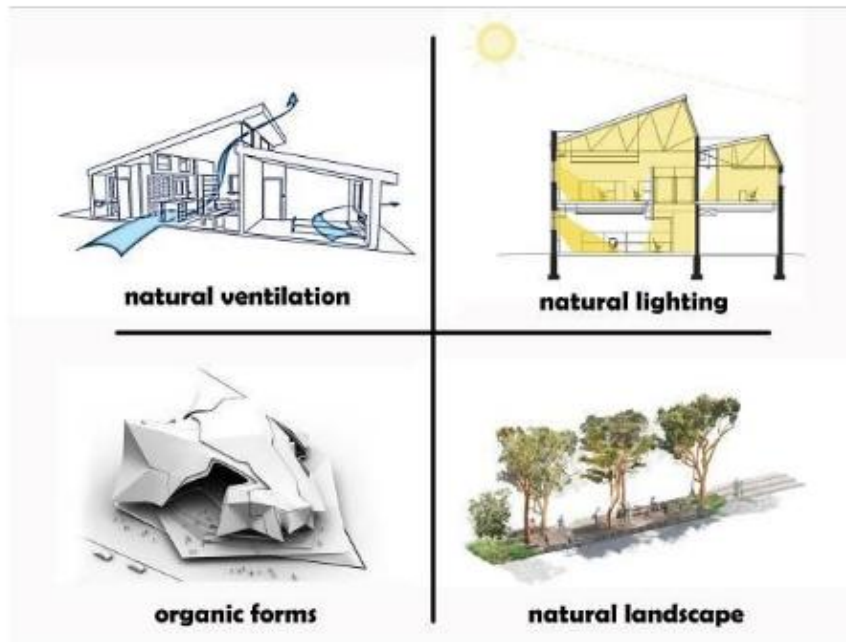


Figure 1; Basic Elements of Biophilic Design adapted
Source (Asim et al., 2021)

2.1.7 Principles and Concepts of Biophilic Design

Biophilia is a psychological emotion that connects nature and people (Hung & Chang, 2021). This concept strengthens the premise that the built environment must be equipped with both biotic and abiotic features for psychological well-being as well as for the preservation of the natural environment (Downton et al., 2017). Kellert, (2022) states that the successful implementation of biophilic design demands steadfast adherence to some fundamental principles. These guidelines serve as essential prerequisites for the successful use of biophilic design. They consist of:

1. Prolonged and recurring contact with nature.
2. Emphasizes how humans adapt to nature to experience health, fitness, and well-being.
3. Promotes a sense of emotional connection to one's environment.
4. Promote healthy connections between people and the environment, which fosters ties between human and natural cultures.
5. Promotes connected, integrated, and mutually reinforcing architectural solutions.

In addition, biophilic design aims to maintain the longevity, effectiveness, and resilience of natural systems. The use of biophilic design can modify a building's or landscape's environmental circumstances in the near term; however, over time, it should foster an ecologically strong and sustainable natural community.

2.1.8 Categories of Biophilic Design

In Kellert, (2022), we observe a design framework that categorizes the attributes of biophilic design into three(3) nature experiences. These include the direct experience of nature, the indirect experience of nature, and the experience of space and place.

- a The direct experience of nature:** this refers to real interaction with built-environmental characteristics. It includes natural light, air, plants, animals, water, landscapes, and others.

Natural Light: Natural light is essential for human well-being because it provides direction about the time of day, night, and season through knowledge of the sun's location and cycle. Understanding natural light may also help with movement and navigation, as well as comfort and enjoyment. Glass walls, reflecting surfaces and materials, and other architectural approaches are all used to bring natural light into interior areas.



Figure 2;natural light introduced into a space

Source:(Maina, 2023)

Air: Natural ventilation is beneficial for human well-being, as it improves both comfort and productivity. By adjusting airflow, temperature, humidity, and barometric pressure, the perception of natural ventilation can be enhanced in any building. This can be achieved through simple methods, like movable windows, or more advanced technical and engineering solutions.



Figure 3;air introduced into a space

Source:(Maina, 2023)

Water: People are naturally drawn to water because it stimulates multiple senses such as sight, sound, touch, taste, and movement. Different design approaches can fulfill this attraction, such as providing views of water bodies, installing fountains, building aquaria, creating artificial wetlands, and other options.



Figure 4;water introduced into a space

Source:(Maina, 2023)

Plants: Vegetation, especially flowering plants, is one of the most successful strategies for bringing the direct experience of nature into the built environment.



Figure 5;plants introduced in a space

Source:(Maina, 2023)

Animals: Positive contact with animal life can be achieved through such design strategies as feeders, green roofs, gardens, aquaria, aviaries, and the creative use of modern technologies such as web cameras, video, binoculars, and spotting scopes. When feasible, contact with animal life should include a diversity of species, and emphasize local rather than non- native species.



Figure 6;animals introduced in a space

Source:(Maina, 2023)

Weather: The perception of and contact with weather in the built environment can be both satisfying and stimulating. This may occur through direct exposure to outside conditions, as well as by simulating weather-like qualities through manipulating airflow, temperature, barometric pressure, and humidity. Design strategies include views to the outside, operable windows, porches, decks, balconies, colonnades, pavilions, gardens, and more.



Figure 7;weather introduced through balconies

Source:(Maina, 2023)

Natural Landscapes and Ecosystems: Self-sustaining ecosystems in the built environment can be achieved through such design strategies as constructed wetlands, forest glades and grasslands; green roofs; simulated aquatic environments; and other means. Contact with natural systems can be fostered by views, observational platforms, direct interaction, and even active.



Figure 8;natural ecosystems intorduced in a space

Source:(Maina, 2023)

Fire: The experience of fire can be both a source of comfort and anxiety. The satisfying presence of fire in the built environment may be achieved through the construction of fireplaces and hearths, but also simulated by the creative use of light, color, movement, and materials of varying heat conductance.



An example of how fire can be introduced

Source:(Maina, 2023)

- b The Indirect Experience of Nature:** this refers to coming into contact with a representation or picture of nature, transforming nature from its original state, or being exposed to specific patterns and processes characteristic of the natural world. Examples of how this can be achieved are:

Images of nature: The image and representation of nature in the built environment plants, animals, landscapes, water, geological features—can be both emotionally and intellectually satisfying. These images can occur through the use of photographs, paintings, sculpture, murals, video, computer simulations, and other representational means.



Showing images of nature used in a building

Source:(Maina, 2023)

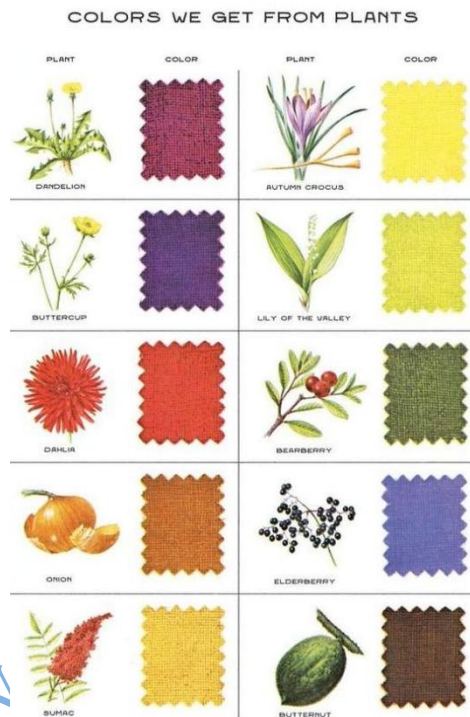
Natural materials: Natural materials can be especially stimulating, reflecting the dynamic properties of organic matter in adaptive response to the stresses and challenges of survival over time. Prominent natural building and decorative materials include wood, stone, wool, cotton, and leather, used in a wide array of products, furnishings, fabrics, and other interior and exterior designs.



Showing natural materials used in a building

Source:(Maina, 2023)

Natural Colors: Color has long served as an important means for locating food, water, and other resources, as well as facilitating movement and wayfinding. The effective biophilic application of color should generally favor muted “earth” tones characteristic of soil, rock, and plants. The use of bright colors should be cautiously applied, and emphasize such appealing environmental forms as flowers, sunsets and sunup, rainbows, and certain plants and animals. The occurrence of highly artificial, contrasting, and “vibrating” colors should be avoided.



Showing natural colours used in a building

Source:(Maina, 2023)

Simulating natural light and air: Artificial light can be designed to mimic the spectral and dynamic qualities of natural light. Processed air can also simulate qualities of natural ventilation through variations in airflow, temperature, humidity and barometric pressure.

Naturalistic shapes and forms: The experience of shapes and forms characteristic of the natural world can be especially appealing. These naturalistic forms can be extraordinarily diverse from the leaf-like patterns found on columns, the shapes of plants on building facades, to animal facsimiles woven into fabrics and coverings.



Showing naturalistic shapes and forms

Source:(Maina, 2023)

Biomimicry: Biomimicry involves studying and emulating the shapes and functions observed in nature, with a focus on other species, as a means of addressing human needs and challenges. For example, biomimicry can be seen in the bioclimatic controls of termite mounds, the structural resilience of spider webs, and the heat-trapping capacity of specific animal hairs.

Age, change, and the patina of time: The natural world is ever-evolving, and the ebb and flow of life are a testament to this dynamic process of growth and maturation. To capture this essence of change and the beauty of time's passing, designers can adopt various techniques, including the use of naturally weathering materials, weathered effects, the incorporation of temporal elements, and more.

Natural geometries: Mathematical properties that are commonly found in nature are referred to as natural geometries. These properties generally include sinuous geometries that are less rigid than artificial ones, hierarchically organized scales, patterns that repeat but vary, and more. Some other notable examples of natural geometries are hierarchically ordered scales like the "Golden Ratio" and "Fibonacci Sequence."

c The experience of space and place: This discusses various natural environmental factors that have been proven to enhance human health and well-being. Among these factors are prospect and shelter, as well as structured complexity, mobility, and navigation. "Prospect" refers to a design element that provides an unobstructed, expansive, and panoramic view of a vast space or area. This feature can aid individuals in monitoring, planning, and surveying their surroundings, instilling a sense of autonomy and command over their immediate environment. Consequently, this can contribute to a heightened sense of safety and security that might otherwise be absent.



Within these three experience categories, 24 biophilic design features have been found and they are listed in the table below.

Direct Experience of Nature	Indirect Experience of Nature	Experience of Space and Place
Light	Images of Nature	Prospect and refuge
Air	Natural materials	Organized complexity
Water	Natural colours	Integration of parts to wholes
Plants	Simulating natural light and air	Transitional spaces
Animals	Naturalistic shapes and forms	Mobility and wayfinding
Weather	Evoking nature	Cultural and ecological attachment to place
Natural landscapes and ecosystems	Information richness	-
Fire	Age, change and the patina of time	-
-	Natural geometries	-
-	Biomimicry	-

Table 1: Attributes of Biophilic Design. Source: (Gillis & Gatersleben, 2015)

2.1.9 Benefits of Biophilic Design

The benefits of biophilic design according to (Zhong et al., 2022) have directly or indirectly addressed the challenges of sustainable architecture. It is essential to human health and development as a need for presence and a strong desire for life. The proper use of biophilic design should result in a wide range of physical, mental, and emotional benefits.

Physical results include higher physical fitness, decreased blood pressure, increased comfort and contentment, fewer disease symptoms, and overall health improvement. Increased contentment and motivation, less stress and anxiety, and greater problem-solving and creativity are all examples of mental advantages. Better coping and mastering abilities, more focus and concentration, greater social interaction, and reduced animosity and aggressiveness are all examples of positive behavioral change (Kellert, 2022).

According to McGee et al., (2019), the advantages of biophilic architecture go beyond the well-known health benefits. There are economic benefits connected with biophilic design across architectural industries, proving the fiscal benefits of nature, but neglecting nature might result in financial loss. Integrating nature into the built environment is a sensible economic investment in health and productivity, based on well-researched neurological and physiological facts.

Asim et al.,(2021) conducted a literature review on the benefits of biophilic design, and in Table 2 we see the analysis of selected available literature whose data was classified based on its influence on the linked and relevant biophilic design patterns. Table 2 lists some of the benefits of biophilic design. as well as the tactics utilized to achieve them and the authors of the accessed literature.

Author	Strategy	Benefits
Herzog (1985)	Use of paintings and photographs of Rivers, ponds, lakes, mountain waterscapes, and large bodies of water.	Positive impact on mood.
Buddell, and Hammit (1987)	Shaded and semi-covered spaces for outdoor environment to create a refuge.	Provides a sense of defense and surveillance against the outdoor environment.
Orians, and Heerwagen (1992)	Use of clean water, which has reflection possibility.	Evaporative cooling; satisfies the thermo-receptors of the body.
Appleton (1996)	Artificial imitation of nature and fractal patterns. Organic and conceptual mimicry of natural entities.	A Positive psychological response towards the immediate environment.
Lohr et al. (1996) Lohr and Pearson Mims (2006)	Use of plants in a windowless indoor environment.	Pain tolerance and stress management. Increased productivity and enhanced presence of mind.
Sapae (1997)	Introducing levels of risk and control in design.	Enhances problem-solving and decision-making skills.
Edwards, and Torcellini (2002)	Modified daylight mechanism, which can adjust throughout the day.	Artificially generated mood and creativity enhancer for workplaces and habitats.
Van den berg et al. (2003)	The natural movement of water.	Stress reduction.
Dietze (2003)	Use of natural sounds and murals inspired by nature.	Reduction in the degree of pain experienced by patients of flexible
Ikeji (2005)	Creation of mystery through the arrangement of trees and objects.	Enhanced preference of space or facade in case of housing.
Leslie (2008) Friedman (2017)	Design of open and unrestricted spaces to represent prospect.	Provides sense of security to the occupants.
Reynolds, et al. (2010)	Use of plants in internal environments.	Lower perception of stress.
White et al. (2010)	Increasing proportion of visible aquatic space.	Increases preference of the space.
Alyarsoo et al. (2010)	Small or momentary interventions with non-visual senses.	Positive health impacts. Physiological and psychological relief.
Almusaed (2010)	Presence of natural or transparent light.	Positive psychological effect, flow of positive emotions and enhances creativity.
Mehra et al. (2012)	Natural sounds of birds, winds and gushing of leaves.	Enhanced creativity.
Tsunetsugu et al. (2013)	Visual connection with nature for 5 – 20 minutes.	Stress reduction.
Van Wieren Kellert (2013)	Elements with unprecedented organic growth like planters and shrubs.	Acts as natural modulators of fear and surprise for the pedestrian.
Benfield et al. (2014)	Natural sounds	Recovery from stress, wounds and sickness.
Browning et al. (2014)	Good connection with ongoing natural processes and systems. Biomorphic designs and patterns	Relaxation, nostalgia, enlightenment and repeated anticipation. Minimizes stress and creates visually preferred environments.
Ryan (2015)	Clouds, shadows, natural sounds and water reflections.	Generates interest and acts as natural energizer.
Song et al. (2016)	Confronting natural environments.	Reduces the chance of heart diseases, balances pulse rate and blood pressure, reduces secretion of cortisol, and enhances the parasympathetic nervous system.
Sharif, and Sabernejad (2016)	Appropriate task-specific lux levels of light.	Improves the accuracy of senses and induces the power of vision.
Lee and Park (2018)	Including accessible hideout spaces in library design, which can provide a view of natural systems.	Psychological stability: tranquility and safety in an unfamiliar environment.
Yin et al. (2018)	Short exposure to biophilic indoor environment.	Lower systolic and diastolic blood pressure and skin conductance. 14 % improvement in short term memory.

Table 2.: Benefits of Biophilic Design.

Source:(Asim et al., 2021)

2.1.10 Impact of Biophilic Design

All biophilic design features are perceived by the human senses of sight, sound, touch, smell, taste, and movement. We regularly suffer boredom, tiredness, and, in extreme situations, bodily and psychological abnormalities when we lack visual contact with the natural world.

Despite our human proclivity for visual perception, other sensory reactions to nature are also important to us. Multisensory experiences with nature in the built environment may significantly improve comfort, pleasure, enjoyment, and cognitive function, while also having a positive influence on human psychology, physiology, and the immediate surroundings (Zhong et al., 2022).

In the quest of sustainable architecture, a complete grasp of biophilic design may serve to deepen creativity and arrange spatial experiences, which adds to design innovation and improves building quality.

2.1.11 Challenges and Limitations of Biophilic Design

Based on Andreucci, Loder, Brown, et al., (2021)'s research, we can conclude that although the concept of biophilic design is becoming more popular, it still suffers from a lack of detail about study findings and factors. Many design circles reject it as "nice to have but not necessary" rather than an effective intervention to promote health and performance. Many of the biophilic design features described above have been supported by research on nature and health to date; yet, in reality, biophilic design is frequently confined to a few variables, limiting its use in design practice. Furthermore, much remains unknown regarding the potential advantages of biophilic design interventions, both individually and collectively.

Biophilic design is also thought to be expensive and difficult to maintain. This can be ascribed to the usage of photographs of high-end, high-spec landscapes and elements such as green roofs and living walls in articles and publications about biophilic design. Although these examples are costly, biophilic design does not have to be (Clancy, 2014).

2.2 Design Considerations

2.2.1 Key Requirements of Resort Design

The following are the minimal requirements for a resort in terms of recreational amenities: (1) Include at least one distinctive amenity or anchor characteristic. (2) Provide five more recreation/leisure/entertainment opportunities. (3) Have one full-service food and beverage establishment. (4) Short-term or overnight housing must be included in the bed base. (5) A minimum of 25 rooms or other accommodations are required (with the exception of properties with two distinctive amenity/anchor features). (6) Highlight a leisure or retreat-related event. (Gb Das, n.d.)

2.2.2 Critical Factors for Resort Design

Based on the considerations of resort requirements and regional style, (Hassan et al., 2010) believes the following six crucial aspects to be significant in resort design:

Site Planning: The study discovered four essential aspects in this research survey, which are as follows: a) The location b). Chalet accessibility c). Entrance. d). Signage

Exterior Design: Roof design is an essential aspect of the resort's appearance. According to Schwanke (1997), most resort hotels are built on the recreational amenity and aesthetic setting of water. Some resorts are also positioned in picturesque highland locations or rural settings to provide guests with a natural living experience. There are five key aspects for resort building exterior design, which are as follows: a). Building materials b). Roof c). Verandah d). Exterior view e). Landscape design

Interior Design: High-quality, long-lasting fitments and finishes are also required to enable convenient maintenance services. According to Lawson (1995), as stated in (Hassan et al., 2010), the style of the room units (always in the shape of a chalet unit) in vacation villages and resort complexes varies to generate originality and character. Landscape and the retention or interpolation

of trees and scrubs to divide and screen groupings of units conceal the density of the structure. Factors important in the interior design are as follows: a). Interior view b). Interior finishes c). Chalet layout d). Chalet size e). Accessibility

Passive and Active Design: This style may be applied in a variety of ways, including the design of roof forms, building facades, window openings, and sun shading systems, as well as the use of local materials and ornamental features. Roofs are often tall, with maximum window openings, extensive use of louvers, and huge overhangs for ventilation and shade. Windows provide for optimum ventilation and give views of the outside. This sense of openness is represented in the vast apertures of the areas with few walls. The following are four crucial aspects that are important for this point: a). Ventilation b). Shades/Natural lighting c). Room's temperature d). Artificial lighting.

Design of Facilities: Resort hotels are frequently located inside bigger resort towns, providing fast access to waterfront activities as well as access to a variety of community amenities such as jungle trails, beach parks, amusement facilities, and shopping services. Restaurant services, a large lobby, and comfy resting places are always available at the resorts. Furniture, fittings, and finishes must be designed to complement the local flavor. There are four crucial criteria that must be considered while designing facilities. These elements are as follows: a). Accessibility (facilities) b). Room facilities (design) c). Toilet facilities d). Bathing facilities

Price: This is a crucial factor that can influence the success of resort design. The guests always look for the overall design in comparison to the price.

2.3 Empirical Review

2.3.1 Implementation of Biophilic Design Strategies

Biophilic design strategies have gained significant attention in recent years as a means of incorporating natural elements into built environments to enhance human well-being and connectivity with nature.

The biophilia hypothesis suggests that humans have an inherent connection with the natural world, and a lack of exposure to nature can negatively impact health, well-being, and performance (Beatrice-Lindner et al., 2023). As a result, various design strategies have been developed to directly incorporate nature into resort environments, such as the use of natural materials, indoor plants, and large windows that provide views of nature. Additionally, biophilic design strategies also involve mimicking the structural properties of nature in the built environment, creating a sense of harmony and connection. Beatley's (2013) work on biophilic cities provides evidence for the effectiveness of biophilic design in creating sustainable and connected environments. Biophilic architecture, as proposed by Joye (2007), emphasizes the need to bring aspects of nature into the built environment, while also mimicking the key structural properties of nature. This can be achieved through the use of organic shapes and forms in building design and landscape planning that evoke a natural affinity in individuals. Furthermore, Kellert's concept of biophilic design expands on this idea by incorporating organic design and vernacular design principles. Organic design involves the intentional use of shapes and forms in buildings and landscapes that directly, indirectly, or symbolically elicit people's inherent affinity for the natural environment. Vernacular design, on the other hand, incorporates local cultural and natural elements into the design of resorts, further strengthening the connection between people and their surrounding environment.

Recent research has explored how incorporating natural elements and mimicking nature's structural properties can positively impact resorts. Empirical studies have shown that biophilic design strategies can be effective in resort settings. Innovative lighting systems have also been developed to enhance this approach, simulating natural sunlight when direct access to windows is not possible. According to Beatrice-Lindner et al. (2023), these strategies have proven successful in resorts.

Chapter Three

Methodology: Case Study

3.1 Introduction

This study focuses on the use of biophilic design methodologies and approaches in the creation of a resort facility that produces restorative and healing effects for its users. A review of the literature on biophilic design techniques and how they may be used in design was conducted using journals, conference proceedings, papers, books, and internet materials. Existing structures created using biophilic design techniques were also investigated and evaluated to have a better understanding of these tactics.

3.2 Case Study Selection Criteria

The case studies were chosen with care based on the following criteria:

1. Resorts and resort destinations with the extent of services necessary.
2. Resorts having biophilic design elements in their architecture.
3. The project's scope (national/international).

3.3 Aspects of Case Study Analysis

Following selection, the case studies were evaluated on four criteria:

1. Overview/general information and service delivered
2. Concept development and biophilic design elements
3. Architectural description/features
4. Study observations and conclusions

3.4 Case Studies

3.4.1 Case Study 1: Whispering Palms Resort

Name: Whispering Palms Resort

Location: Lagos Badagary Expressway, Nigeria

Project year: 1985

3.4.1.1 Overview

Whispering Palms began as a family-owned business and has expanded from a few chalets for friends and visitors to a 122-room resort. Professor Deji Femi - Pearse constructed the building that today serves as the resort reception and family residence in 1985. The success of the resort concept led to the construction of the first 40-room building in the 1990s. The resort is set on 60 hectares of land off the Lagos Badagary Expressway in Nigeria.



Fig 3.1 showing the Resort entrance

Source: Author's survey

3.4.1.2 Concept

The resort's goal expands on Professor Deji Femi - Pearse's previously established foundation by further enhancing the hotel's reputation as a venue for family adventures where learning is combined with a respite from the everyday rigors of Lagos life.

The resort's preponderance of open-air areas has made it a notably safe haven in troubled times.

The future of the resort's green areas is secure since the managing director is an outstanding landscaper whose work covers several of Lagos's more recognizable institutions. Whispering Palms

is set to be Nigeria's first solar-powered hotel, providing energy stability and a green attitude in the face of climate change.



Fig 3.2 showing the Resort entrance

Source: Author's survey



Fig 3.3 showing Resort landscape

Source: Author's survey



Fig 3.4 showing the Resort's beachside seating
Source: Author's survey

3.4.1.3 Facilities

This resort has the following facilities and amenities: Reception building, Outdoor Gym, Restaurant & Outdoor bar, Water activities, Lodging facilities with 4 room typologies, Museum, Private zoo, Event Hall, Playground, Sport Facilities, Salon and Spa, Clinic, Pool, Marina restaurant.



Fig 3.5 showing the Resort's zoo
Source: Author's survey



Fig 3.6 showing the tennis court

Source: Author's survey



Fig 3.7 showing the First aid clinic

Source: Author's survey



Fig 3.8 showing the spa

Source: Author's survey

3.4.1.4 Materials

Brick and sandcrete blocks are the main building materials used for the walls of most of the facilities in the resort. Sea shells and natural stones were used as decorative elements on the outdoor steps, walls, and centerpieces at various points on the site.



Fig 3.9 showing the Resort entrance

Source: Author's survey

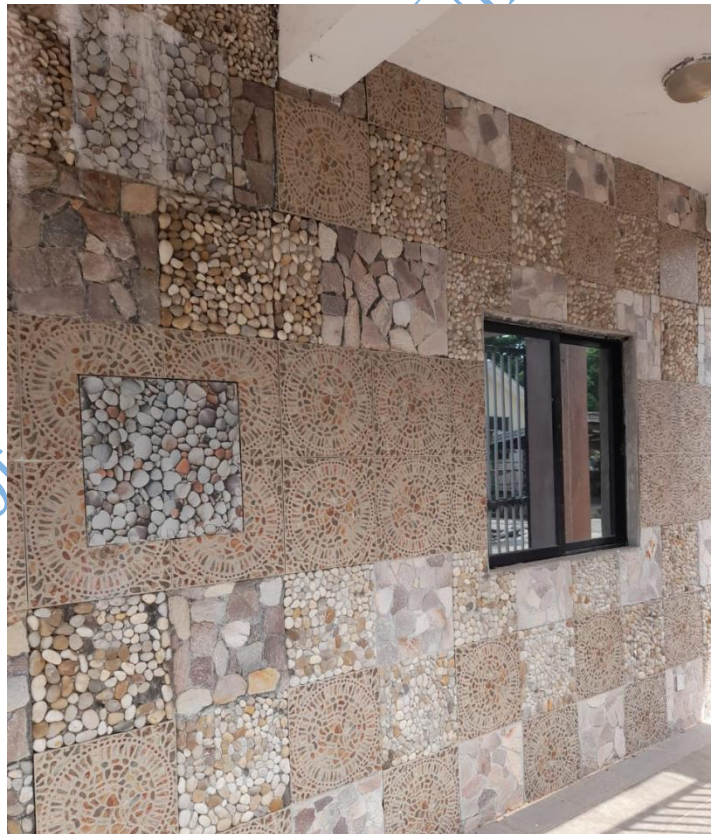


Fig 3.10 showing a wall decorated with seashells and natural stones

Source: Author's survey



Fig 3.11 showing a centerpiece adorned with seashells and natural stones
Source: Author's survey



Fig 3.11 showing steps adorned with seashells and natural stones
Source: Author's survey



Fig 3.12 showing ticket point

Source: Author's survey

3.4.1.5 Deductions

- Good zoning of facilities on site
- Good landscaping
- There is an abundance of green spaces and open areas with sit outs
- Good use of natural materials for aesthetics
- Appreciation and preservation of the natural environment
- Adequate parking spaces

3.4.1.6 Assessment of Biophilic Design Elements

S/N	Design Classification	Features/Attributes	Level of application				
			1	2	3	4	5
1	Direct Experience of Nature	Water					●
		Air			●		
		Light				●	
		Plants					●

		Animals				●	
		Natural Landscapes & Ecosystems				●	
		Weather					
		Fire					
2	Indirect Experience of Nature	Images of Nature				●	
		Natural Materials				●	
		Natural Colors				●	
		Simulating natural light and air				●	
		Naturalistic shapes & forms				●	
		Natural Geometries Biomimicry				●	
3	Experience of Space and Place	Prospect and Refuge					
		Organised Complexity					
		Mobility & wayfinding				●	
		Transitional Spaces				●	
		Cultural and ecological attachment to place					

Table 3: Assessment of Biophilic Design Elements in Whispering Palms Resort

Source: Researchers Fieldwork

3.4.2 Case Study 2: La Campagne Tropicana Beach Resort, Lekki, Nigeria

Name: La Campagne Tropicana Beach Resort

Location: Lekki, Nigeria

Project year: 1984

3.4.2.1 Overview

Otunba Dr Walen Akinboboye founded this African theme tourist resort in 1984. It takes up 65 acres of land and water. It is at Ikegun, Ibeju Lekki LCDA, Epe Expressway, Lagos, located on the Atlantic Ocean's shore, flanked by Ikegun Lake.



Fig 3.13 The site La Campagne Tropicana Beach Resort

Source: (Moses, 2021)

3.4.2.2 Concept

The Architect's concept was based on the rich Yoruba culture, as evidenced by the naming of each facility, the materials used, the embellishments on the exterior and interior spaces, and the artifacts attached to each lodging facility, all of which were inspired by Yoruba cultural settings from the past. It is clear that the Architect was inspired by the Yoruba people's traditional constructions.

3.4.2.3 Facilities

This resort is referred to as a destination resort due to the presence of the following facilities and amenities:

Reception building, Administrative building, lodging amenities, Games, Water sports, Semi-outdoor relaxation structures consisting of wooden pillars, mats, thatch roofs, and Ankara fabric,

Spa, Water sports include boat cruises, kayaking, water cabanas, and so forth. On-site eateries include 'Bolekaja' and 'Eebio,' Suya/ Asun Spot, and 'Yoru'bar', an African-themed bar amid the forest. Sporting amenities include beach soccer, basketball, a basketball court, table tennis, and tennis. Multipurpose hall/cinema (70-person capacity), Children's park, Creative palace for entertainers, Sickbay, security stations, and other auxiliary facilities required for the resort's effective operation.

The lodging facilities are of various forms and designs that are called traditional names. Ilerimi is the presidential suite (a 3-bedroom apartment), Anago is a 2-bedroom apartment, Oso is a studio apartment, and Obalerigi, Laba, Obieze, and Putt are all studio apartments. The Putt apartments are likewise studio flats, but they have different layouts and other amenities, as shown in the photos below.

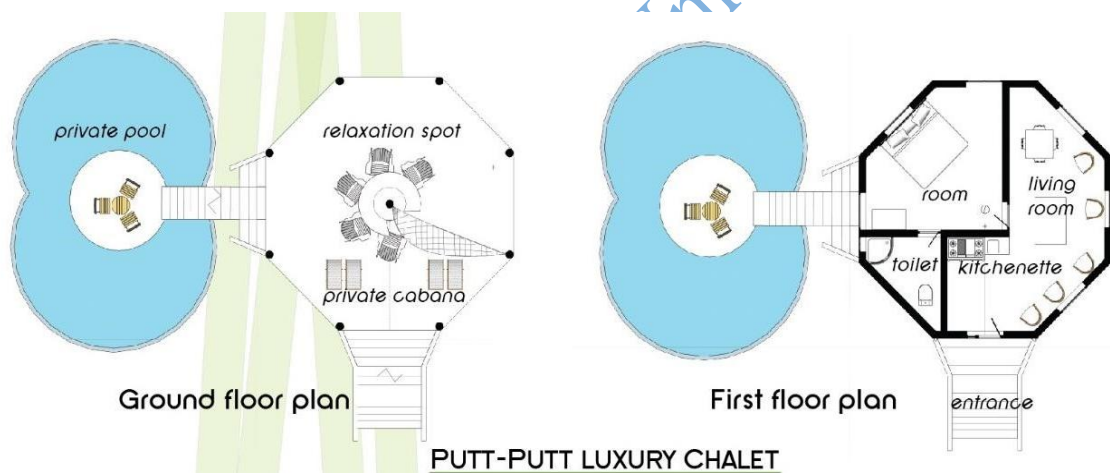


Fig 3.14 Some of the floor plans of the lodging facilities

Source:(Moses, 2021)

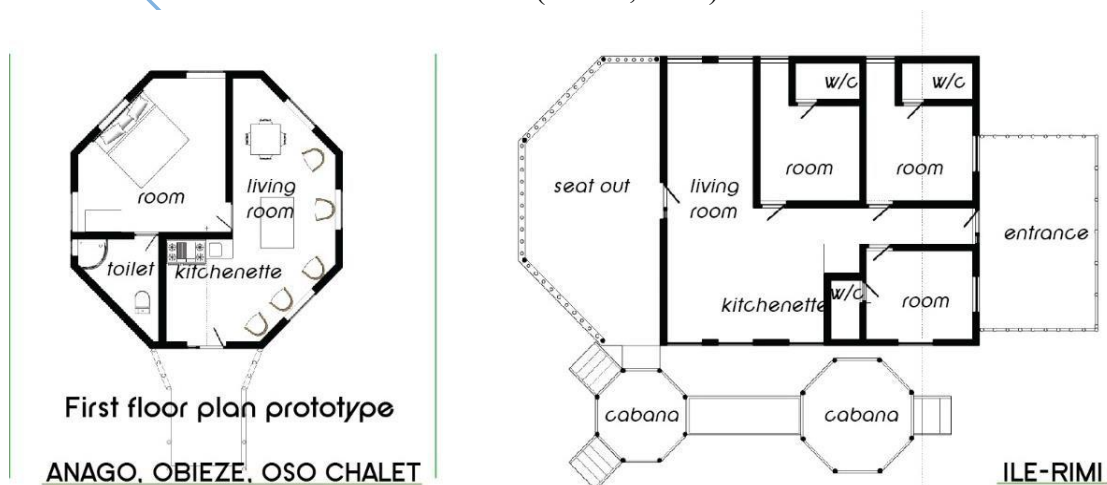


Fig 3.15 Some of the floor plans of the lodging facilities

Source: (Moses, 2021)



Fig 3.16 The Presidential lodging facility called Ile- Rimi

Source:(Moses, 2021)



Fig 3.17 The interior views of the Presidential lodging facility called Ile- Rimi

Source: (Moses, 2021)



Fig 3.18 The exterior views of the lodging facility called the Putt-Putt

Source: (Moses, 2021)



Fig 3.19 The interior views of some of the lodging facility

Source: (Moses, 2021)



Fig 3.2 The exterior views of the Relaxation facility called SIMI

Source: (Moses, 2021)

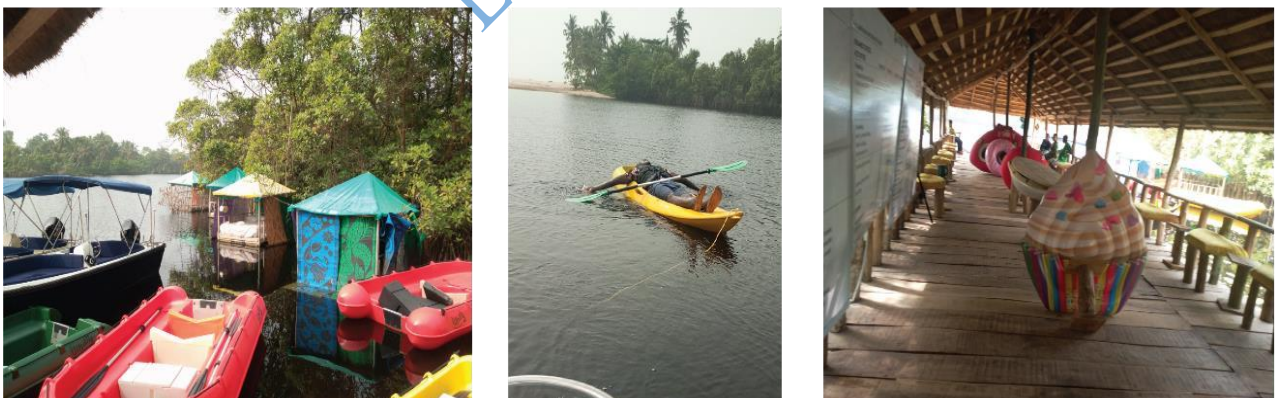


Fig 3.21 The water sports, water cabanas alongside the water sport arena

Source: (Moses, 2021)

3.4.2.2 Materials Used

As shown in fig 3.13 to fig 3.21, local and indigenous materials were widely utilized in the construction of the resort facility,

- Brick: Used for the outside walls of the majority of the resort's hotel structures.

- Timber posts: Used as structural columns for several of the accommodation and outdoor amenities.
- Bamboo is mostly used as an interior cladding material.
- Concrete is used for floors as well as some structural columns. Mat: Used for the ceiling in the interior spaces and blinds for exterior seat-outs
- Palm frond: This material is widely used for cladding both internal and external areas.
- Thatch: A type of roof covering.
- Ankara is an African fabric that is used for curtains, ornamental items, shades, and table and chair coverings.

3.4.2.4 Deductions

- Use of local materials with Yoruba decorations is excellent.
- Use of bamboo in interior design
- On-site facility zoning is excellent.
- Natural wild life appreciation and preservation
- The resort is an eco-resort in the sense that it is built around natural components such as the jungle, the lagoon, and the ocean.
- There are plenty of parking places available.
- Good use of passive design concepts, including the use of natural ventilation and lighting in all spaces.
- The majority of the structures are made of thick timber.
- The main kind of construction employed on this facility was post and beam.

3.4.2.5 Biophilic Design Elements

S/N	Design Classification	Features/Attributes	Level of application				
			1	2	3	4	5
1	Direct Experience of Nature	Water					●
		Air					●
		Light					●
		Plants					●
		Animals					

			Natural Landscapes & Ecosystems				●	
			Weather					
			Fire					
2	Indirect Experience of Nature		Images of Nature			●		
			Natural Materials					●
			Natural Colors				●	
			Simulating natural light and air			●		
			Naturalistic shapes & forms				●	
			Natural Geometries					
			Biomimicry					
3	Experience of Space and Place		Prospect and Refuge					
			Organised Complexity					
			Mobility & wayfinding			●		
			Transitional Spaces			●		
			Cultural and ecological attachment to place					●

Table 4: Assessment of Biophilic Design Elements in La Campagne Tropicana

Source: Researchers Fieldwork

3.4.3 Case Study 3: Amandari Resort, Ubud, Bali

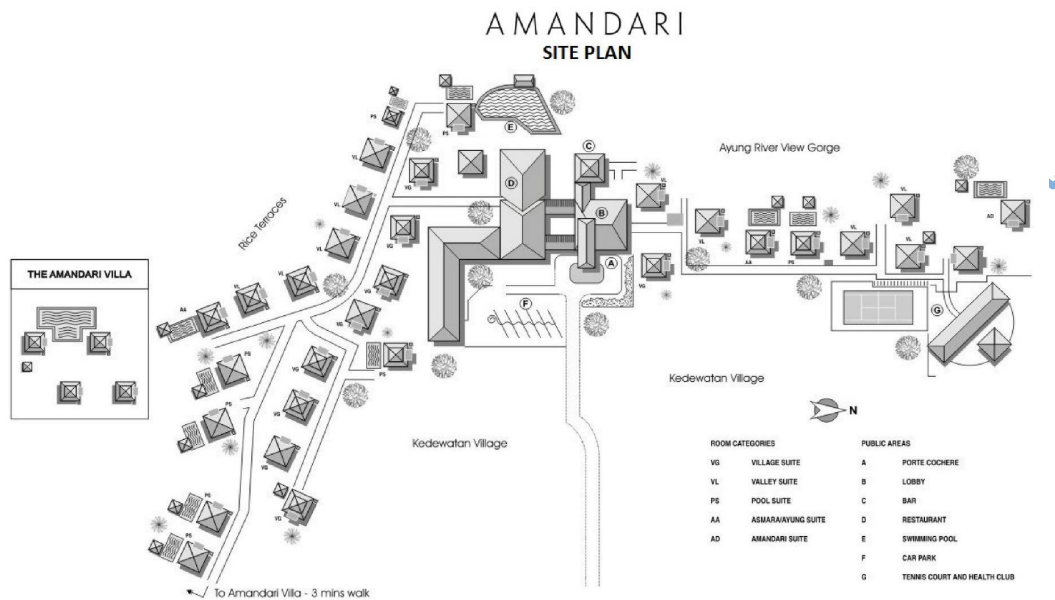
Name: Amandari Resort

Architect: Peter Muller

Location: Ubud, Bali

3.4.3 Overview

The Amandari resort is located in the town of Kedewatan, about 15 minutes from Ubud. On a 15,000 sqm plot of land, it is nestled on a mountainside overlooking rice terraces and the nature of



the Ayung Valley.

Fig 3.22 Site Plan of Amandari Resort

Source: (Los, n.d.)

3.4.3.2 Concept

The architect Peter Muller created this resort in the style of a traditional Balinese town on the beautiful rim of the Ayung River Gorge. Amandari, in Bali's cultural center, is surrounded by forest and rice terraces. Alang-alang-thatched cottages, some with pools, all with private tropical gardens, cocoon visitors beneath bamboo ceilings, their suites exquisitely adorned with teak and coconut wood. Children attend dancing classes here, and religious processions pass through on a daily basis, descending down the steps that flow below Amandari to a 7th-century stone tiger - a theme repeated throughout the site.

3.4.3.3 Facilities

Accommodation: There are about 10 different accommodation options at Amandari resort as seen in the table below:

Do Not Copy, Lead City University, Nigeria

Room Type	Features	Number Available	Room size
Village Suites (single-storey)	<ul style="list-style-type: none"> Surrounded by tropical foliage, or with views of the Ayung Valley or rice paddies. Private courtyard garden with sunken marble bathtub. 	2	110m ²
Village Suites (duplex)	<ul style="list-style-type: none"> Surrounded by tropical foliage, or with views of the Ayung Valley or rice paddies. Private courtyard garden with sunken marble bathtub. 	7	158m ²
Valley Suites (single-storey)	<ul style="list-style-type: none"> Surrounded by tropical foliage, or with views of the Ayung Valley or rice paddies. Private courtyard garden with sunken marble bathtub. 	9	110m ²
Valley Suites (duplex)	<ul style="list-style-type: none"> Surrounded by tropical foliage, or with views of the Ayung Valley or rice paddies. Private courtyard garden with sunken marble bathtub. 	1	158m ²
Pool Suites (single-storey)	<ul style="list-style-type: none"> Private swimming pool of 30–44 m² (323–473 ft²) Private garden and outdoor living area Outdoor sunken marble bathtub 	4	110m ²
Pool Suites (duplex)	<ul style="list-style-type: none"> Private swimming pool of 30–44 m² (323–473 ft²) Private garden and outdoor living area Outdoor sunken marble bathtub 	4	158m ²
Asmara Suite	<ul style="list-style-type: none"> Views of Ubud's lush rice paddies Expansive duplex configuration Private 37 m² (394 ft²) pool with large terrace Garden and outdoor living area 	1	158m ²
Ayung Suite	<ul style="list-style-type: none"> Private 36 m² (390 ft²) pool with views of Ayung Valley Expansive duplex configuration Garden and outdoor living area 	1	158m ²
Amandari Suite	<ul style="list-style-type: none"> Private 60 m² (645 ft²) infinity pool in spacious tropical garden Picturesque views of the Ayung valley Outdoor dining bale Separate living room pavilion that can be used as an additional bedroom A two-bedroom Amandari Suite can be created by connecting with a Valley Suite 	1	290m ²
Three-bedroom Amandari Villa	<ul style="list-style-type: none"> A Balinese-style compound, less than a minute's drive from the resort Five pavilions comprise three bedrooms, a glass-walled living room and a fully fitted kitchen Garden and landscaped deck with a marble-floored dining bale Expansive two-tier swimming pool finished in pale green tiles (upper: 40 m², lower: 65 m²) Serviced by two staff with a driver on call 	1	530m ²

Table 5 showing Room typologies available at Amandari Resort
Adapted from: (Los, n.d.)



Fig 3.23 Image showing the Three-bedroom Amandri Villa
Source: Author's survey



Fig 3.24 Image showing the Village Suite
Source: Author's survey



Fig 3.25 showing Amandari suite

Source: Author's survey



Fig 3.26 Two-Bedroom Suite

Source: Author's survey

Other facilities available at Amandari include:

Relaxation and Wellness: This includes the spa, gym, pool, and other amenities.

Spa: There are two open-air bales, a beauty room, a sauna, and a marble steam room in the spa. A tranquil location near a lotus pond, where the bales appear to float. Treatments may also be scheduled in-suite or in a bale with a view of the Ayung Valley. The extensive treatment menu includes Balinese products known for their calming qualities.

Gym: This is set by the spa, offering cardiovascular equipment overlooking the lotus pond.

Yoga and meditation: Private sessions with a resident teacher are provided in an outdoor environment.

Swimming pool and music pavilion: The 28-meter (308-m²) green-tiled main pool is near the gorge's edge and offers stunning views of the rice terraces. Nightly gamelan players and regular dance performances are held in an adjacent music pavilion.

Tennis: Guests have exclusive use of a floodlit hardcourt. Equipment and striking partners can be provided.

Library: Books, newspapers, and games are available. An outdoor bale can be utilized to read while sipping tea, coffee, or drinks.

Boutique and gallery: Guests can purchase Indonesian handicrafts such as baskets, silk, ceramics, and silverware.

Activities & Excursions: Amandari can offer guided tailormade tours around Bali; popular day outings include Gunung Kawi, a collection of 11th-century temple structures dedicated to King Anak Wungsu; Lake Batur; Mount Agung; and Ceking, noted for its steep rice terraces. Amandari guides know the island inside and out and will show tourists both popular and off-the-beaten-path attractions.



Fig 3.27 showing an outdoor seating area

Source: Author's
survey



Fig 3.28 showing the pool and outdoor seating area

Source: Author's survey



Fig 3.29 showing the dining at Amandari Resort
Source: Author's survey



Fig 3.30 showing the massage area
Source: Author's survey



Fig 3.31 showing an aerial view of the resort
Source: Author's survey



Fig 3.32 showing the village
Source: Author's survey

3.4.3.4 Materials Used

As shown in the photographs above, local and indigenous materials were widely utilized in the construction of this resort

- Brick: Used for the outside walls of the majority of the resort's hotel structures.

- Wood: Used as timber posts or structural columns for several of the accommodation and outdoor amenities. It was also used as a flooring material in a number of buildings in the resort.
- Concrete is used for floors as well as some structural columns.
- Ceramic tiles: used as a decorative element and floor finish
- Thatch: A type of roof covering.

3.4.3.5 Deductions

- Use of local materials
- Natural wild life appreciation and preservation
- The resort is an eco-resort
- Good use of passive design concepts, including the use of natural ventilation and lighting in all spaces.

3.4.3.6 Assessment of Biophilic Design Elements

S/N	Design Classification	Features/Attributes	Level of application					Observation
			1	2	3	4	5	
1	Direct Experience of Nature	Water					●	
		Air				●		
		Light				●		
		Plants					●	
		Animals			●			
		Natural Landscapes & Ecosystems				●		
		Weather						
		Fire						
2	Indirect Experience of Nature	Images of Nature			●			
		Natural Materials					●	
		Natural Colors				●		

		Simulating natural light and air			●			
		Naturalistic shapes & forms		●				
		Natural Geometries						
		Biomimicry						
3	Experience of Space and Place	Prospect and Refuge						
		Organised Complexity						
		Mobility & wayfinding			●			
		Transitional Spaces			●			
		Cultural and ecological attachment to place					●	

Table 6: Assessment of Biophilic Design Elements in Amandari Resort
Source: Researchers Fieldwork

3.4.4 Case Study 4: Castaway Island Resort

Name: Castaway Island Resort

Architect: VTN Architects

Location: Vietnam

Year: 2019

3.4.4.1 Overview

Castaway Island Resort is situated on a small but lovely island in the Cat Ba Archipelago, a popular tourist destination in Vietnam. It can accommodate up to 160 guests, the majority of which are international visitors. The location is only accessible by boat, which takes around two hours from the port of Hai Phong.



Fig 3.33 showing Masterplan of Castaway Resort
Source: archdaily

3.4.4.2 Concept

The goal of the resort is to provide a memorable stay on the island surrounded by tropical nature. It rests peacefully on the white-sand beach, loving nature and becoming one with it.

3.4.4.3 Facilities

The resort comprises of five huts, a restaurant, and a pavilion on a 3,000-square-meter private beach surrounded on one side by a gorgeous mountain range and on the other by an immense beachfront of white sand.



Fig 3.34 showing lodges at Castaway Resort
Source: archdaily



Fig 3.35 Pictures showing the huts, restaurant, and pavilion

Source: archdaily

3.4.4.4 Materials Used

Bamboo was utilized for the project because it is an environmentally benign material that can be readily integrated and removed without compromising the natural beauty of the gulf where the project exists.

The bamboo building has a thatched roof, providing a genuine Vietnamese cultural experience while also lowering environmental effect. The thin bamboo (Tam Vong), which has a diameter of only 40-50 mm, is constructed with a bamboo dowel nail and then fastened with rope. The bamboo is treated using a natural traditional process created in a Vietnamese artisan hamlet that entails soaking the bamboo in mud and then smoking it.

The restaurant also has a hyperbolic-parabolic shell construction that creates a semi-outdoor place for socializing and engagement. Each bamboo shell unit is made out of 80 straight bamboos, resulting in a wavy ceiling and rhythmical roof landscape.

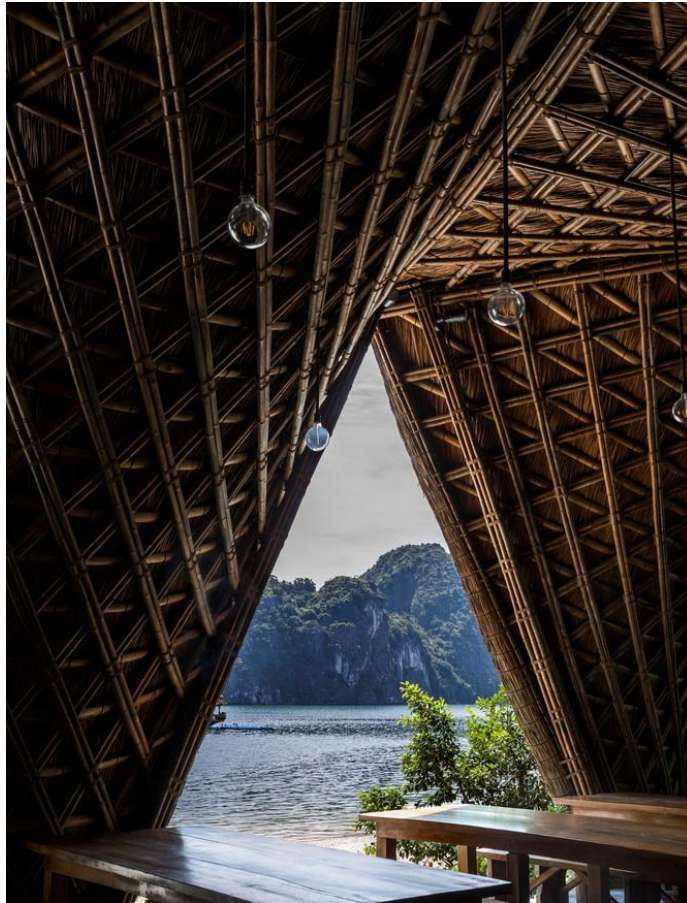


Fig 3.36 showing the dining
Source: archdaily



Fig 3.37 Images showing Bamboo shell roof
Source: archdaily

The Five huts for accommodation are created from bamboo frame modules to provide pleasant bed space for each visitor. These frameworks are built on the ground to reduce building time and

increase craftsmanship. The hut's façade is made of recycled timber shutters, which are common in traditional Vietnamese colonial mansions.



Fig 3.38 Image showing bamboo frame of the accommodation

Source: archdaily

3.4.4.5 Deductions

These bamboo constructions not only improve the experience of visitors on the island, but they also serve as a landmark for this renowned tourist site, where numerous boats travel through the Cat Ba Archipelago.

Despite the project's development, the land has been left untouched, the flora protected owing to the use of such an environmentally friendly bamboo structure. This is an ecologically responsible angle taken with this project.



Fig 3.39 showing one of the lodges

Source: archdaily



Fig 3.40 showing the room

Source: archdaily

3.4.4.6 Assessment of Biophilic Design Elements

S/N	Design Classification	Features/Attributes	Level of application				
			1	2	3	4	5
1	Direct Experience of Nature	Water					●
		Air				●	
		Light				●	
		Plants					●

		Animals			●		
		Natural Landscapes & Ecosystems				●	
		Weather				●	
		Fire			●		
2	Indirect Experience of Nature	Images of Nature		●			
		Natural Materials					●
		Natural Colors				●	
		Simulating natural light and air			●		
		Naturalistic shapes & forms				●	
		Natural Geometries					
		Biomimicry					
3	Experience of Space and Place	Prospect and Refuge					●
		Organised Complexity		●			
		Mobility & wayfinding			●		
		Transitional Spaces			●		
		Cultural and ecological attachment to place					●

Table 7: Assessment of Biophilic Design Elements in Castaway Island Resort

Source: Researchers Fieldwork

3.4.5 Case Study 5: The St. Regis Maldives Vommuli Resort

Name: The St Regis Maldives Vommuli Resort

Location: Maldives

Architect: WOW Architects

Year: 2016

3.4.5.1 Overview

This design aims to pleasure the senses through education, raising awareness, and developing new ways of interacting with the physical world. Paradise is experienced and appreciated emotionally and intellectually, but with a great knowledge of the intricate linkages of the eco systems being inhabited.

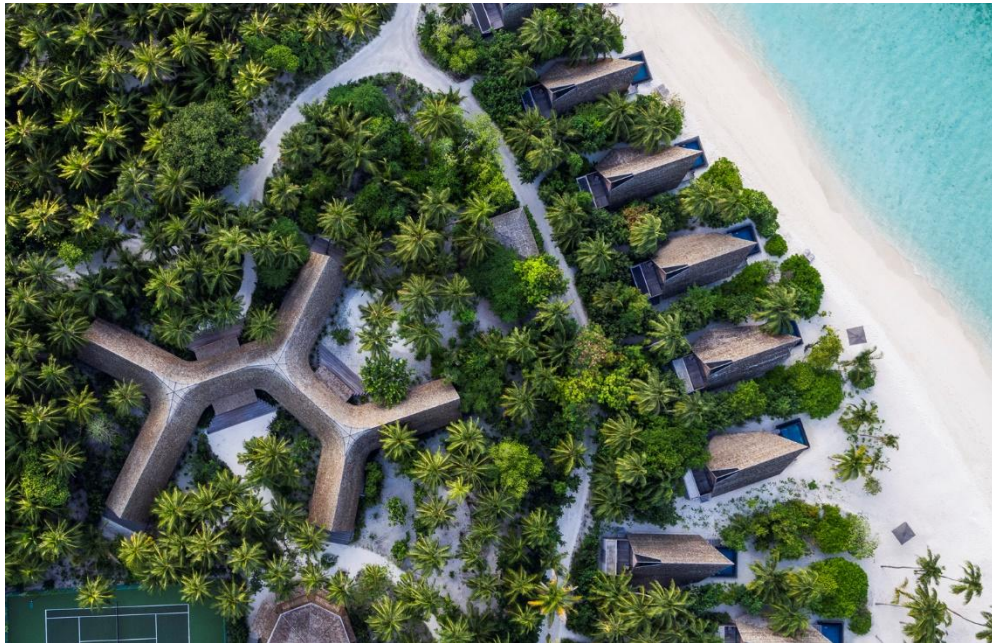


Fig 3.41 Site view of the resort

Source: archdaily



Fig 3.42 Showing the resorts water parts

Source: archdaily

3.4.5.2 Concept

The island is ringed by a vast 'House Reef,' and it is divided into numerous biological zones: lagoon, beach, coastline, and forest. These zones serve as the foundation for developing immersive events that assist participants on their path of discovery and awareness development.

The landscape idea prioritizes the preservation of current island flora and wildlife, as well as the careful replacement of displaced plant material with locally acquired species from surrounding islands. Certain plant species, particularly fruit trees, herbs, and salt-resistant plants, are selectively introduced into the experience zones to support the programming activities, such as the food garden activity and the nature discovery path.

Nature is handled as an extension of the major concept driver, architecture and interior design. The forms and spaces are inspired by nature, and the juxtaposition of these forms against variants of the basic hut provides the resort's architectural character. These shapes form a nature-inspired island settlement that enables tourists to examine, guess, and envision the formal origins, ultimately raising awareness.

3.4.5.3 Facilities

Each zone has unique anchoring activities: The Lagoon zone features a water amphitheater and a trademark spa, the Beach zone has two signature restaurants, the Jungle zone has a nature exploration center and a pop-up café, and the Coastal zone includes a diving center and a signature bar.



Fig 3.43 showing water restaurant

Source: archdaily.

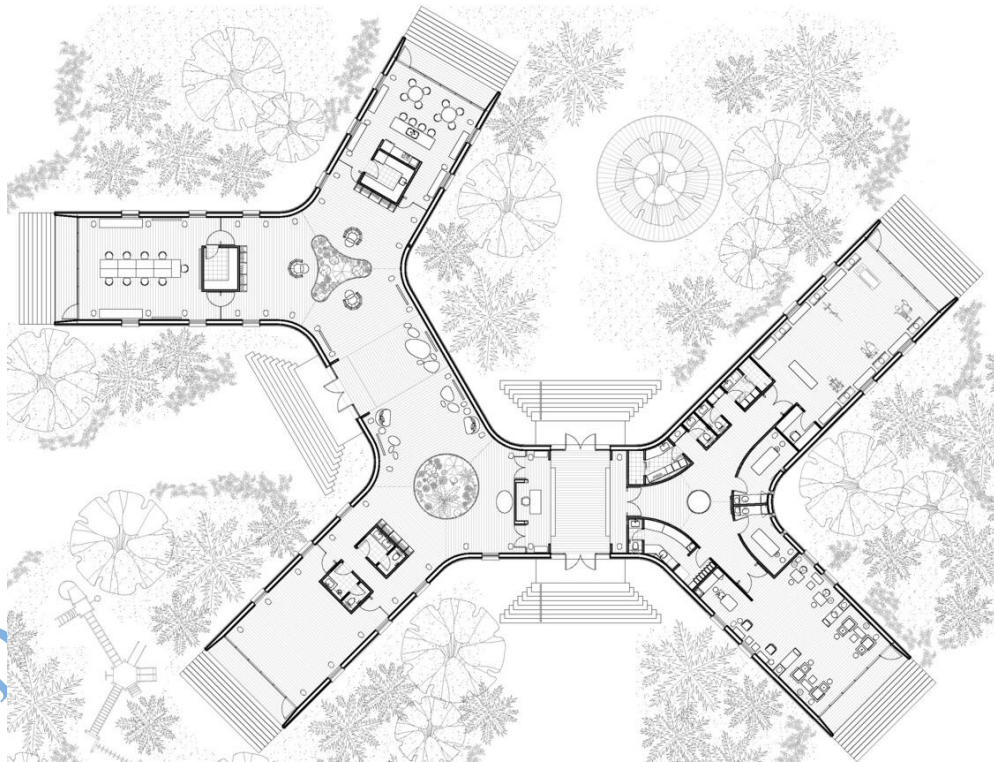


Fig 3.44 showing floor plan of main resort building

Source: archdaily

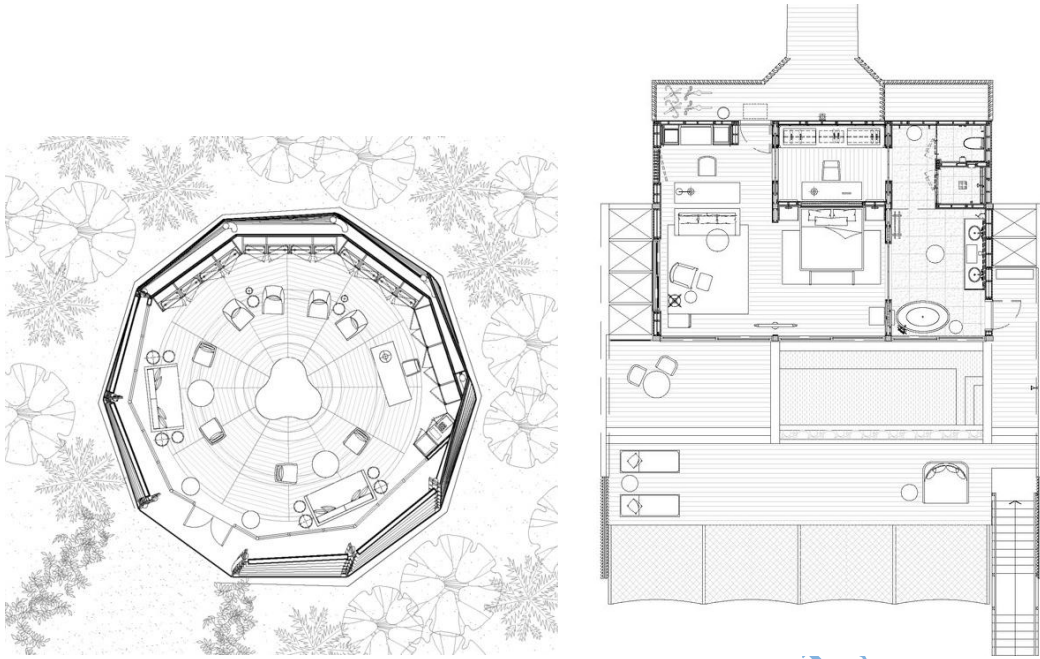


Fig 3.45 showing floor plan of spa

Source: archdaily

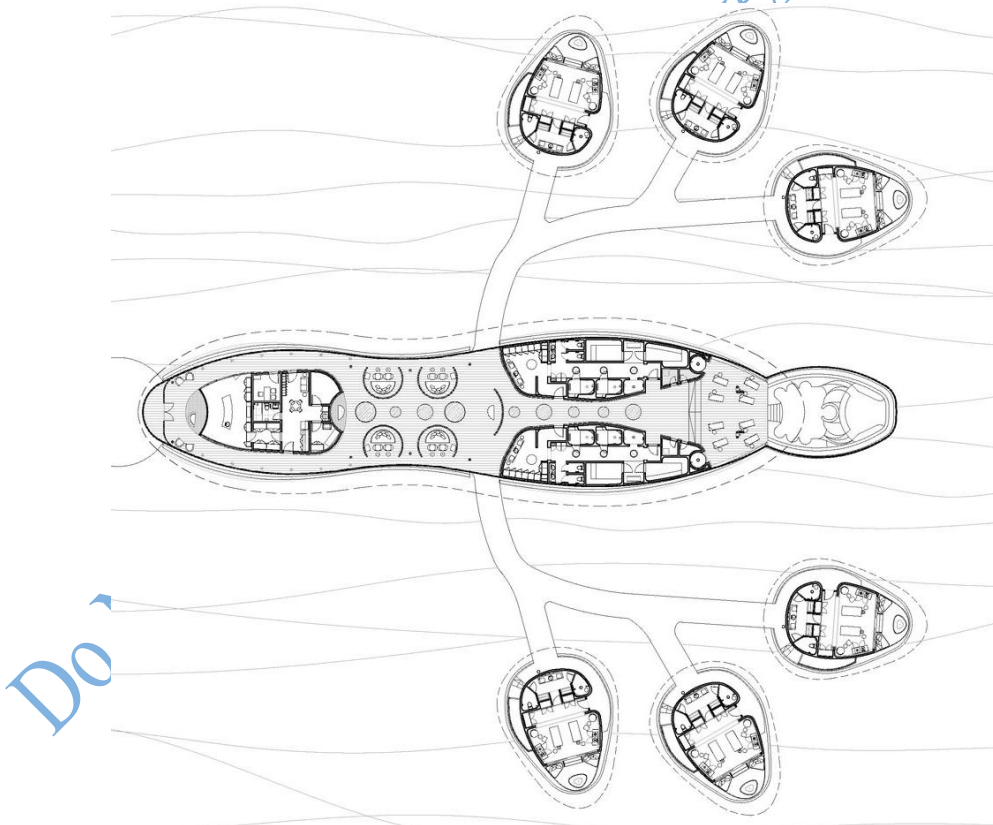


Fig 3.46 showing floor plan of massage rooms

Source: archdaily



Fig 3.47 showing the spa

Source: archdaily

3.4.5.4 Materials Used

A pre-fabricated timber system was chosen as the preferable technology to achieve little effect during construction while also minimizing logistics and manpower. This is a renewable resource, thus it is ecologically beneficial, and it contributes to the resort's eco-consciousness.

As a manner of reflecting the devotion to the environment, there is a limited use of concrete and steel, and a maximum use of cross laminated wood technology in the creation of the different shapes. Local artisans were commissioned to make arts and crafts for the interiors, and traditional methods of building, particularly in landscape design, were used.



Fig 3.48 showing interior view of the restaurant
Source: archdaily



Fig 3.49 showing lodges interior and exterior
Source: archdaily

3.4.5.5 Deductions

- There's a good use of natural materials
- Efficient utilization of both land and water
- Great use of naturally occurring forms and shapes
- Integration of all the buildings through landscaping

3.4.5.6 Assessment of Biophilic Design Elements

S/N	Design Classification	Features/Attributes	Level of application				
			1	2	3	4	5
1	Direct Experience of Nature	Water					●
		Air					●
		Light					●
		Plants					●
		Animals					●
		Natural Landscapes & Ecosystems					●
		Weather				●	
		Fire			●		
2	Indirect Experience of Nature	Images of Nature				●	
		Natural Materials					●
		Natural Colors					●
		Simulating natural light and air				●	
		Naturalistic shapes & forms					●
		Natural Geometries					●
		Biomimicry					●
3	Experience of Space and Place	Prospect and Refuge				●	
		Organised Complexity				●	
		Mobility & wayfinding				●	
		Transitional Spaces				●	
		Cultural and ecological attachment to place					●

Table 8: Assessment of Biophilic Design Elements in St. Regis Maldives Vommuli Resort

Source: Researchers Fieldwork

Chapter Four Site, Project Analysis and Design Synthesis

4.1 Study Area

This section discusses the preliminary design proposal and the design decisions taken to arrive at the proposed restoration resort design. The solution for the proposed design is based on the space requirements, case studies, site location characteristics and the application of biophilic design elements in Architecture to ensure user wellness and sustainability.

4.1.1 Site Location and Description

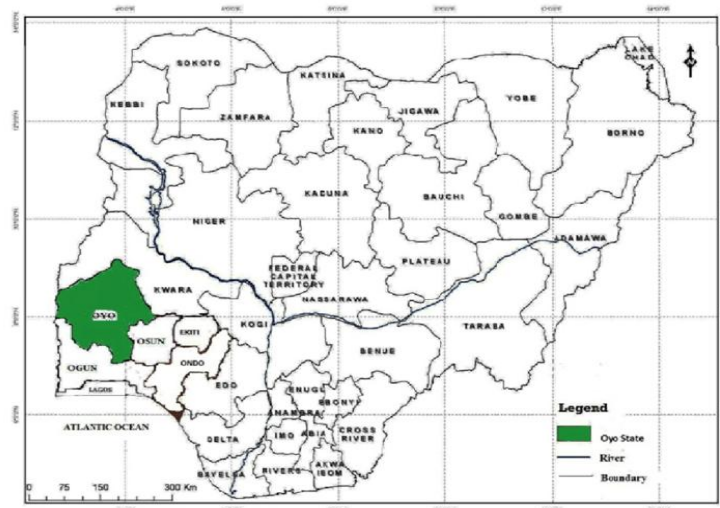


Figure 4-1 Map of Nigeria Highlighting the geographical region of Oyo state

Source: Google

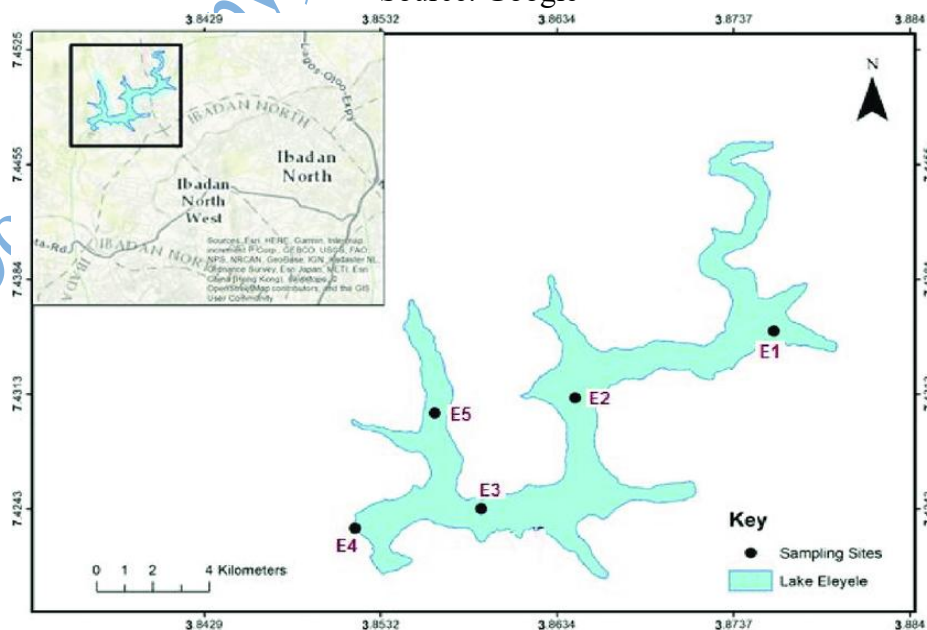


Figure 4-2 Map showing Eleyele lake, Ibadan city, Oyo state

Source: Google

The site is located in Ibadan, Oyo state along the Eleyele-Ologuneru road. It is bounded by the Eleyele river and the Eleyele market. The Eleyele area is in the Ibadan North West local government area, squeezed between the Ologuneru residential area and Sango.



Fig 4.3 showing google earth view of proposed site

Source: GoogleEarth

4.1.2 Site Selection Criteria

The proposed design is for a Restoration Resort near the Eleyele River. The Eleyele neighborhood is bounded by the Eleyele River. This area is undeveloped, with wide swaths of undeveloped terrain. Ibadan is not renowned for having many bodies of water, therefore the existence of this lake makes the location more appealing as a tourist destination and even as a key biophilic feature. The development of a Restoration resort in Eleyele would boost tourism in Oyo State and Nigeria as a whole. Other variables addressed in site selection include:

- The natural beauty of the surroundings provided by nature in this location adds a sense of comfort and relaxation.
- The site's topography slopes in the direction of the water body, which adds to the beauty and variety of user experiences in the design.

- **Regional Characteristics:** It is also adjacent to a neighboring market and a neighboring residential neighborhood.
- **Sufficient Room and Future Expansion Potential:** The chosen location has enough space for the building and can also support the different traffic lines that come to the beach resort. It enables for future growth, preserves lovely grounds, and eliminates unpleasant overpopulation looks.
- **Access to the location:** There are two existing roads going to the site. One comes from Sango, the other from Ologuneru.
- **Orientation & Exposure:** The coastline, along with the green grass, plants, and mild winds, creates a lovely setting for rest and relaxation.

4.2. Project Analysis and Design Synthesis

4.2.1 Brief Analysis

With the recent emphasis on mental health issues, stress reduction, healthy living, and a healthy lifestyle, there is a need to encourage people to engage in activities that will take their minds off pressing or worrying issues and focus on rebooting, recovering, and healing before returning to work.

These findings highlight the importance of having areas that can accommodate the activities required to generate the desired calm ambiance. As a result, this design is expected to satisfy architectural, sustainability, services, and structural functions by incorporating good circulation, accessibility, landscape planning and design, natural lighting, and ventilation, resulting in a functional and economically viable design that provides spaces that can develop the emotional, physical, cognitive, social, and spiritual health of its users.

4.2.2 Brief Development

Based on the brief, literature and case studies carried out, the resort would be a destination resort with a full-service lodging facility which provides access and offers a range of amenities including recreation facilities to emphasize a leisure experience to users. The resort will consist of the following facilities zoned into 3 parts:

4.2.2.1 Administrative Zone

- Reception
- Seminar rooms
- Clinic
- Supermarket
- Offices
- Museum
- Restaurant
- Spa
- Gym
- Salon
- Arcade
- Library
- Art gallery

4.2.2.2 Rest Zone

- Studio apartments
- Two-bedroom apartment

4.2.2.3 Other Facilities on Site

- Restaurants
- Beach club
- Sport facilities
- Amphitheatre
- Boat cruise
- Water sports
- Playground
- Swimming pool
- Outdoor relaxation areas

4.2.3. Design Criteria

Criteria considered in the design of this resort include:

4.2.3.1 Accessibility

The entry and exits of the resort will be located along the proposed road for easy access to the site.

Easy access to each of the resort amenities will be made possible by coordinated design

Service areas for the delivery of goods and services to support the operation of this facility.

4.2.3.2 Circulation

The resort facility will use interconnected networks to ensure easy circulation. Separate routes will be designated for business and leisure guests, allowing everyone easy access to resort amenities without mingling together. This will be achieved through proper building zoning.

4.2.3.3 Passive Design Elements

The resort will utilize photovoltaic cells to harness sunlight and generate alternative and renewable energy. Additionally, bamboo will be used as a building material in the resort's design.

4.2.3.4 Sustainability & the Experience of Nature

The resort facilities will use bamboo as a renewable building material to promote sustainability.

The construction process will prioritize the preservation of the natural environment, ensuring harmony between the resort and its surroundings.

4.2.3.5 Landscape

The site's natural features will incorporate both soft and hard landscaping to provide a serene and enjoyable atmosphere for tourists and guests. The layout has been carefully designed to allow easy access to both indoor and outdoor amenities for simultaneous use.

4.2.3.6 Aesthetics

The design of the landscape and buildings will aim to appeal to users through a combination of form, colors, materials, and patterns.

4.2.3.7 Rainwater & storm water collection

Rainwater and storm water collection systems will be incorporated to ensure sustainable water management and resource conservation and avoid flooding.

4.2.3.8 Site Zoning

The site is organized into four different zones, each with its own unique activities. Visitors can enjoy a variety of experiences in each zone. The rest zone offers apartments and outdoor spaces for those who plan to stay overnight. In the administrative zone, there are three buildings. One building houses management facilities, such as offices and conference centers. Another building has restorative activities, like a spa, salon, and gym. The third building has fun activities, such as an arcade, library, and art gallery. The water zone has a boat trip, a beach, various water activities, and a restaurant called the pod. The activity zone has athletic grounds, a playground, and the main resort restaurant.

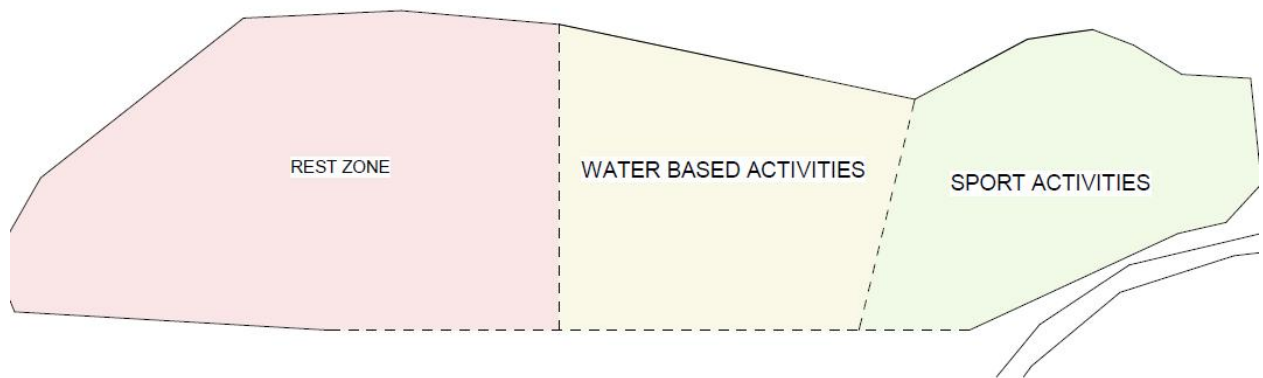


Fig 4.4 showing Site Zoning

Source: authors fieldwork

4.2.4. Conceptual Development

The concept in architecture refers to the fundamental guiding principle that shapes the design of a structure. It involves combining various elements into a coherent whole. In the case of this restoration resort, the aim was to bring people closer to nature by using natural materials and incorporating natural forms into both the interior and exterior of the building.

The resort design is based on the belief that architecture and nature are closely intertwined. This is evident in the layout of the site, which resembles a tree, and in the buildings and landscaping that imitate the pattern of tree rings visible after a tree has been cut down.



Fig 4.5 showing elements of nature as a concept, Fig 4.6 showing tree rings in a felled tree
Source: Google

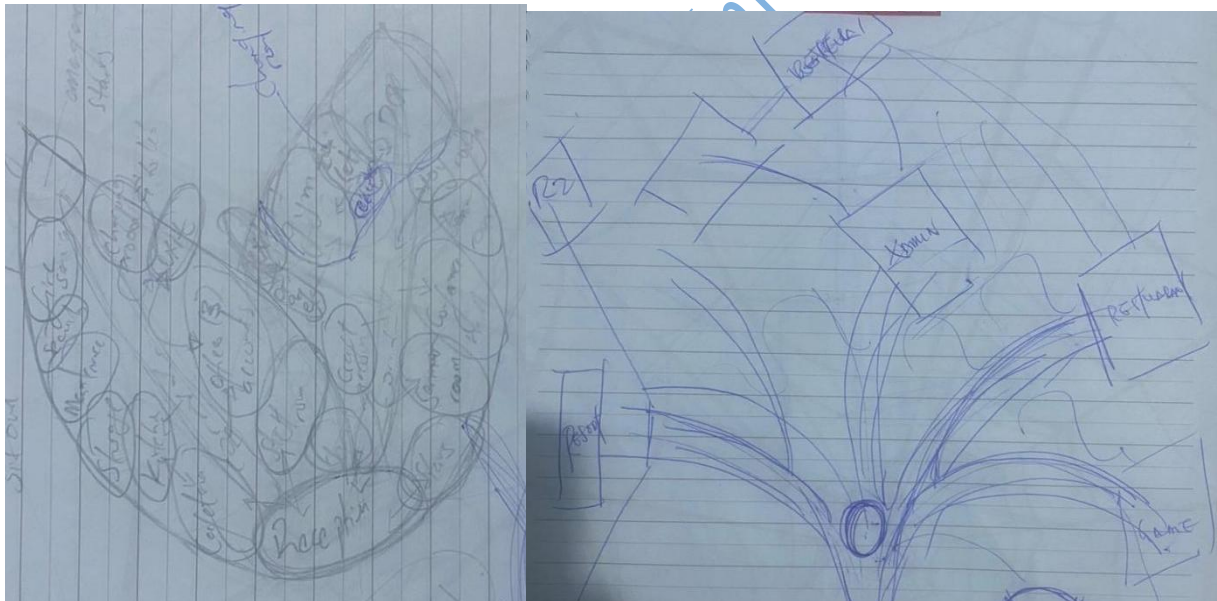


Fig 4.7 showing sketches as inspired by the concept
Source: authors fieldwork

4.2.5. Space Allocation

Space Name	Space Size
Library	
Gym	
Salon	
Spa	
Conference Hall(2)	
Offices(6)	

Storage	
First-aid Center	
Game room	
Museum	
Art Gallery	
Restaurant	
Supermarket	
Dry Cleaning	
Toilets	
Bedroom	

Table 9: Space Allocation

Source: Researchers Fieldwork

4.2.6. Construction Methods and Materials

In the quest to achieve sustainability and incorporate nature in the resort, bamboo is considered as a building material for the design and construction of the destination resort. All structural works and configurations will be handled by a certified structural engineer registered by COREN who also has a good experience in handling bamboos for structural purposes, especially for columns, beams, reinforcements and so on. Several analyses will also be required to determine the soil safe bearing capacity, effect of wind load among others on the facility. The buildings will be made up of sandcrete blocks, with bamboo as the structural and roof material. The use of each interior space shall also determine the choice of finishes.

4.2.6.1 Pre-Construction Operations

The pre-construction operations are the operations that are carried out by the contractor and other concerned agencies. The operations are evaluation of health and safety aspects of the project, provision of on-site documentation, provision of facility access and security. A preconstruction conference should be organized to allow all the parties involved to get clear understanding of the procedures involved in contractor submittals, sampling and testing, construction surveys, inspections by outside agencies, payment requests, claims and disputes, unforeseen job conditions and change order requests.

4.2.6.2 Substructure

The substructure of the buildings is comprised of mainly foundation. As a result of the sites proximity to a water body, raft foundation would be employed. A predefined modular grid is used for the building to indicate the columns, running from center to center. Raft foundation will be used all through the structure as seen in Figure 4.7. All the reinforcements used for the raft foundation will be treated split bamboo tied together with binding wire, thereby taking the place of steel in construction.

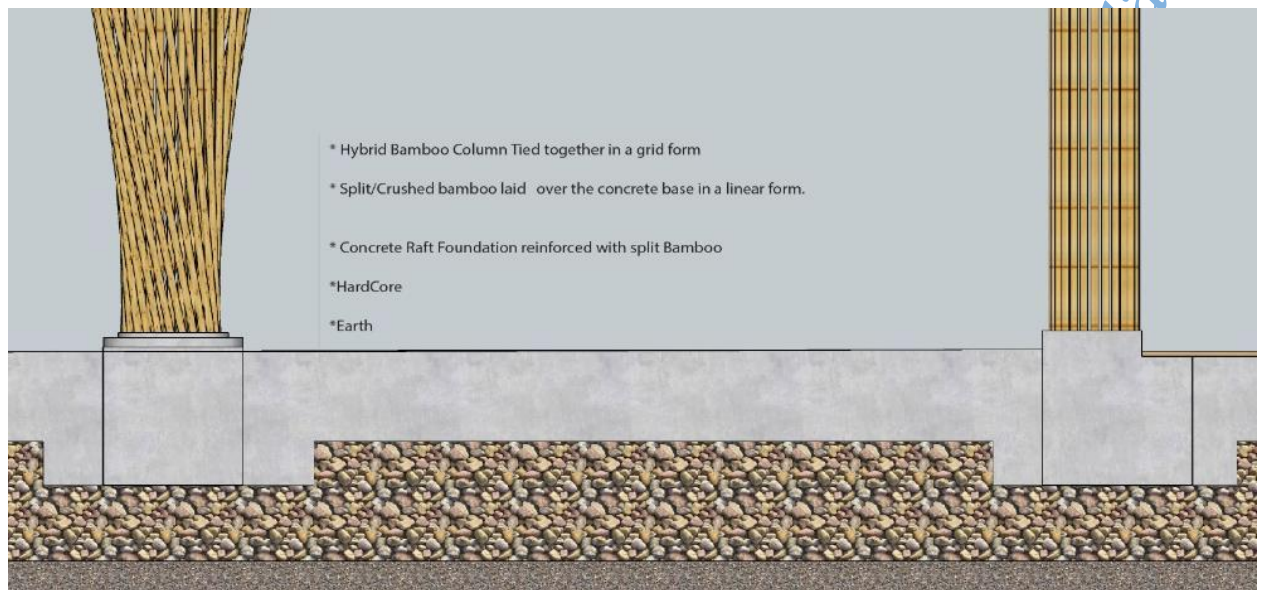


Fig 4.7 showing raft foundation with bamboo

Source: authors fieldwork

4.2.6.3 Superstructure

The building will be a combination of sand Crete blocks and a concrete mix. Tied bamboo in clusters laid together systematically will be used for columns, beams, and slabs. Knitted crushed split bamboo will be adopted as roofing material. The ceiling will be the naked beauty of the bamboo trusses used for the roof members while the floor slabs will be finished generally in non-slippery laminated bamboo material. Mechanized anti-fire equipment will however complement the anti-fire efforts.

4.2.8. Building Services

To make the most of a building, it's important to have essential utility services in place. These include water and electricity supply, sewage disposal, drainage, and fire protection. These services are crucial for effective use of the building.

Water Supply: To ensure a steady water supply for resort guests, water mains will be connected to dedicated reservoirs. Additionally, boreholes and electric pumps will be installed to ensure uninterrupted water supply to the building. To facilitate distribution, storage cisterns will be strategically placed throughout the premises.

Electrical Systems: The resort will be served by the Ibadan Electricity Distribution Company's (I.B.E.D.C.) existing lines in the area. On-site, a distribution network will be provided to supply power to each floor and area. In case of power outages, solar panels installed in a solar farm will generate electricity to meet power requirements.

Fire Protection: The goal of fire protection is to avoid the ignition and spreading of flames, control the spread of smoke, and ensure the safe evacuation or rescue of individuals. To effectively extinguish fires in the event of an outbreak, both active and passive measures will be implemented. Active measures will involve the installation of heat-activated sprinklers. Additionally, crucial fire safety precautions include marked exits, smoke and heat detectors, smoke and fire alarms, water spray extinguishers, and CO2 extinguishers.

Sewage Disposal: Proper facilities for handling, storing, and collecting refuse are available with frequent access for collection. These facilities are conveniently located, well-ventilated, and meet all fire safety and public health requirements. Sewage disposal is facilitated through well-designed pipes to ensure clean building facades. Waste from toilets, known as black water, is directed to soil pipes that run downhill and end in a septic tank. Additionally, there is a central sewer in the resort.

Drainage: In the resort, we will be installing underground drainage pipes made of reinforced concrete. These pipes have been specifically designed to conform to the site's configuration and will ultimately discharge into outer channels.

Chapter Five

Conclusion

5.1 Project Appraisal

The thesis focused on designing a resort in Nigeria that prioritizes human well-being through biophilic design approaches. Through the analysis of five case studies, effective biophilic strategies and restorative solutions were identified that can be confidently incorporated into the resort's design. The use of natural ventilation and lighting through atriums and curtain walls, incorporation of natural forms, landscapes, and ecosystems, as well as the use of plants and natural materials were all found to be highly effective.

Additionally, strategic placement of green areas and potted plants around circulation areas and lobbies will create a strong connection to nature while improving air quality by absorbing toxic air and CO₂. With these design elements in place, the resort's buildings will be transformed into a refreshing and natural environment that prioritizes human well-being above all else.

5.2 Conclusion

To sum up, incorporating biophilic design elements into resorts has numerous benefits. It not only helps preserve natural resources and restore ecosystems, but also promotes a deeper connection with nature, leading to improved human health and well-being. By including features like natural lighting, live plants, and animals, resorts can create a restorative environment that reduces stress and promotes wellness. Moreover, biophilic design can attract more guests, increase revenue, and

improve customer satisfaction. Additionally, it can contribute to the resort industry's larger sustainability goals by reducing energy consumption and pollution. Biophilic design can also be integrated into larger city plans, allowing resorts to support local green spaces and amenities (Bereitschaft & Scheller, 2020) Ultimately, biophilic design enhances the guest experience while contributing to environmental sustainability and economic viability.

5.3 Recommendations

The following recommendations are proffered to stake-holders in the hospitality industry, building professionals and interested personnel:

- Further research on biophilic design should be carried out on biophilic design. This will help better understand how to incorporate biophilia into spaces for improved human wellbeing
- Additionally, utilizing sustainable, locally available materials can bring nature into resort facilities and benefit users.
- Biophilic design elements should be prioritized in the design of resort facilities

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Appendix 1
Presentation Drawings

Nigeria



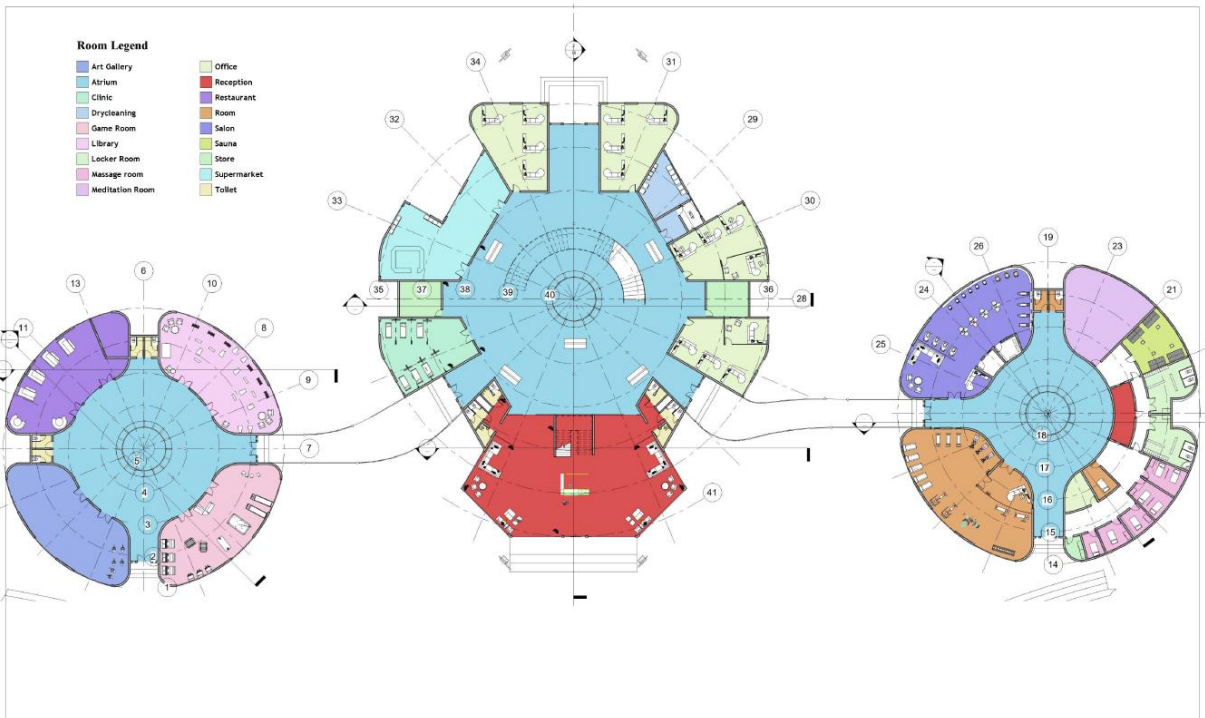
1 Site
1 : 1000

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 Scale: 1 : 1000
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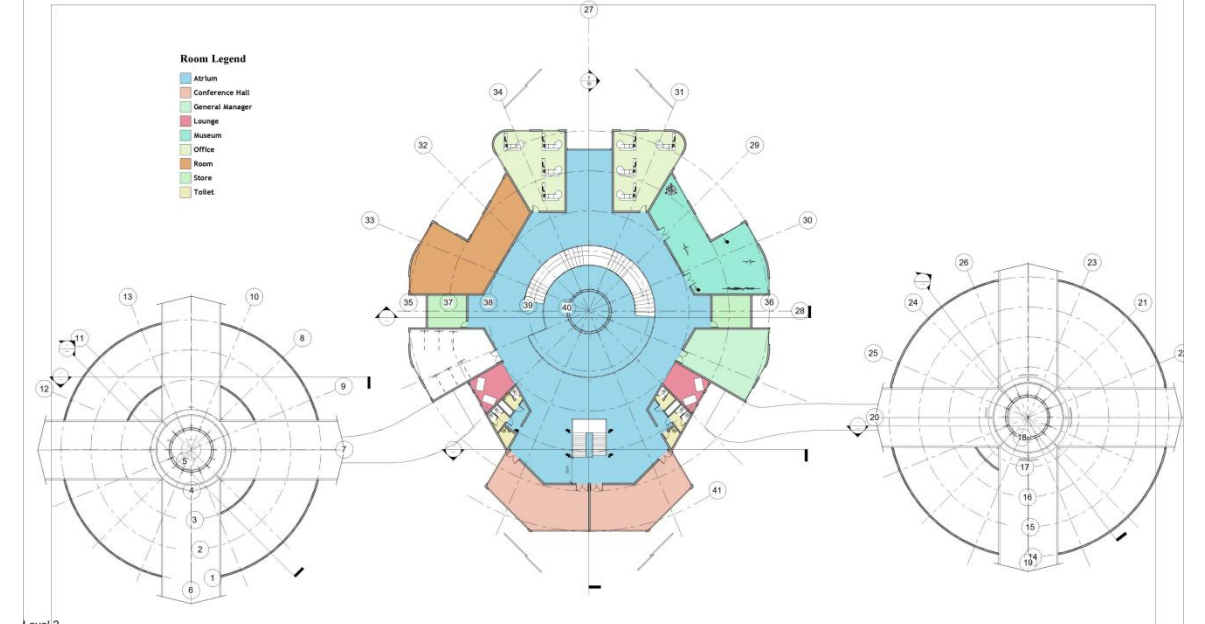
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Level 2
 1 : 200

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STUDIO CRITICS: _____
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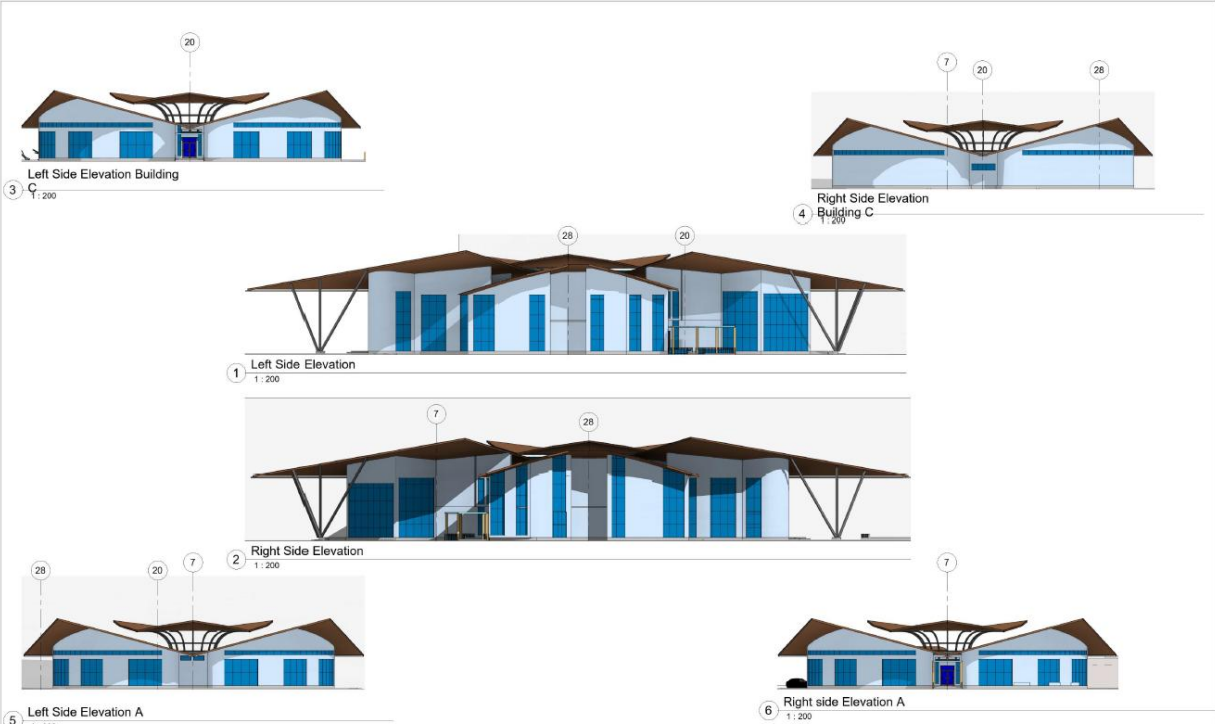
1 Roof level
1: 200

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2 North
1: 200

1 South
1: 200

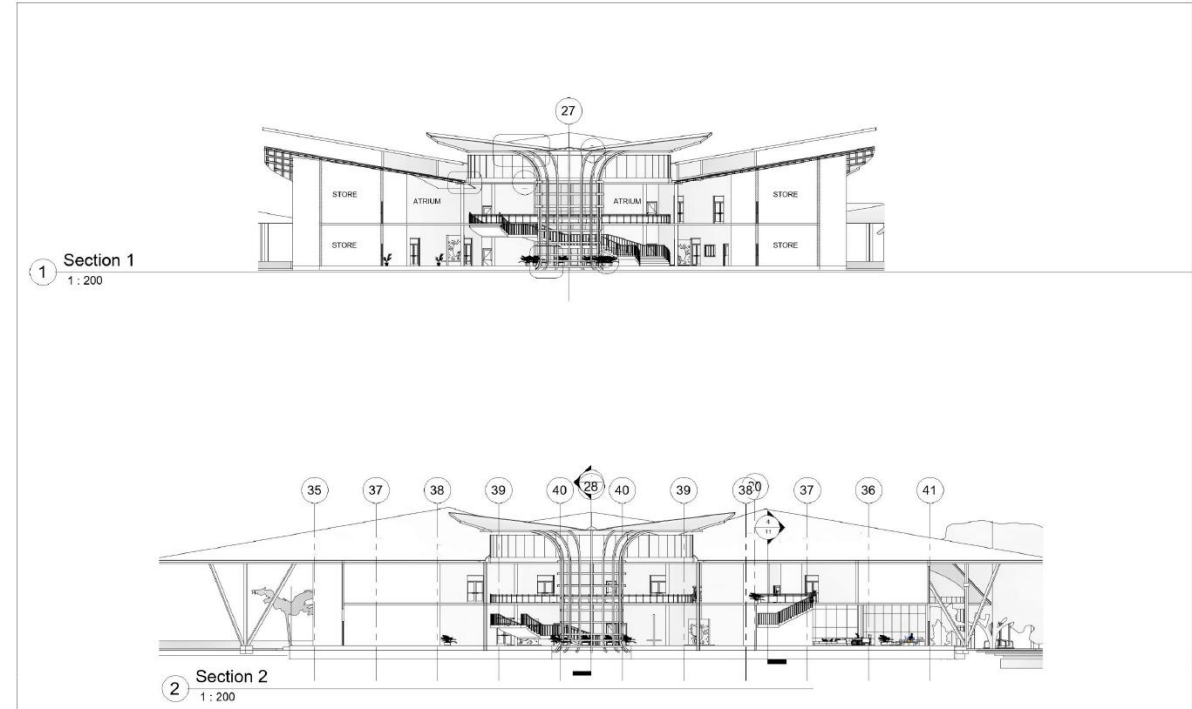
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Reg no: LCU/PG/002803		FRONT & BACK ELEVATIONS		
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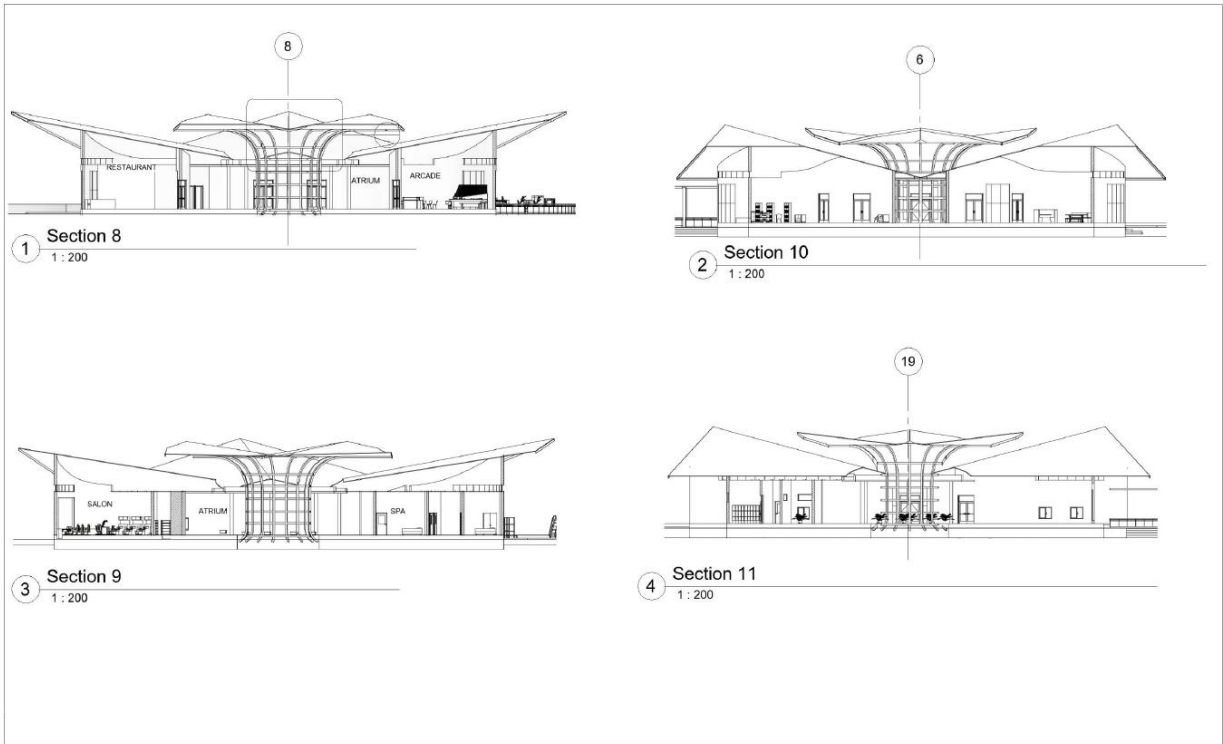
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Scale: 1 : 200
COURSE TITLE: ARC 721 - ARCHITECTURAL DESIGN STUDIO



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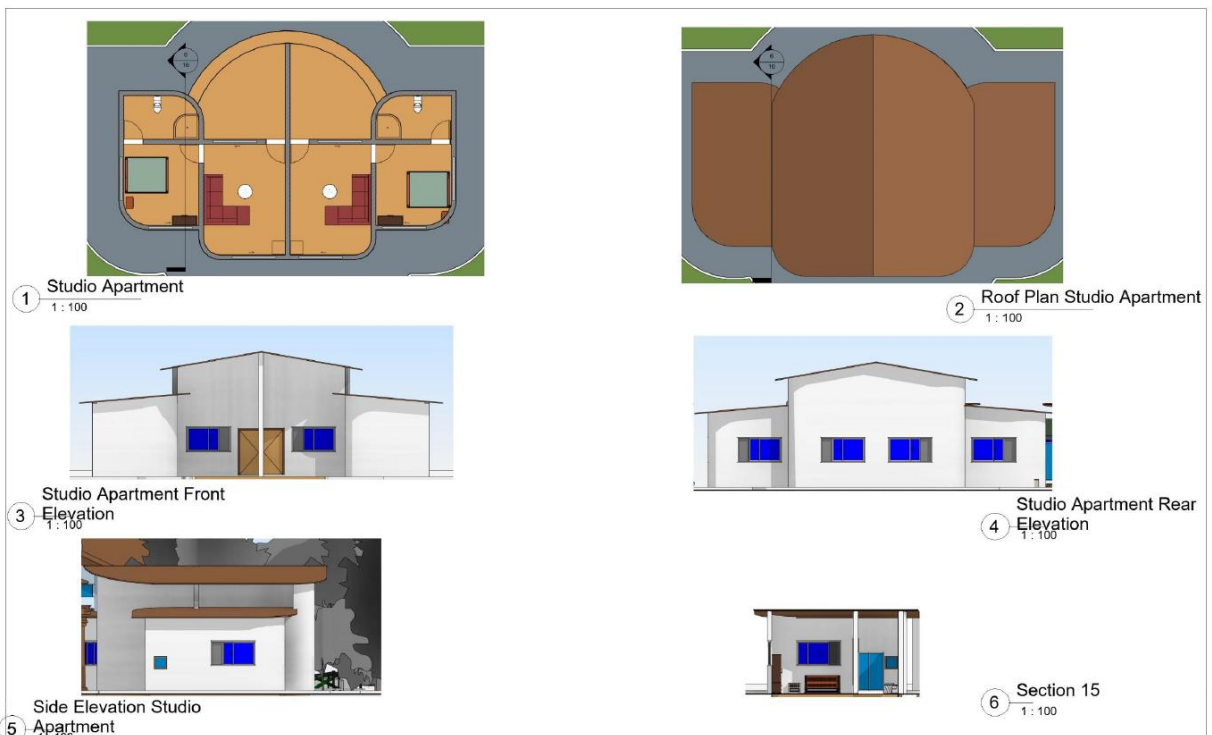
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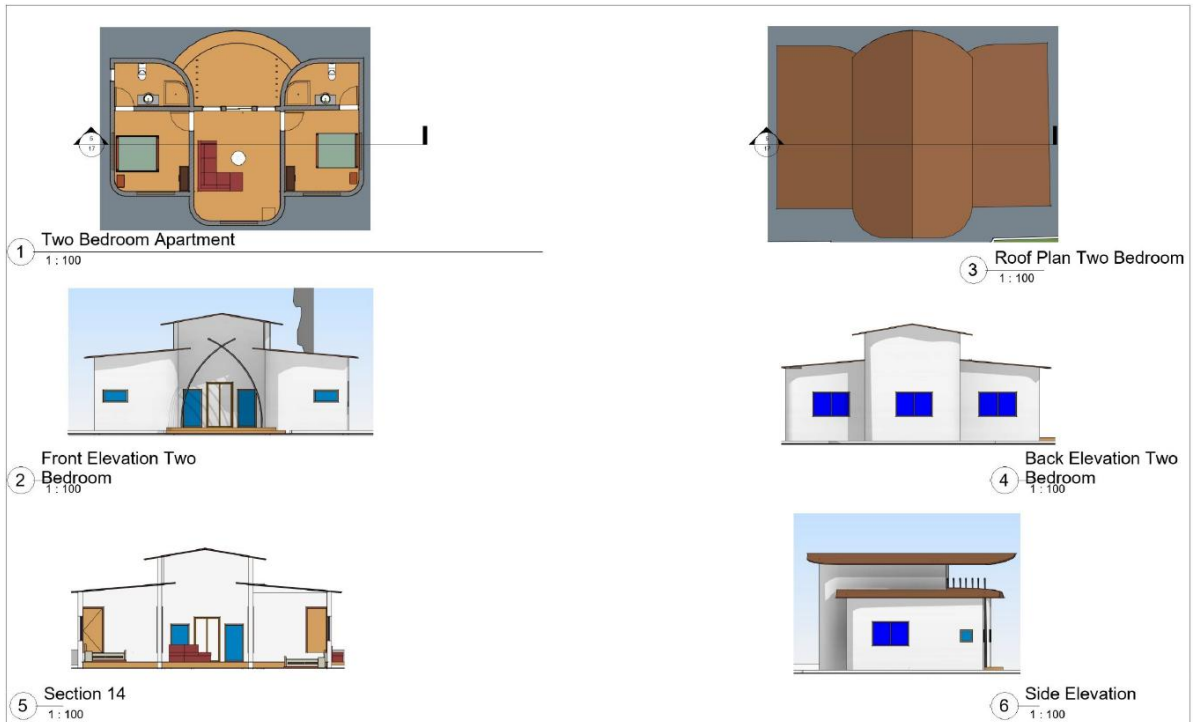
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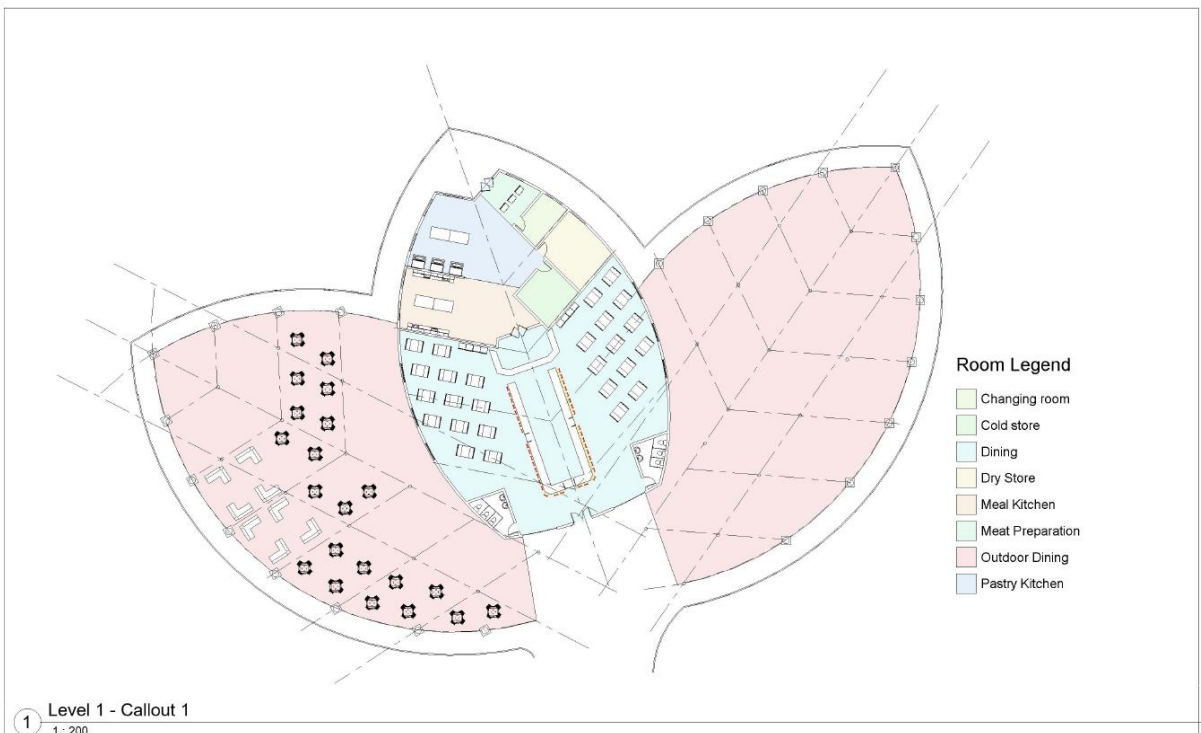


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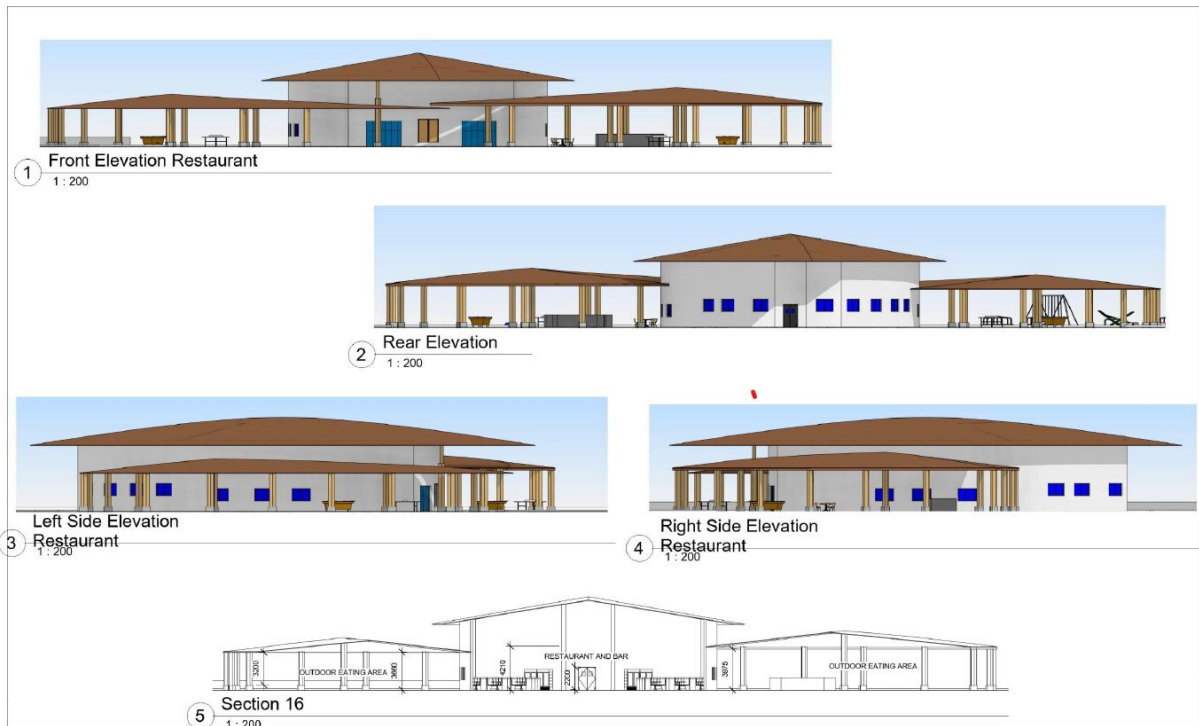
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COURSE:	ARC 711
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COURSE TITLE:	ARCHITECTURAL DESIGN STUDIO

RESTORATION RESORT

Biodata

A. Personal Data

Full Name: Sharon Iretomiwa AGBOOLA

Address: SW9 Elewura Street, Challenge, Ibadan.

Email Address: sharonagboola@gmail.com

Phone Number: +2349023484312

Date of Birth: August 1, 2000

Place of Birth: Ibadan, Oyo State

Nationality: Nigerian

Marital Status: Single

Name and Address of Next of Kin: Olagunju Agboola

B. Educational background

Educational Institutions Attended with Dates

a. Primary Education

- i. Kambridge Comprehensive Nursery & Primary School, Oni & Sons, Oluyole, Ibadan

2003 - 2008

ii. African American International Christian School, Arigidi Close,
Bodija, Ibadan
2008 - 2010

b. Secondary Education

i. Imperial City Honors Academy, Bodija, Ibadan 2010 - 2013
ii. The Smart School, Ojoo-UI road, Ibadan 2013 - 2016

c. Higher Education

i. J-Say Prevarsity, Oluyole, Ibadan 2016 - 2017
ii. Lead City University 2017 - 2021

C. Academic and Professional Qualifications with Dates

i. Bachelor of Science (B.Sc) Architecture 2021
ii. West Africa School Certificate 2016
iii. Primary School Leaving Certificate 2010

D. Work Experience with Dates

Graduate Assistant, Lead City University, Nov 2021 - Current
Site Manager and supervisor, Clinton's Developers Ltd Jul 2020 - Sep 2020
Intern Trainee, ABDT Partnership (Chartered Architects) Jun 2019 - Sep 2019
Intern Trainee, ABDT Partnership (Chartered Architects) Jun 2018 - Sep 2018

E. Publications

Sharon Agboola et al. "Barriers to the adoption of lean practices (LPS) in the Nigerian Building Industry." Tropical Journal of the Built Environment (TJBE)

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Date

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