PSYCHOSOCIALLY SUPPORTIVE DESIGN
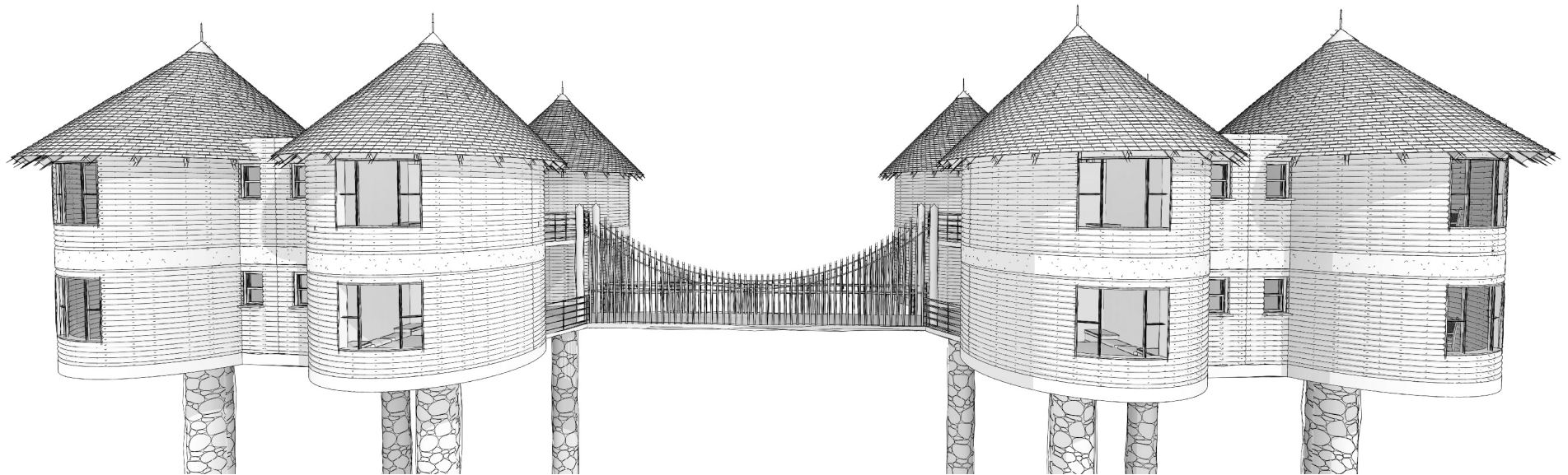
A CRITIQUE OF RETREAT CENTRES IN KENYA

Department of Architecture & Building Science

University of Nairobi

The University of Nairobi

Department of Architecture & Building Science

School of the Built Environment

PSYCHOSOCIALLY SUPPORTIVE DESIGN

A CRITIQUE OF RETREAT CENTRES IN KENYA

A research thesis presented to the Department of Architecture & Building Science in partial fulfilment of the requirements for the degree of Bachelor of Architecture

by

Opiyo Barry Paul

B02/30731/2015

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Dedication

To God,
the Source and Giver of all life, knowledge and wisdom
for the benefit and joy of all man.

Declaration

I hereby, declare that this thesis is my original work and that, to the best of my knowledge, has not been submitted in any other university or institution of higher learning in any form for the attainment of a diploma or degree.

This thesis is submitted in partial fulfilment of the examination requirement for the award of the Bachelor of Architecture degree, in the Department of Architecture and Building Science at the University of Nairobi.

Author: (Sign)…………………………………………………………. Date: …………………………………………………………….
OPIYO BARRY PAUL | B02/30731/2015

Supervisor: (Sign)…………………………………………………. Date: …………………………………………………………….
ARCH. CALEB MUTALI

Supervisor: (Sign)…………………………………………………. Date: …………………………………………………………….
ARCH. PENINAH MUTONGA

Year Master: (Sign)……………………………………………….. Date: …………………………………………………………….
ARCH. NORBERT MUSYOKI

Chairman, Department of Architecture and Building Science, School of the Built Environment
ARCH. MUSAU KIMEU

(Sign)……………………………………………………………….. Date: …………………………………………………………….

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Abstract

In an attempt to temporarily get away from life's stresses and the fast-paced life that characterizes life in the 21st Century, people withdraw from their regular occupation and take vacations for purposes of recreation or tourism. This is made possible by special facilities that focus on retreat as their sole duty and aim in order to satisfy a need that most if not all people have. However, the relief is short lived and people eventually return to the very circumstances that heaped enough pressure on them for them to need a vacation at a special retreat facility. If only the experience at the retreat facilities could be replicated in the day to day life and environment of all individuals then the retreat experience would be more abundant and life's stressors would possibly be less.

This research seeks to investigate the retreat environment in Kenya, herein termed as psychosocially supportive design, with the aim of deducing the feasibility of a replication of such restorative environments in non-retreat specialised settings. Building on existing information regarding the design and planning of restorative environments, the study asks; Is it possible to have a non-retreat related built environment such as in offices and cities that is generally restorative and can such an environment be created.

Based on the review of literature concerning health promotion and psychosocially supportive design, a critical analysis of given retreat facilities is conducted to investigate which peculiar qualities make the given facilities retreat oriented and how do they perform as retreat facilities. The results show that active design, social support design and biophilic design are the key components that actively make a place restorative.

It is therefore recommended that if psychosocial support, as realised through active design, social support design and biophilic design, is made a deliverable at inception of any given project, regardless of the building function, the resultant built environment will be restorative.

1   INTRODUCTION

1.1 Background of Study

As the human race rapidly develops into a more sophisticated civilization each day, the activities of daily living pick up the pace and this has shaped the world into a very busy place, particularly in the more developed areas and metropolitan places (Fig. 1.1).

However, one thing that cannot be rushed or changed are the laws of nature that sustain life on this planet. We human beings, though rapidly trying to invent and innovate in order to achieve what we believe as our highest expression of intellect in whatever field we engage in, are subject to the laws of nature. Exposure to the hustle and bustle to keep up with the rapidly changing world eventually takes its toll on the body and retreat becomes necessary. If the call by nature to retreat is ignored, then disease, which is an effort of nature to free the system from conditions that result from a violation of the laws of health (White, 1905), sets in and we are struck by ailment.

Modern medicine with all its dynamic and progressive technology has done wonders for the human race. Time and accuracy of diagnosis, prevention of disease and treatment of disease have all improved considerably over the last century however, the frequency of cases of illness does not reflect the major advancement in the medical field. This starts a conversation on what more could possibly be done to ensure societal health and wellness is directly proportional to the increase of knowledge in the medical field. Ancient medicine takes us back to the study of the complex relationship between body and mind as pertains to health (Fig. 1.2). Here in lies the difference. Whereas medicine today is focused on pathogenesis which is focused on origin and development of disease, the answer to physical illness may be in shifting focus from pathogenesis to how we can fortify the human body from external factors that result in mental and physical illness; 'Salutogenesis' a term coined by medical sociologist Prof. Aaron Antonovsky in 1979. Salutogenesis is a medical approach to health that focuses on factors that support our well-being and health rather than factors that cause disease.

According to the Transportation Research Board Special Report 282 (2005) while examining the influence of the built environment on physical activity, it was deduced that the built environment is a pivotal determinant of health and quality of life by directly or indirectly influencing active lifestyles that in turn influence people's physical, mental and social health and well-being. (S.C Brown et al., 2009; Titze, 2010; Villanueva et al., 2013). Physical activity in this case is just one of many other ways in which the built environment influences health.

The evidence is increasingly showing that built environments (Fig. 1.3) have an impact on our well-being and, based on the environmental and socioeconomic context within which we exist, is likely to

Fig. 1.1 The hustle and bustle of cities as seen in Nairobi traffic.

Fig. 1.2 The mind-body connection is a hidden root of illness where the health of one can affect the health of the other.

Fig. 1.3 Tony Molleapaza Rojas Children's Hospital, Peru by EGM Architects.

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Fig. 1.4 Mental fatigue arising from stress affects well-being.
Source: https://claritychi.com/mental-fatigue/

Fig. 1.5 Healing environments facilitate for mental healing.
Source: https://www.ludwigs.nl/destination-detox-5-heavenly-spots-to-cleanse-body-mind-soul/

Fig. 1.6 Nairobi as an example of a busy cluttered and undesirable environment which individuals return to after seeking retreat in healing environments.
Source: https://commonpurpose.org/blog/archive/cscleaders-in-nairobi-reflections-on-a-city-of-contrasts/

influence our individual actions to improve lifestyle and health status (Glasgow Centre for Population Health, GCPH, 2013).

It is in the salutogenic model that architecture and the built environment comes in play because it is architecture that shapes our internal and external environments which directly alter the human psychology. The relationship between stress, health and well-being in a person can be influenced positively or negatively by manipulation of the human psychology through architecture.

As pertains to architecture, Alan Dilani (2007) emphasizes that qualities of our physical environment ought to meet the functional efficiency needs as well as be psychosocially supportive design so that our built environment enhances and creates conditions that set-in motion health processes.

1.2 Problem Statement

In an ideal situation, architecture should not be a part of the environmental stressors which contributes to mental stress that leads to deterioration of mental and physical health (Fig. 1.4). Every work of architecture should support the health of its users and positively manipulate the human mind into production of hormones that boost our vital force. Psychosocially supportive design ought not to be confined to hospitals and retreat and wellness centres such that architecture meant to heal is only confined to already ill people or only people aware of the necessity preventing illness by elimination of environmental stressors. Psychosocially supportive architecture needs to pervade in our entire environment for the human being to thrive.

Presently, retreat centres all around the world aim to psychologically heal their occupants from their respective stressors and provide an escape from the hustle and bustle of making a living. People who are aware of the importance of healing the mind for the benefit of overall health and well-being go on wellness retreats where they are withdrawn from their environmental stressors and they place themselves in a different environment (Fig. 1.5) where they are rejuvenated and re-energized. This is an unfortunate circumstance because the larger population in Kenya are not able to access such centres due to two main factors, lack of finances or ignorance of the impact of mental health on the physical well-being. In some cases, even the places meant aren't carefully thought out in design for their core function.

Unfortunately, once people come back from their retreats, they go back to the same unhealthful conditions (Fig. 1.6) experienced before they went to the retreat centres. Such people will eventually need to retreat again to a stress-free centre to rejuvenate hence the beginning of a vicious cycle. Furthermore, this is only for the small population of people who are aware and capable of visiting retreat centres. For the larger population of people, they will continue to live and experience

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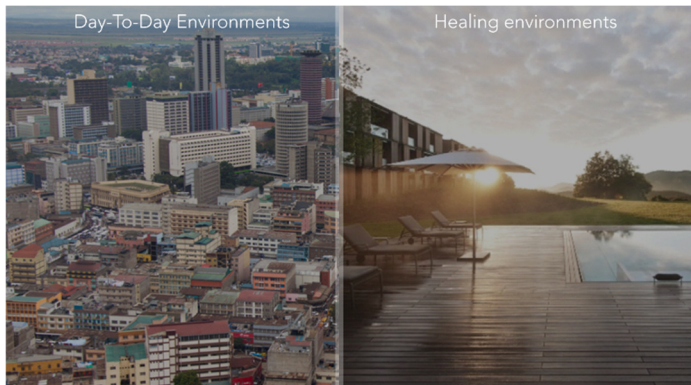
Fig. 1.7 *An observation of the difference in the two environments can shed light on what ought to be done to ensure we are ever in psychosocially reinforcing environments.*
Source: Author

Fig. 1.8 *An investigation into the architecture for retreat reveals the principles that are to be considered for psychosocially supportive design.*
Source:
https://www.visualatelier8.com/architecture/2019/11/4/neriandhu-tsingpu-yangzhou-retreat

unhealthful environments until their immunity succumbs to the surrounding pressure. Then and only then will they be put in a healing environment to recuperate before they return to previous conditions they were in before illness and the cycle begins again.

An investigation into psychosocially supportive design in retreat centres and its principles (Fig. 1.8) would seek to understand what retreat centres have or should have in order for them to be effective in healing the mind. Once the principles are established and understood, the lessons can be ploughed back into architecture (Fig. 1.7) as a whole and how they can be taken into account for all work of architecture to ensure psychosocially supportive architecture recessively aids healthful conditions as opposed to the vicious cycle that alternates between sickness and health with no constancy.

1.3 Research Aims & Objectives

The principal objective of this study is to investigate the incorporation of the salutogenic theory in architectural design of retreat centres. This study also aimed to achieve the following sub-objectives:

1. To define and explain psychosocially supportive design.
2. To document the architectural design principles that go into retreat centre design.
3. To determine how psychosocially supportive design can be incorporated into other architectural design and not restricted to restorative or healing environments.

1.4 Research Questions

1. What is psychosocially supportive design?
2. What architectural framework constitutes psychosocial support in retreat centre design?
3. How can psychosocial support be achieved in all architectural design not confined to restorative or healing environments?

1.5 Justification of Study

The focus in the past has been on how to provide architecture for healing within healing environments like hospitals and rehabilitation centres but upon further investigation of the ongoing discussion on health and wellness, we realize that, as much as possible, all architecture should be used as a tool to influence health filled living.

Fig. 1.9 In understanding architecture for retreat the principles are better understood for application in all architecture.
Source: https://www.yatzer.com/Island-Retreat-Fearon-Hay-Architects-Waiheke-Island-New-Zealand

Fig. 1.10 All architecture, regardless of the building function should contribute to the well-being of its inhabitants.
Source: https://www.portfoliomagsg.com/article/the-wonder-called-woha.html

Fig. 1.11 Psychosocially Supportive architecture uses a preventive care strategy towards health promotion.
Source: https://www.tripsavvy.com/hanna-house-by-frank-lloyd-wright-4123882

Not only sick people deserve to be placed in environments that reinforce their vitality. Seemingly healthy people also ought to have the privilege of having their health sustained in conducive and health supportive spaces. The results of this study will provide insights and information on the adoption of salutogenic principles in all aspects of architecture not only restricted to health environments (Fig. 1.10).

According to Ray Pentecost, who is an architect and president of the International Academy for Design & Health (IADH), "The projects that don't have it [psychosocially supportive design strategies] are going to fall out of favour in the same way that construction for fire safety became more than an option,…When clients understand how much healthier their world could be, the architects who aren't doing it [practising salutogenic architecture] won't stay around…"

1.6 Significance of Study

In understanding psychosocially supportive design, we can better understand how the human mind perceives architecture and in turn produce architecture that contributes to its society positively by influencing the general health and immunity of a people by not being a part of the environmental stressors that so easily beset us psychologically and eventually physically.

Retreat centres being the epitome in terms of places people go to in order to experience psychosocially supportive design so as to rest from the hustle of contemporary life, ought to rightfully set a standard for all design in the built environment to emulate.

The adoption of a psychosocially supportive approach to design puts in place a preventive care strategy (Fig. 1.11) that shifts attention from pathogenesis to a more holistic understanding and evolution towards a healthier society (Dilani. 2015; Karaca, 2018)

If at all policies that require our built environment to undergo a paradigm shift in order for it to contribute toward a healthier society, we ought to understand fully what is lacking and what needs to added, subtracted or improved.

Knowledge of psychosocially supportive design (Fig. 1.9) in architecture, as it relates to retreat and its strategies will educate the relevant authorities on what retreat centres do in order to be considered retreat destinations and how the same strategies can be incorporate into built environments that we encounter in day to day living.

Lessons learned once ploughed back to the retreat centres and eventually all our physical environs, a great solution to vitality and health in society will have been set in motion. Collectively, money, time

Fig. 1.12 Design for physical activity as a core component of psychosocially supportive design.
Source: https://faulknerbrowns.com/latest/opinion/promoting-the-principle-of-active-design
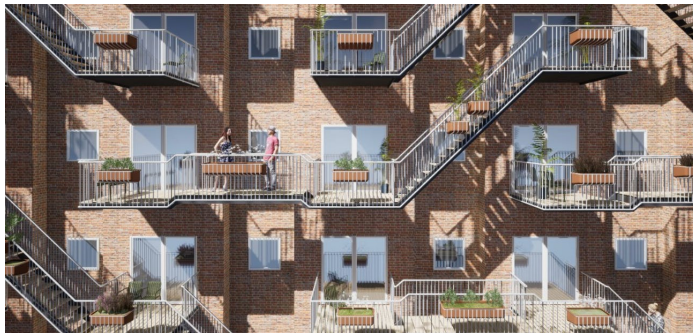
Fig. 1.13 'Social balconies' to satisfy a need for social support design as a core component of psychosocially supportive design.
Source: https://archinect.com/news/article/150095104/these-modular-social-balconies-create-semi-public-gathering-spaces-on-any-building-facade

Fig. 1.14 Biophilic design as a core component of Psychosocially Supportive Design.
Source: https://hospitalityinsights.ehl.edu/biophilic-design-singapore

and other resources will have been greatly spared to be channelled into other pertinent challenges that any contemporary society runs into.

1.7 Assumptions of Study

For purposes of this study, environmental stressors termed as Generalised Resistance Deficits in the salutogenic approach to architecture that are not directly or indirectly linked to architecture and design may be given mention but ignored as part of the in-depth study. The study will fully focus on architecture as a possible influence in the state of well-being.

Though, well-being can be affected by a myriad of things including pathogens and social stress linked to human interactions and relationships, these factors will not be addressed and will be assumed constant in every society and individual. Design related factors as pertains to the physical environment will be given sole priority as the source of stress notwithstanding the existence of other major sources of stress in life.

1.8 Scope of The Study

Design for psychosocial support being a broad field of study, the design strategies that comprise of psychosocially supportive design that will be under investigation in this study are:

1. Active Design
2. Social Support Design
3. Biophilic Design

For purposes of this study, retreat centres in Kenya will be under scrutiny and considering the manner of retreat in the location of study, any other establishments generally considered retreat centres or visited as places of retreat Such establishments include national park/reserve lodges, coastal hotels and lodges.

1.9 Limitations of The Study

The limitations to the study revolve around financial constraints, limited permission to conduct research and limited time. Some reading materials online require purchase and were not readily availed to the author and the time availed for the field study is not sufficient for a conclusive in-depth study of salutogenic architecture and all its principles.

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1.10   Literature Reviewed

1.10.1   Literature Reviewed of Published Books

1. ***Welcome to Your World: How the Built Environment Shapes Our Lives (2017), Sarah Williams Goldhagen***
This book examines and illustrates the influence of the built environment on our lives. The book explains how the built environment profoundly shapes the narratives we tell ourselves and construct out of our daily lives. It holds a mirror to show the physical environments that we have made and illustrates ways to rethink and design our worlds to be less soul deadening and more enlivening to human bodies and minds, communities and polities.

2. ***Healing Spaces: The Science of Place and Well-Being (2009), Esther Sternberg***
The author seeks to immerse readers in the discoveries that have revealed a complicated working relationship between our senses, emotions and immune system. The argument brought forth is that if our senses can induce healing then our place in nature is of critical importance. The discoveries in this book point to possibilities of design for neighbourhoods, hospitals and communities that promote health and healing for all.

3. ***The handbook of Salutogenesis (2017), Jan A. Golembiewski et. al***
The book is an in-depth survey of Salutogenesis showing the history, breadth and strengths of a salutogenic perspective on health promotion, health care, and wellness. From there, experts and scholars from different fields describe a range of real-world applications within and outside health contexts such as in architecture.

4. ***Health, Stress and Coping (1979), Aaron Antonovsky***
This book forms the foundation of the salutogenic concept and pieces together the concept of 'health-ease' over 'dis-ease' which has to do with pathogenesis. The author looks at stress from an extremely wide perspective without emphasizing any particular stressor but poses the question, "What are the origins of health?" without denying the accomplishment of pathogenesis in promoting health.

5. ***The Hidden Dimension (1990), Edward T. Hall***
The book is an examination of various cultural concepts of space and how differences among them affect modern society. The author introduces the science of "proxemics" and demonstrates how man's use of space can affect personal business relations, cross-cultural exchanges, architecture, city planning, and urban renewal.

Fig. 1.15 How the Built Environment Shapes Our Lives
Source: https://www.amazon.in/Welcome-Your-World-Environment-Shapes/dp/153841273X
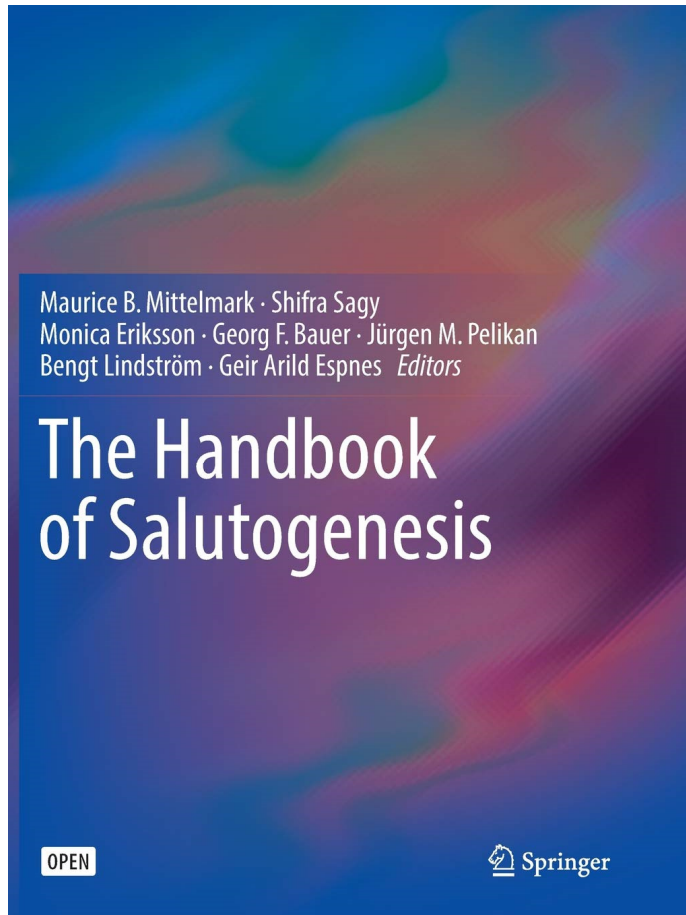
1.10.2   Literature Reviewed of Published Journals and Papers

1. ***Start Making Sense; Applying A Salutogenic Model to Architectural Design for Psychiatric Care (2010), Jan A. Golembiewski***
   This paper aims to look into the significance of architectural design in psychiatric care facilities. It suggests a strong correlation between perceptual dysfunction and psychiatric illness, and also between the patient and his environment. It aims to show that architecture should be sympathetic and does not exacerbate the psychosis.

2. ***Psychosocially Supportive Design: A Salutogenic Approach to Design of the Physical Environment (2009), Prof. Alan Dilani, Ph. D.***
   This article seeks to shed light on factors in the physical environment that could promote health, well-being and increase an organization's productivity and profitability. Furthermore, it raises the need to systematically conduct more empirical studies that investigate and verify the salutogenic model and identify a range of wellness factors in psychosocially supportive design that in turn promotes health and well-being.

3. ***Salutogenic Approach for Designing Restorative Environments (2018), Elif Karaca***
   This journal seeks to demystify salutogenic architecture and its application by putting together different strategies and understanding, from various experts and scholars, of salutogenic approaches to design of restorative environments. It outlines the basic principles of salutogenic design and the merits carried in the practice of salutogenic architecture.

4. ***Salutogenic Design: The neurological basis for health promoting environments (2012), Jan Golembiewski***
   The author argues that architecture embodies narratives that may either support or work against a state of good health hence, he debunks the neurological theory for it to be used in explaining why salutogenic environments work toward improving health outcomes.

5. ***Does the Built Environment influence Physical Activity: Examining the Evidence (2005), Transportation Research Board (Institute of Medicine of the National Academies), Washington D.C***
   This special report aims to investigate the role that the built environment has in engagement of individuals in physical exercise and activity in the society. The conclusions set forth argue that physical activity is important for health and inadequate physical activity being a major challenge can be largely prevented by active design principles in the built environment.

Fig. 1.16 The Handbook of Salutogenesis
Source: https://www.amazon.co.uk/Handbook-Salutogenesis-Maurice-B-Mittelmark/dp/3319791443
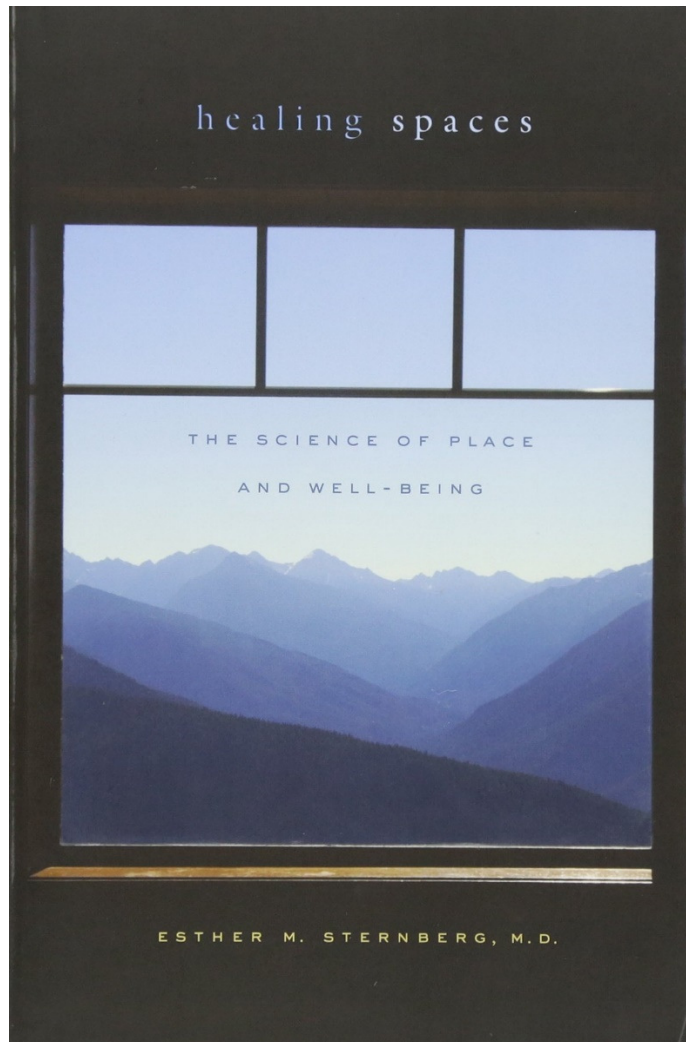
Fig. 1.17 Healing Spaces: The Science of Space and Well-Being
Source: https://www.amazon.co.uk/Healing-Spaces-Esther-M-Sternberg/dp/0674057481

1.10.3 Literature Reviewed of Previous Theses

1. *Neuroscience and Architecture: The Science of Space and Well-Being (2013), Mutinda Brian M. University of Nairobi*
   The author of this thesis sought to understand the implications of health and brain function in architecture. He argued it is largely considered the next frontier in architecture because it suggests the possibility of a new evidence-based design system to lead to a healthy built environment. The author argues that spaces are presently designed in a myopic utilitarian manner that is counterproductive with particular emphasis on classrooms and hospitals.

2. *Architecture for Retreat: Extracts from Environmental Psychology (2010), Tirop Andrew K. University of Nairobi*
   The thesis looks at contemporary life in the urban setting to be a source of stress due to fast paced life and a need for retreat, self-reflection and self-preservation arises. In response to these conditions, the author looks at theories related to environmental psychology in order to propose application of the lessons learned in architecture for retreat. The three theories covered include; Biophilia theory, Attention Restoration Theory and Psycho-Physiological Stress Recovery.

3. *Place Meaning in Architecture: Designing a Retreat Centre for Youth (2003), Maganga Aggrey M. University of Nairobi*
   This thesis focuses on the genius loci of a place and its ability to directly facilitate retreat through its authenticity of identity. The author looks at design interventions in architecture that give a place its identity such as colour, texture, shape and form, light, visual appropriateness and personalization.

4. *Sensory Phenomenon in Space (2013), Chwire Charles C. University of Nairobi*
   The author seeks to raise need for a re-sensualized architectural approach basing it on the argument that a good portion of existing architecture doesn't satisfy the entire spectrum of senses and is thus soul deadening. To do this, the author goes into an in-depth study of the sense of taste, sight, touch, sound and smell as pertains to architecture in an attempt to explain how the architecture relates to the aforementioned senses and what ought to be done to create a satisfying sensuous experience in architecture.

5. *Tectonics: Architecture for the Senses (2010), Kabogo Edward T. University of Nairobi*
   The thesis investigates how employing available materials and building technology with integrity to their properties and using meaning to tie them together can create a rich experience in spaces.

2 LITERATURE REVIEW: HEALTH PROMOTION AND RESTORATIVE ENVIRONMENTS

Fig. 2.1 The specialized agency of The UN that is concerned with international public health.
Source: https://www.un.org/youthenvoy/2013/09/who-world-health-organisation/

Fig. 2.2 Health is the core to human happiness as it sets precedence for one to thrive in whatever they desire.
Source: https://wellnesskeen.com/importance-of-health-ethics

Fig. 2.3 A holistic and comprehensive approach to health as opposed to just biomedical interventions.
Source: https://axesspointe.org/social-determinants-on-patient-outcomes/health-rankings-model/

2.1 Introduction
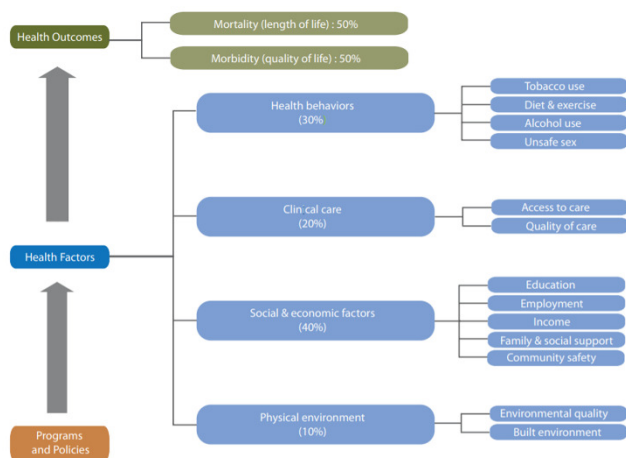
As defined by the WHO, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. From this definition it is clear that being presently free from any disease or ailment is not the ultimate guarantee of perfect health. In the recent past, it has come to the attention of the international community that biomedical interventions, in and of themselves are not entirely a guarantee of better health in our societies.

It is no secret that health is a fundamental part of life on planet earth for mankind. The success of whatever systems we put in place to organize ourselves into countries, governments and organizations heavily lean on the health and well-being of the population in question. According to the WHO, as pertains to health and development, better health is central to human happiness (Fig. 2.2) and well-being and it makes a contribution to economic progress because healthy populations live longer, are more productive and save more.

With the undisputable evidence on the importance on health to mankind, the spending on healthcare in relatively successful countries that understand this clearly depicts the pivotal nature of health in their various societies. As seen in the WHO Global Health Expenditure Database, approximately 10% of the GDP in most developed countries (US 17.07%; Canada 10.53%; UK 9.76%; Sweden 10.93%; Denmark 10.35%) comprises of their current health expenditure. For developing countries like Kenya, the current health expenditure is at 4.55% of GDP (WHO, 2016). For developing countries like Kenya, the current health expenditure is at 4.55% of GDP.

From these statistics, it is a no brainer that health and well-being in any country is very important to the respective governments and as a result a large amount of their expenditure goes toward better healthcare. However, given the opportunity, these governments would gladly spend less on healthcare if at all the health standards could continue to be improved at a smaller cost so as to have more money to channel into less successful areas of their various economies. In this school of thought, the idea and concept of 'health promotion' came into existence and discussion.

The health of an individual is heavily linked to social, economic and political factors outside the domain of the health sector. These factors largely shape the circumstances in which people grow, live, work and age as well as the systems put in place to deal with health needs ultimately leading to inequities in health between and within countries (Kumar and Preetha, 2012). It is for this reason that attaining the highest possible health standard does not depend so much upon biomedical interventions but on a comprehensive, holistic approach (Fig. 2.3) that must 'empower individuals and communities to take
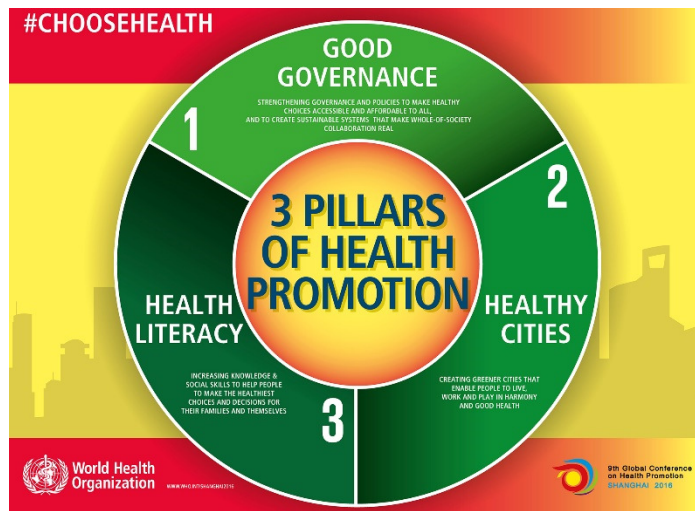
Fig. 2.4 WHO Pillars of Health Promotion which focus on disease and illness prevention.
Source: http://www9.who.int/healthpromotion/en/

Health Field Concept (Lalonde, 1974)

- Human biology

- Environment

- Lifestyle

- Health care organization
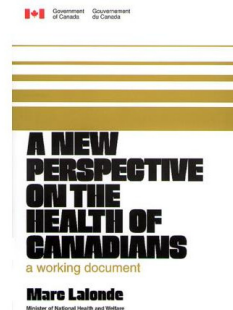
Fig. 2.5 The determinants of health as per the Health Field Concept in The Lalonde Report of 1974
Source: https://www.slideserve.com/bernadette/introduction-to-health-promotion-and-population-health

actions for their own health, foster leadership for public health, promote intersectoral action to build healthy public policies and create sustainable health systems in the society' (Kumar and Preetha, 2012)

2.2 Historical Evolution of Health Promotion

The term 'health promotion' is generally considered a relatively new term but the concept and idea of health promotion has been around for as long as the human race has been concerned with improvement of public health (Cragg, Davies and Macdowall, 2013). According to Virginia Berridge (2010), the term 'health promotion' was first used at a global policy level in the 1980s and it is commonly accepted that the basic concepts as relates to 'health promotion have been developed over the last two decades (Tountas, 2009) however, it's roots and origins date as far back as the 19th century under different ancient world civilisations and the Greek in particular long before the germ theory of disease had been formulated (Kumar and Preetha, 2012).

Henry Ernest Sigerist (1891-1957) a swiss medical historian was the first man to coin the term 'health promotion' in 1945. He defined four major tasks of medicine as; promotion of health, prevention of illness, restoration of the sick and rehabilitation (Kumar and Preetha, 2012). Sigerist observed that promotion of health obviously tended toward disease and illness prevention but it was not enough as special protective measures were needed for effective prevention to occur (Fig. 2.4).

The term 'health promotion officially came into national and international policy when it found reflections in the Ottawa Charter for health promotion 40 years later after it was coined by Sigerist in 1945.

In 1974, the Canadian government published the 'New Perspective on the Health of Canadians' report by Marc Lalonde hence commonly referred to as the Lalonde report (Fig. 2.5). In this report the conventional biomedical concept of health was challenged and it was the cornerstone that resulted in international debate on the role of nonmedical determinants of health. The Lalonde report argued that major health related challenges like cardiovascular diseases, cancers and road accidents among other challenges were unmanageable by the biomedical approach and sought to replace it with 'Health field concept'. In the health field concept, four health fields were considered as the determinants of health and disease; lifestyle, health care organization, human biology and environment.

Though highly criticized by sceptics as a gimmicky strategy in the Canadian government's health care systems, the report was eagerly accepted internationally by other nations like the US, UK and Sweden among others who in turn went ahead to publish other similar reports (Kumar and Preetha, 2012).

Fig. 2.6 Alma-Ata Declaration at an international conference on primary health care held in Alma-Ata, Kazakhstan in the Soviet Union from September 6 to September 12, 1978
Source: https://circulatingnow.nlm.nih.gov/2019/10/10/the-whos-alma-ata-declaration-of-1978/
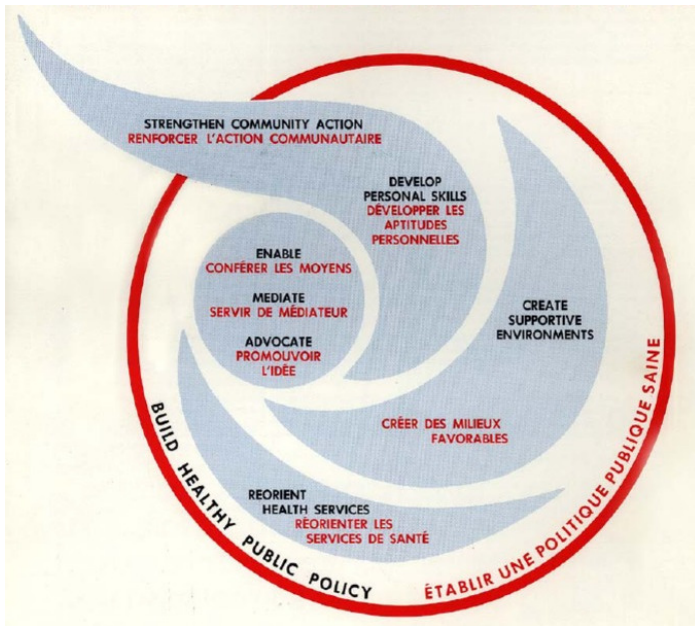
Fig. 2.7 Ottawa Charter for Health Promotion emblem adopted at the first international conference on health.
Source: http://docshare.tips/ottawa-charter-for-health-promotion_585806dcb6d87fcd1d8b6382.html

Possibly the greatest backing on the concept of health promotion came in the 1978 Alma Ata declaration (Fig. 2.6) which acknowledged promotion and protection of a population's health as essential to sustained economic and social development that contributes to better quality of living and world peace. Due to growing expectations from the international community on the idea of health promotion, WHO partnered with Canada to host an international conference in 1986 which produced the 'Ottawa Charter for Health Promotion' and set precedence for subsequent conferences on the same concept.

2.2.1 Ottawa Charter for Health Promotion

The charter defined health promotion as "the process of enabling people to increase control over, and to improve, their health." The charter goes on to state that, "to reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living…. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to well-being." (WHO, 1986) (Fig. 2.7)

The charter proposed for the international community to advocate for health actions that brought about supportive political, economic, social, cultural, environmental, behavioural, and biological factors for health which enabled a given population have control of factors that influenced their health.

A number of health promotion conferences by the WHO have since been held and have further developed the concept. Such conferences include:

1. Adelaide (1988) – focused on all government sectors such as agriculture, education etc. considering health as an essential factor when formulating healthy public policy.
2. Sundsvall (1991) – highlighted that poverty and deprivation affecting millions in degraded environments affected health.
3. Jakarta (1997) – highlighted poverty, low status of women, civil and domestic violence as major threats to health.
4. Mexico (2000) – called on the international community to address social determinants of health in order to achieve health related millennium development goals.
5. Bangkok (2005) – identified four commitments to make health promotion central to national government and corporate operations globally.
6. Nairobi (2009) – called for urgent need to implement already identified action points in health promotion like leadership and community involvement.

Fig. 2.8 The National Congress of Brazil by Oscar Niemeyer; the built environment is a sector within which the health promotion agenda can be propagated.
Source: https://www.voanews.com/arts-culture/brasilias-dramatic-architecture-draws-world-cup-tourists
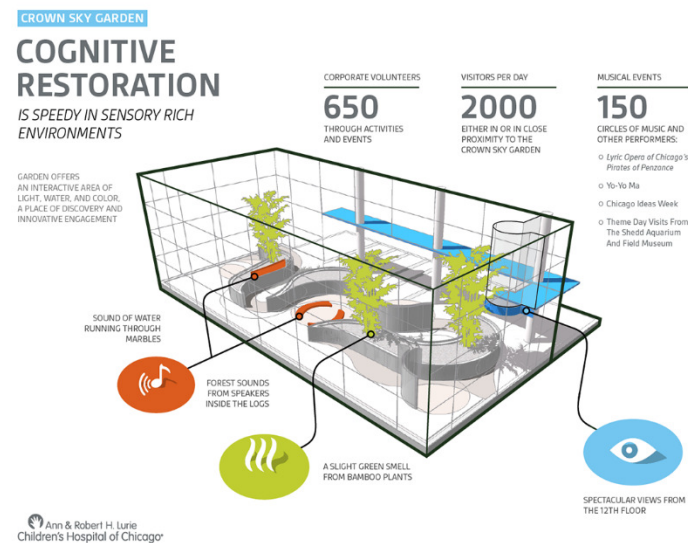
Fig. 2.9 Crown Sky Garden, Lurie Children's Hospital
Source: https://www.behance.net/gallery/27073875/crown-sky-garden-cildrens-hospital-in-chicago

Based on the several conferences, a multi-sectoral stakeholder approach in health promotion includes participation from different ministries, public and private sector institutions, civil society, and communities all under the endorsement and guidance of the Ministry of Health (Kumar, 2012).

2.3 Impact of The Physical Environment on Health and Well-Being

The physical environment is the setting in which the human race operates and sectors that have anything to do with the physical environment begin to become of keen interest in the goal towards health promotion and their potential in contributing positively or negatively. As pertains to the physical environment, the built environment refers to the man-made environment ranging in scale from buildings to parks. Majority of human activity revolves around the built environment comprising of architecture and related interdisciplinary fields.

Research indicates that the manner in which our physical setting is designed, planned and manipulated can and will affect our physiological and psychological health and well-being (Fig. 2.8). In order to draw the parallels, a basic and foundational understanding of human perception of the built environment and its subsequent consequences in the human body is necessary (Fig. 2.9).

2.3.1 Mind-Body Relationship in Promotion of Health and Well-Being

For many years, philosophers and scientists have alienated the mind from the body and vice versa but as has been demonstrated through biofeedback in medical research, what we think and feel indeed influences the response of our bodies and the mind and body are intimately connected (Moyers and Grubin, 1993).

"The mind is its own place, and in itself can make a Heav'n of Hell, a Hell of Heav'n" ~ John Milton, Paradise Lost

There are four information processing systems that interact in the human body; the mind (brain function), the endocrine system (hormonal feedback system), the nervous system (communication network between mind (brain) and body) and the immune system (defence system against foreign invasions). These four systems are in constant and continual communication with each other (Maier, Watkins and Fleshner, 1994; Ray, 2004). The science that incorporates these four information systems has been termed as psychoneuroimmunology.

In an attempt to understand psychosocial moderators of immune functions, a study was conducted where immune system function was monitored under stressful conditions and the health/illness
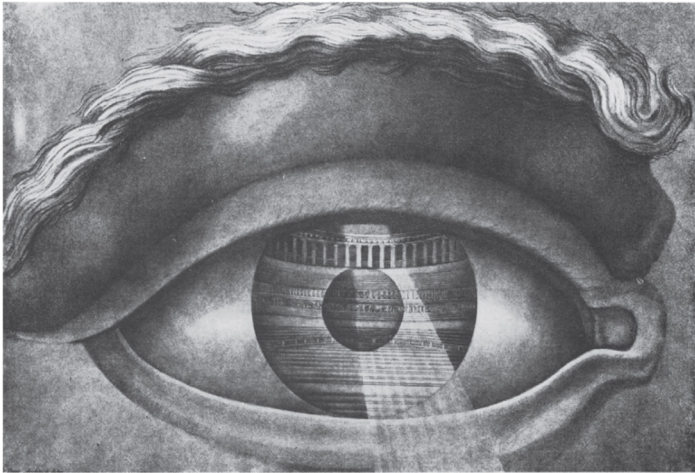
Fig. 2.10 What we perceive with our senses serves as stimuli to the brain which results in chemical/ electrical changes in the human brain.
Source: Eyes of The Skin; Architecture and the Senses – Juhani Pallasmaa (2012)
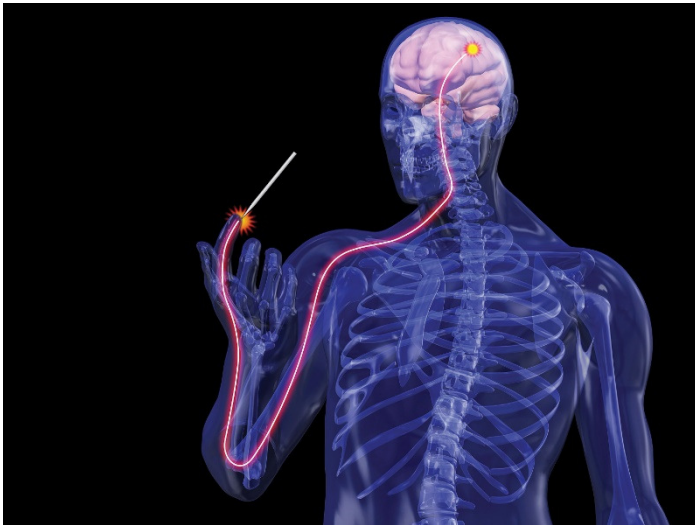
Fig. 2.11 Psychological experiences contribute to the allostatic load positively or negatively thus draw the body into a response to the brain communication.
Source: https://2012books.lardbucket.org/books/an-introduction-to-nutrition/s07-nutrition-and-the-human-body.html

changes were tracked. Forty first year medical students were observed for a year during which the effectiveness of their immune systems was monitored before and during exam periods. It was predicted that the examinations would be stressful and thus impair their immune system functions which would result in an increase in infectious illnesses. The prediction was accurate and the stress weakened the immune systems of the students which led to more infections and illnesses. (Kiecolt-Glaser and Glaser, 1987; Ray, 2004)

Scientists have over the years explored the chemical links between mind (brain) and body to better understand their intimate relationships. According to Candace Pert, former chief of the Brain Biochemistry Section of the National Institute of Mental health (USA), molecules known as neuropeptides provide the crucial link. They are strung together like a strand of pearls and act as messengers linking with specific receptor molecules as though guided by antennas tuned to the brain. The neuropeptide activity fluctuates with our states of mind hence Candace Pert refers to them as 'biochemical units of emotion which translate emotions into bodily events' (Moyers and Grubin, 1993).

Based on this, it is literally true to conclude that our thoughts, feelings and beliefs are chemical and electrical activity in the nervous system resulting in changes in our mind/brain (Fig. 2.10). As we change our minds, we are changing our biology. A psychological experience, is all in the mind, however, the mind being part of brain function draws the body into a response to the brain regardless of the experience being positive or negative, imaginary or real (Ray, 2004). Hence, the biblical reference in Proverbs 23:7, "For as he thinketh in his heart, so is he…"

The determinant of the impact of anything on the psychoneuroimmunology of a person boils down to stress/ allostatic load that is key in upsetting important health-related homeostatic systems such as the equilibrium between the body and a pathogen (Bremner, 1999; Ray, 2004). Stress is a result of excess of demands in relation to resources required to adapt and cope with the demands. When a person a can neither apply available resources nor acquire new resources to offset demands, stress turns chronic. (Hartig, 2004)
Different experiences evoke directly proportional mind-body responses that either reduce or increase stress (Fig. 2.11). Positive emotions alleviate stress and sustain life by powerfully influencing well-being and vice versa (Goldhagen, 2017).

2.3.2 Architecture & Cognition

A few years ago, technological advancements required to aid in analysis and study of the human brain and its functions had not been realised but now, in the wake of a spate of innovation in technology, unprecedented insight and precision has come into the study of the human brain.
At the helm of understanding the link between architecture and cognition is in two relatively new but
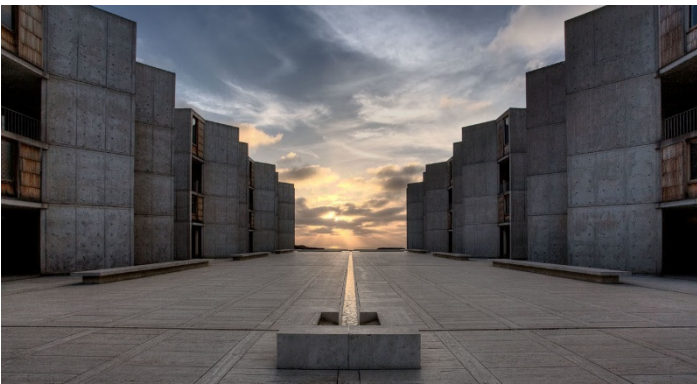
revolutionary scientific disciplines; cognitive neuroscience and cognitive neuropsychology (Goldhagen, 2017).

Architecture is multi-sensory and involves several realms of sensory experience which fuse into each other (Pallasmaa, 2012). The basis of experience therefore is on our sensory perceptions and internal thoughts which work hand in hand to determine how we respond upon making sense of our environment (Goldhagen, 2017).

Though experience is subject to different individuals, cognition is not. Our thoughts are largely as a result of our bodies which are shaped by our environments hence our internal cognition happens outside of our conscious awareness and it is a product of the intimate interaction between mind, body and environment (Fig. 2.12). The body is no mere receptacle but there is constant dialogue with the mind, conscious and subconscious, on processing of our internal and external environments. (Goldhagen, 2017).

Psychosocially supportive design comprising of thoughtfully composed ordering systems and sensuously active spaces, materials and textures among many other elements of good design (Fig. 2.13) result in coherent places with a positive effect on the psychology of a human being. (Goldhagen, 2017) Through our senses, architecture experienced can shape our cognition, emotion and action for better or for worse (Fig. 2.12).

The manner in which architecture is composed and how its users will experience it determines the stress load that will be placed upon the users of the space. Poor design results in subconscious stress and the associated bodily response is degenerative to health and well-being.

2.4 Restorative Environments & Retreat Centres

With or without architecture, human beings inevitably deplete resources required to cope with daily life demands. These demands vary widely from physical to psychological and when they become unmanageable, both psychological and physical health are in jeopardy (Hartig, 2004) as has been demonstrated earlier.

The replenishing of depleted resources is not void of a socio-physical environment within which restoration is more effectively achieved than in others (Fig. 2.14). Such environments can be more effective in restoration support in two key ways; they have a relative absence of the perceived social and physical demands and they have qualities promoting restoration (von Lindern, Lymeus and Hartig, 2016).

Fig. 2.12 Architecture can shape our cognition, emotion and action for both positive and negative outcomes.
Source: https://ark-architects.com/tag/neuroscience/

Fig. 2.13 Salk Institute by Louis Khan; A carefully crafted and composed work of architecture that has a positive effect on the psychology of a human being.
Source: https://blogs.getty.edu/iris/inside-the-conservation-work-at-the-salk-institute-louis-i-kahns-masterpiece/

Fig. 2.14 A socio-physical environment can contribute to resource restoration required to cope with daily life.
Source: Photo by Asad Photo Maldives from Pexels

Restoration in this case can therefore be defined as 'the process of renewing, recovering, or re-establishing physical, psychological, and social resources or capabilities diminished in ongoing efforts to meet adaptive demands' thus a restorative environment 'an environment that permits and promotes restoration' (Hartig, 2004).

The definition of a retreat centre varies widely depending on mainly function of the particular retreat centre. However, what does not vary is the concept and founding principle which is restoration. Whether it be religious, social or physical, the idea behind retreat centres is provision for a change in environment for its users to provide restoration.

In Kenya, there are several varied retreat destinations and types due to the different touristic ventures that take place in the country that has tourism as its second largest source of foreign exchange. Beach tourism, eco-tourism, cultural tourism and sports tourism are all part of the tourism sector in Kenya. For purposes of this study, the retreat typologies in Kenya have been clustered under three typologies;

1. Spiritual Retreats: Established by religious groups and organisations that aim to provide their users with an experience aimed at deepening their connection with their respective supreme or supernatural being (Fig. 2.16 and Fig. 2.19).
2. Game excursion Retreats: Established as game viewing excursions nature walk retreats that aim to put their users in withdrawn natural environments to observe and appreciate flora and fauna not common to the urban setting (Fig. 2.15 and Fig. 2.20).
3. Scenic Retreats: Established with an aim of immersing their users in withdrawn locations around particular scenery such as mountainous, coastal or forest regions which are in retired destinations away from urban hustle and bustle of the city (Fig. 2.17 and Fig. 2.18).

2.5 Synthesis

In this chapter, the concept of health promotion is introduced and the increase in the acceptance of health as not the mere absence of disease is discussed where a more holistic approach evolved and many sectors outside the immediate health domain were scrutinized in order to establish the relationship between health and our political, social, cultural, environmental, behavioural, and biological factors. Through the inquiry into health promotion our physical environment (constituting of architecture) is identified as a key factor in determining our physiological and psychological health and well-being thus, environments which promote health termed as restorative environments and the factors which make up such environments form the framework upon which retreat centres are planned, designed and built to create psychosocially supportive environments.

Fig. 2.16 Mhondoro Game Lodge; a game excursio retreat.
Source: https://www.scottdunn.com/za/luxury-holidays/africa/southern-africa/south-africa/madikwe-and-the-northwest/mhondoro-game-lodge

Fig. 2.15 Vajrasana Buddhist Retreat by Walters & Cohen Architects as a Spiritual Retreat.
Source: https://www.archdaily.com/798645/vajrasana-buddhist-retreat-walters-and-cohen-architects

Fig. 2.17 Navutu Dreams Resort & Wellness; a scenic retreat
Source: https://retreathub.com/property/navutu-dreams-resort-wellness-retreat-cambodia/

For purposes of this study, only a foundational background is offered as pertains to the neuroscience behind restorative environments. More in-depth analyses and studies on environmental psychology and neuroscience as pertains to architecture have been put together breaking down the theories and concepts behind restoration through environment. Two such dissertations include 'Neuroscience and Architecture: The Science of Space and Well-Being' and 'Architecture for Retreat: Extracts from Environmental Psychology' which were both presented at the University of Nairobi in 2013 and 2010 respectively.

Fig. 2.20 Forest Resort; A scenic Retreat
Source: https://www.pinterest.com/pin/366832332138706097/?lp=true

Fig. 2.19 Bethany Retreat House; a spiritual retreat
Source: https://www.nashvilledominican.org/apostolate/where-we-serve/bethany-retreat-house/
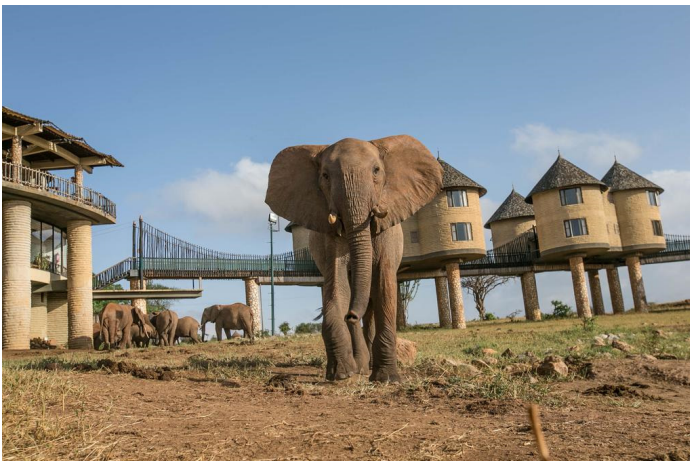
Fig. 2.18 Sarova Salt Lick Game Lodge; A game excursion retreat
Source: https://www.booking.com/hotel/ke/sarova-salt-lick-game-lodge.en-gb.html

3 LITERATURE REVIEW: SALUTOGENSIS AND RESTORATIVE ENVIRONMENTS

3.1 Introduction

During the late 70s and the whole of the 80s when the concept of health promotion began to gain global traction, different scientists and policy makers began to come up with strategies and concepts in favour of health promotion and others in scepticism of the whole idea of health promotion. For one particular medical sociologist, he was sceptical of the health promotion agenda due to the manner in which it was being implemented and hence came up with the theory upon which he believed health promotion could reach its full potential. This chapter focuses on the theory of Salutogenesis and its architectural application which forms the basis of this dissertation.

3.2 Theory of Salutogenesis: History and Meaning

The term 'salutogenesis' was coined by a Prof. Aaron Antonovsky (1923-1994), an Israeli American medical sociologist (Fig. 3.1), in his 1979 book Health, Stress and Coping as a theory and research model focusing on the origins and assets of health as opposed to the origins of diseases and their subsequent risk factors (Fig. 3.2); pathogenesis ((Antonovsky, 1979; Mittelmark *et al.*, 2017; Karaca, 2018). He came to realise the need for a paradigm shift in how the health promotion agenda was to be implemented and stated that there was a need to dial down on the pathogenesis route and instead look into the origins of health.

In his initial work as a stress and coping survey researcher with foci on particular diseases, Antonovsky came to the realisation that his interest had no starting point in a particular disease rather in "the illness consequences of psychosocial factors howsoever these consequences might be expressed" (Antonovsky, 1990; Mittelmark *et al.*, 2017). Antonovsky came to the question 'What makes people healthy?' and brought need to coin the term salutogenesis which is an amalgamation of the words 'saluto' for health (Latin) and 'genesis' for origins (Greek) (Antonovsky, 1979).

In the salutogenic model, health and illness are used as two poles on opposite ends of a multidimensional continuum and in this case, the two poles are used as heuristic devices because there's no realistic achievement of absolute health or illness (Fig. 3.3). Pathogenesis asks, 'why does a person enter into a state of illness?' whereas Salutogenesis asks 'what are the factors pushing an individual towards this end or that end of the continuum?'. The theory therefore side-lines the health/disease dichotomy in favour of the health ease/ dis-ease continuum (Antonovsky, 1979).

According to Antonovsky, the primary premise and heart of the salutogenic model (Fig. 3.4) is a construct termed as the sense of coherence (SOC

Fig. 3.1 Israeli-American medical sociologist, Prof. Aaron Antonovsky (19 Dec, 1923 – 7 July, 1994)
Source: https://snl.no/Aaron_Antonovsky

Fig. 3.2 An assets approach toward health and wellness
Source: https://eubirthresearch.files.wordpress.com/2018/03/bengt-lindstrc3b6m-presentation.pdf

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Sense of Coherence derived from: Meaning, Comprehensibility and Manageability and other treatment

Generalised Resistance Resources (GRRs)

Death

State of Wellbeing

Life

Deterioration

Better Health

Generalised Resistance Deficits (GRDs)

Inabilities, Illnesses and Stress

The Salutogenic Effect

Fig. 3.3 The Salutogenic concept that puts the state of health of well-being as a point on a continuum and forces supporting or inhibiting better health act by influencing a component known as the sense of coherence(SOC). Forces that support better health are called Generalised Resistance Resources (GRRs) whereas those inhibiting are called Generalised Resistance Deficits (GRDs).
Source: Author; Golembiewski (2010)

Key to Figure1

Arrow A: Life experiences shape the sense of coherence.
Arrow B: Stressors affect the generalized resistance resources at one's disposal.
Line C: By definition, a GRR provides one with sets of meaningful, coherent life experiences.
Arrow D: A strong sense of coherence mobilizes the GRRs and SRRs at one's disposal.
Arrows E: Childrearing patterns, social role complexes, idiosyncratic factors, and chance build up GRRs.
Arrow F: The sources of GRRs also create stressors.
Arrow G: Traumatic physical and biochemical stressors affect health status directly; health status affects extent of exposure to psychosocial stressors.
Arrow H: Physical and biochemical stressors interact with endogenic pathogens and "weak links" and with stress to affect health status.
Arrow I: Public and private health measures avoid or neutralize stressors.
Line J: A strong sense of coherence, mobilizing GRRS and SRRs, avoids stressors.

Line K: A strong sense of coherence, mobilizing GRRS and SRRs, defines stimuli as nonstressors.
Arrow L: Ubiquitous stressors create a state of tension.
Arrow M: The mobilized GRRs (and SRRs) interact with the state of tension and manage a holding action and the overcoming of stressors.
Arrow N: Successful tension management strengthens the sense of coherence.
Arrow O: Successful tension management maintains one's place on the health ease/dis-ease continuum.
Arrow P: Interaction between the state of stress and pathogens and "weak links" negatively affects health status.
Arrow Q: Stress is a general precursor that interacts with the existing potential endogenic and exogenic pathogens and "weak links."
Arrow R: Good health status facilitates the acquisition of other GRRs.

Note: The statements in bold type represent the core of the salutogenic model.

Fig. 3.4 The Salutogenic Health Model
Source: Mittelmark et. al (2017)

3.2.1 Sense of Coherence (SOC)

Antonovsky(1979) defines the sense of coherence as "…a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can reasonably be expected." SOC is a crucial variable in explaining movement along the health ease/dis-ease continuum.

The SOC reflects a person's view of life and capacity to respond to stressful situations (Mittelmark *et al.*, 2017). In the salutogenic model of health, not only stressors are observed but their flip side too, resources are also brought under scrutiny. The combined working of both resources and stressors results in effects that create life experiences, characterized by consistency and load balance which result in a strong or high SOC thus moving an individual toward health (Fig. 3.5).

Forces that support better health on the continuum, earlier termed as resources (Fig. 3.7), in the SOC concept are called Generalised Resistance Resources (GRRs) whereas the stressors (Fig. 3.6) are called Generalised Resistance Deficits (GRDs) and they work the inverse direction of better health and facilitate deterioration. (Antonovsky, 1987; Golembiewski, 2010). A strong/high SOC predicts better health and weak/low SOC predicts poor health.

According to Antonovsky (1987), there are 3 core components that determine one's sense of coherence; comprehensibility, manageability and meaningfulness. When confronted by a stressor, a person with a strong SOC will; believe that the challenge is understood(comprehensibility), believe that the resources required to cope are available(manageability) and wish to, be motivated to, cope (meaningfulness) (Antonovsky, 1996).

3.2.1.1 Comprehensibility

This refers to the cognitive dimension where the extent to which one perceives internal and external stimuli as rationally understandable and as information that is orderly, coherent, clear and structured rather than as noise – that is, chaotic, disordered, random, unexpected and unexplained (Mittelmark *et al.*, 2017; Karaca, 2018). An individual high on the sense of comprehensibility expects that looming stimuli will be predictable or, at the very least will be orderable and explicable when they come as a surprise. The desirability of stimuli/challenges in the Salutogenic model of health is not implied but when things such as death, failure and war occur, a person high on the sense of comprehensibility can and will make sense of them (Antonovsky, 1987).

Fig. 3.5 A sense of coherence of one's circumstance is vital in coping with their allostatic load (stress level) at any given time.
Source: https://www.codeofliving.com/how-to-find-peace-of-mind-in-modern-times/

Fig. 3.6 Forces working against a strong sense of Coherence are Generalised Resistance Deficits
Source: https://www.mindful.org/anxious-stressed-thats-okay/

Fig. 3.7 Forces working in favour of a strong sense of coherence are Generalised Resistance Resources.
Source: https://www.fashionkibatain.com/top-10-tips-for-a-stress-free-work-life/

Fig. 3.8 The sense of coherence is determined by three core components of an individual's perception of their surrounding circumstances; Comprehensibility, Manageability and Meaningfulness.
Source: Author

3.2.1.2 Manageability

This refers to the instrumental/behavioural dimension where the extent to which one perceives that the resources that are at one's disposal are adequate to meet the demands posed by stimuli that bombard the individual (Antonovsky, 1987; Mittelmark et. al, 2017; Karaca, 2018). There is a pervading belief that resources to act are available and within one's control (Jensen et al., 2017). Such an individual cannot feel victimized by unfortunate events or feel that life has treated them unfairly hence they are able to cope and not grieve endlessly (Antonovsky, 1987).

3.2.1.3 Meaningfulness

This refers to the motivational dimension where one feels that life makes sense emotionally, and that at least some of the problems and demands posed in day to day life are worth investing energy in and are worthy of commitment and engagement. The challenges are welcomed rather than taken on as burdens that one would much rather do without though possibly tough and unpleasant (Antonovsky, 1987; Mittelmark *et al.*, 2017; Karaca, 2018). This does not mean an untoward event is worthy of joy and happiness but when such things happen to an individual high on the sense of meaningfulness, they will willingly take up the challenge in determination to seek meaning in the challenge and overcome with dignity (Antonovsky, 1987).

3.3 Psychosocially Supportive Design: Application of Salutogenesis to Architecture

According to WHO (1986) as observed in the Ottawa Charter for Health Promotion, "Health is created and lived by people within the settings of their everyday life; where they learn, work, play and live." This statement alluded to the fact that built environments have a significant impact upon human health and well-being hence the necessity to understand the relationship between health and the built environment in order to bring the understanding to design.

In the 1990s, architect Prof. Alan Dilani (Fig. 3.9) suggested the use of Prof. Aaron Antonovsky's salutogenic theory to coin 'Psychosocially Supportive design', a theory and framework to promote health through the design of the physical environment (Ziegler, 2014; Karaca 2018). The theory proposes a model where health promotion is achieved through design within the physical environment, particularly within healthcare facilities (Dilani, 2007).
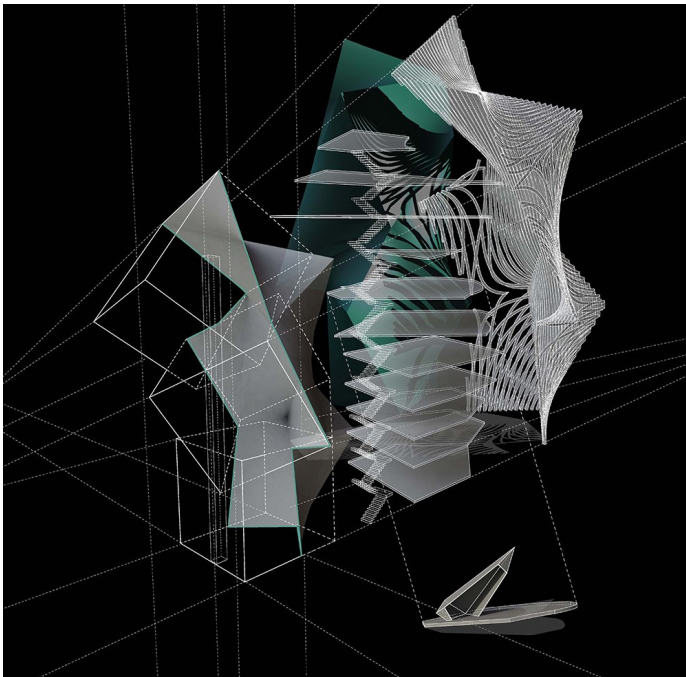
Psychosocially supportive (salutogenic) design is all about encouraging active health rather than merely treating illness (Mazuch, 2017) by creation of a preventive care strategy that changes the current focus from risk factors to holistic understanding and evolution towards a healthier society. Salutogenic design contexts promote and activate people physiologically, psychologically and socially in order to strengthen one's SOC. This is done by appealing to the human senses which in turn start mental processes that result in reduced anxiety and promote positive psychological emotions fundamental in health promotion (Dilani, 2015).

By use of the salutogenic model of health in building a framework for psychosocially supportive architecture, the focus is turned toward an internalization process of the sense of coherence concept. How does a design element become a generalised resistance resource or deficit (Maass, Lillefjell and Espnes, 2017)? How can a design element develop a strong SOC? To answer these questions the 3 core components of a strong SOC must be brought under scrutiny.

3.3.1 Comprehensibility Through Architecture

This has to do with reading and understanding the environment (Karaca, 2018), the capacity to understand and negotiate the contexts we find ourselves in (Golembiewski, 2017). Comprehensibility has got to do with the sense of predictability and feelings of security felt by the individual thus the design elements must support the predictability and security feelings (Karaca, 2018).

To maximise comprehensibility, ambiguity (Fig. 3.10) in design should be avoided to reduce the possibility of perceptual distortion (Golembiewski, 2014). According to Ken Yeang (2015), 'environmental comprehensibility' requires environmental orderliness, predictability and legibility. An example of this would be the use of legible and intuitive way finding to create visual order and eliminate visual chaos that disorients a building user (Dilani, 2015).

Spatial cognition though very important in environmental comprehensibility is not all there is to this component. Understanding of what objects are and what their functions are is also of great importance. Object comprehension is a product of the filters of memory, culture and a pre-existing epistemology (Hall, 1990; Searles, 1965). Users understand their context through association with familiar concepts, languages, objects, forms, materials, textures, emotions and expectations. It is therefore important to, as far as possible, provide a familiar environment in design (Golembiewski, 2017; Karaca, 2018).

According to James Gibson and other researchers who have delved into the ecological theory of perception, perception (whether visual, acoustic, haptic, temporal or olfactory) is synthetic (Hall, 1990) and for this reason, the relationship between comprehensibility and the environment that we draw experience from is personal. Not everyone can gather the exact same information from the same

Fig. 3.9 Prof. Alan Dilani, founder of the International Academy for Design and Health (IADH) and the journal, World Health Design, coined the term Psychosocially Supportive Design as an application of salutogensis to the design of the physical environment.
Source:
http://picssr.com/photos/dohogu/interesting/page14?nsid=34878350@N06

Fig. 3.10 Ambiguity in design increases the possibility of perceptual distortion thus making architecture less comprehensible.
Source: https://www.arch2o.com/dichotomy-ambiguity-ziba-esmaeilian/

Fig. 3.11 The success of Alvar Aalto's Saynatsalo Town Hall is largely due to its association with familiar languages, concepts, forms, materials, objects, textures, emotions and expectations within its geographical context and even beyond thus it increases its likelihood of comprehension.
Source:
http://takehiko.scripts.mit.edu/4561_cgi/v12b/4561_list.cgi?semester=2018s

Fig. 3.12 Four Seasons Hotel, Montreal restaurant lounge by Atelier Zébulon Perron; A careful balance in the sensorial stimulation arising from a given space gives just enough to aid comprehensibility and identity whilst preventing distortion that would otherwise arise in overly stimulating environments.
Source: https://www.ai-architect.com/atelier-zbulon-perron-designs-sensual-bar-and-restaurant-at-montreals-four-seasons-hotel/

experience (Hall, 1990) but in normal circumstances, the "gap" between a subjective experience and the reality of the objective world is acceptable and is resolved without consideration (Golembiewski, 2010). Therefore, it is understandably important that the built environment should be designed to reduce the possibility of perceptual distortion.

As per Jan Golembiewski (2010), cognitive scientists have counted at least thirteen distinct ways that people comprehend the relative depth of space visually and several other ways when we include the various tactile, thermal and acoustic perceptual systems. For purposes of this thesis, the perceptual systems shall not be discussed in depth but samples of how provision can be made within our built environment to strengthen comprehensibility shall be provided. Textured surfaces assist with textural perception. Horizontal (or vertical) courses in masonry or timber assist linear perception. Various objects in or internal (pieces of furniture, paintings, rugs, light fittings etc) and external (the presence of trees, landscape features etc) assist with size and scale perception, the various perspectives of parallax and other perspectives. All these perspectives support the same cognitive function, that is the measuring and comprehension of space and therefore, the more provisions for these perspectives the more successful design can be in reducing the likelihood of miscomprehension. ((Osmond, 1957, 1958; Searles, 1960; Hall, 1990).

However, the purpose of a place or an object is not directly cognised. Comprehension is manufactured through the filters of memory, culture and a pre-existing epistemology (Searles, 1965; Hall, 1990). Human beings therefore understand their environs by association with familiar languages (Fig. 3.11), concepts, forms, materials, objects, textures, emotions and expectations. Therefore, to provide a familiar environment for users of spaces in order to increase the likelihood of comprehension and to reinforce messages that aren't likely to increase stress levels cannot be overstated.

A design team must consider visual, acoustic, haptic, temporal and olfactory sensibilities in their designs, not just to avoid excessive sensory pollution (such as street sounds and kitchen smells) but to avoid distortion generally and beyond perceptual distortion, they need to be aware of environmental symbolism that might be amplified, de-contextualised or miscomprehended (Fig. 3.12).

In matters pertaining to environmental comprehensibility, other things that could come under scrutiny might be the material palette. Could certain materials be considered ambiguous and be subject to miscomprehension? Could 'dishonesty to material' such as veneer or printed timber be a source of confusion to some individuals? Perhaps there are other advantages still for choosing real exposed timber, stone, natural carpet and quality pressed brick; being ubiquitous the world over, they will resonate with a wider range of cultural backgrounds. Natural materials are also replete with textures to assist with difficulties in perceptual cognition.
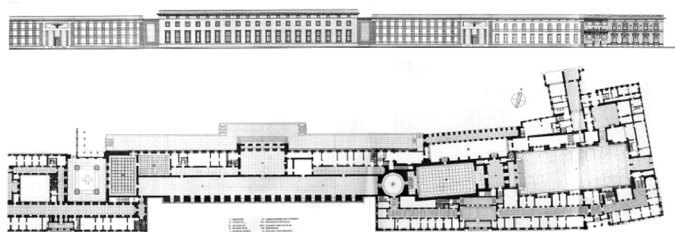
Designers that adopt a salutogenic framework as a guiding theory might find it at odds with architectural fashion. In an attempt to achieve environmental comprehensibility, some architectural theories may not be favourable. Postmodern double readings, façadism, deconstructivism and tectonic expressionism tend to be intentionally confusing (Fig. 3.13), but do not need to be abandoned altogether. Obtaining, an even higher level of artistic expression in balance that still maintains comprehensibility may be the epitome of the contemporary architectural theories.

3.3.2 Manageability Through Architecture

This has to do with how architecture enables one with the resources to meet their personal demands in order to be effective in their actions. The most obvious architectural element wielding this core component of SOC is form. Architectural form can psychologically amplify or deny power. A good case scenario of this is in the New Reich Chancellery (Fig. 3.14) by German architect Albert Speer, Adolf Hitler's chief architect between 1933 and 1945. As narrated in The Edifice Complex, (Sudjic, 2006) in 1939, the disempowering 'architectural stage set' by Nazi architecture (New Reich Chancellery) caused Emil Hacha, Czechoslovakia's president to freely hand over the reins of his state to Germany without an attempt to engage his well-equipped and technologically advanced army and arsenal that were in position to defend Czechoslovakia's borders. From the broadest elements of architecture such as form to the minutest details such has door knobs or handles, architecture can with us or against us. (Golembiewski, 2010)

The sense of control, of one's environment and life circumstances, is very fortifying. (Golembiewski, 2010; Karaca 2018). Control of movement, lighting, ventilation, privacy, security, thermal comfort and many other components that come together to make up architecture determine manageability. Some design decisions may lead toward providing non-architectural interventions such design to provide for social support the core principle in achieving manageability is for users to feel like they are influencing what is happening around them and they are not victims of circumstances (Dilani, 2015).

3.3.3 Meaningfulness Through Architecture

This has to do with find meaning through the physical environment (Karaca, 2018) and because meaning in life is essential to the maintenance of life through a strong SOC (Antonovsky, 1987), it should be a pivotal concern for architects when designing (Golembiewski, 2017). Rarely ever do people actively seek out meaning in life, but for an architect, providing a right context might inspire a search for meaning or enrich one (Golembiewski, 2017).

According to Jan A. Golembiewski (2017), meaning "is illusive and difficult to provide for, as questions of meaning steer pretty quickly to philosophical and cultural/social debate rather than to the simple

Fig. 3.13 Postmodern architectural theories seek to intentionally confuse and in most cases are not favourable in the quest to achieve environmental comprehensibility.
Source: https://thearchitecturedesigns.com/most-beautiful-deconstructivism-architecture-buildingswhat-is-deconstructivism/

Fig. 3.14 The New Reich Chancellery by Albert Speer for its time was a magnificent structure that disempowered Hitler's allies and foes alike giving his forces an impression of invincibility.
Source: https://www.planetminecraft.com/project/neue-reichskanzlei-1939-1945/

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Fig. 3.15 Central Wolfe Campus by HOK; Incorporation of nature in the built environment creates an opportunity for social support as well as evolved human-nature relationships that give rise to meaning.
Sources: https://www.hok.com/news/2018-11/wallpaper-highlights-hoks-biophilic-design-of-the-central-wolfe-campus-in-silicon-valley/

Fig. 3.16 The Thread by Toshiko Mori; The forms, finishes and relationships of buildings when used to communicate the cultural aspects of a given people positively impact human health.
Source: https://www.archdaily.com/608096/new-artist-residency-in-senegal-toshiko-mori?ad_source=search&ad_medium=search_result_all

cause and effects so desirable in the physical sciences. Of all the sources of environmental meaning, there is little doubt that it is primarily found in the social environment – in love and communication, in family and in friendship" (Golembiewski, 2017). This being the case, to make provision for social support is imperative in designing for environmental meaningfulness.

Meaningfulness also refers to a personal or cultural connection that can be enhanced by aesthetics or spatial and programmatic considerations. (Golembiewski, 2010). For environmental meaningfulness, provision of visual and aesthetic meaning, interest, satisfaction and attendant spaces for contemplating in the environment are needed (Dilani, 2015).

Roger Ulrich has made important contributions as pertains to accessibility of the natural environment and better health outcomes (Fig. 3.15). Though not explicitly stated in his research, it is likely that health benefits derived from access to natural landscape occur as a result of meaning being so easily found in nature (Golembiewski, 2017).

3.4 General Principles of Salutogenic Design

The general design principles and elements that support the salutogenic design process in developing a sense of coherence are:

3.4.1 Culture

The culture of a society or community brings about a sense of belonging to the individuals. According to Konlaan (Konlaan, 2001), participation in cultural activities positively impacts human health. In his study he proves that there is a close link between being an active cultural consumer and an increase in an individual's health status rating (Dilani, 2015).

As stated by Stephen F. Kenney (Kenney, 1994) in a thesis on Cultural Influences on Architecture, "Architecture is a manifestation of the cultural context in which it resides. The form and relationships of buildings and spaces act as a kind of cultural marker (Fig. 3.16) that can be read, similar to the way one might read a newspaper or road map for information, to describe the way of life and social status of its inhabitants."

Aspects of culture such as attitude toward privacy, family structure/hierarchy or role of women within the society among many other aspects can influence architecture to respond to the varied complexities of different cultures. For example, as pertains to the degree of privacy within a society, the attitude toward nakedness of its people will determine the visual porosity and openness of their architecture to the public. Modesty oriented attitudes result in more closed architecture and vice versa (Kenney, 1994).

The more that an architectural piece of work conforms to the culture within its immediate context, the better the architectural edifice will aid its users in establishment of a strong sense of coherence through meaning and comprehensibility (Fig. 3.17). It respects and relates to the attitude of the people it serves and as a result a sense of belonging developed and strengthened.

3.4.2 Aesthetics & Décor

The concept of aesthetics having any impact on health appears to be widely regarded as a superstitious & occult concept and is thus not nearly as widely accepted, however, this has been scientifically tested and proven severally with findings that have defied the notorious belief such as a 30.8% faster recovery and 38% lower mortality in patients with psychiatric disorders exposed to sunlit rooms (Golembiewski, 2017). When an individual is seemingly healthy, the exhibit a theoretical surplus of resources and the idea of aesthetic impact seems to be far-fetched but when ill, any genuine influence geared toward better or worse health is very important (Golembiewski, 2017).

When an individual observes or views drawings, paintings, sculptures or other artistic elements aimed at offering aesthetic experiences, complex cognitive and emotional processes arise (Fig. 3.18). The process of viewing, processing & understanding the art form in question the individual may experience joy, participation or interest which may lead to positive stimuli, satisfying and rewarding the viewer (Dilani, 2015). This in turn becomes a promoter of a strong SOC.

In the design of spaces, it then becomes of interest to architects to carefully and intelligently introduce relevant art forms and ornaments that are geared toward rewarding the users of a space with aesthetic experiences that strengthen their sense of coherence.

3.4.3 Daylighting

Research has it that daylight has positive effects on a human being's psychological wellbeing and its absence thereof can lead to physiological and psychological difficulties (Dilani, 2015).

Daylight is largely brought into architecture through windows and the amount or distribution determined by window quantity and sizes. The windows bringing in daylight allow for users within a building to have a link to the outer world and satisfying a user's need for viewing seasonal variations and happenings outside of the confines of an interior space (Fig. 3.19). On the flip side, rooms without windows can exacerbate and affect human well-being negatively. As per Heerwagen and Orians (1986), a study was conducted on blue collar workers who were denied access to windows and the result showed that they experienced tension and were more negative toward their physical working conditions as compared to their colleagues in offices with windows. (Dilani, 2015).

Fig. 3.17 Islamic Cultural Centre, Wuppertal, Germany - In order to aid the establishment of a strong sense of belonging, an architectural piece ought to conform as much as possible to the culture.
Source: https://www.archilovers.com/projects/237275/islamic-cultural-center-wuppertal-germany.html

Fig. 3.18 Aesthetic elements evoke complex cognitive and emotional processes that satisfy the viewer.
Source: https://worldarchitecture.org/article-links/ecvpg/31-design-completes-greenland-phoenix-pearl-living-aesthetics-gallery-in-qingdao.html

It is therefore undoubtable that daylighting allowed into a building can contribute to the meaningfulness and manageability brought about by a work of architecture.

3.4.4 Sound, Music & Noise Control

The word noise by definition does not come with a positive connotation and this is because it is a result of sound resulting from undesirable fluctuations. Such sound can psychologically disorient, irritate and eventually harm the well-being of human beings. Research has it that noise causes irritation which leads to stress and stress-related diseases. This is because it raises the cortisol level (Dilani, 2015). Cortisol is the body's main stress hormone which ideally has a function to boost your body in various ways when under duress in order to cope before balance is restored. However, when the levels of cortisol are higher than they need to be, it becomes a demerit that can derail the bodies most important functions resulting in several health problems (Louise Chang, 2018).

According to Alan Dilani (2015), workers in less noisy environs require fewer coping strategies for adapting to their physical environment and can therefore focus their energy and coping strategies on other stressful events. It is for this reason that we can safely say that the physical auditory environment can be vital in helping people cope with other stressors. Some sounds can promote health such as music as it decreases the activation in the sympathetic nervous system and has on several occasions been linked to promotion of human well-being.

The challenge of salutogenic design is in integration of spaces for musical experiences in the built environment. For a designer considering acoustics and sound as a salutogenic element, there are two options, to reinforce ones SOC by creating sounds or to buffer against noise (Fig. 3.20 and Fig. 3.21).

3.4.5 Thermal Comfort

The manageability of one's environment as earlier discussed is very important in development of a strong SOC. The ability to regulate one's ambient conditions such as temperature is an example of manageability of a given space. Research in work environments has shown that a lack of control of one's environment is stressful and associated with negative effects resulting from raised raring of psychological stress.

It has been argued by several researchers that increased psychological stress ratings as a result of environmental conditions such as temperature can be mitigated if people/ users are given ways to increase their control over stressful conditions.

Fig. 3.19 Natural light has positive effects on the psychological well-being by linking users to the outside world and satisfying a need to be a part of happenings beyond the confines of interior space.
Source: https://www.wallpaper.com/travel/kengo-kuma-amanpuri-retail-pavilion-phuket-thailand

Fig. 3.20 There are sounds that can promote health and vice versa. Sensitive consideration to buffer undesirable sound and let in desirable sound works toward developing a strong SOC.
Source: https://www.archdaily.com/572043/sonorous-museum-adept

Fig. 3.21 A 230ft long sea organ in Croatia by architect Nikola Bašić takes advantage of the Adriatic sea waves to produce random soothing rhythmic tunes.
Source: https://inhabitat.com/incredible-sea-organ-uses-ocean-waves-to-make-beautiful-music/

Fig. 3.22 Evaporative cooling as passive strategy to provide thermal comfort within a building.
Source: https://nzeb.in/knowledge-centre/passive-design/evaporative-cooling/

Fig. 3.23 Olea All Suite Hotel by BLOCK722 architects+: the material finish in any given project determines the colour of a building. The familiarity of the colours and textures increases the likelihood of comprehension to reinforce one's SOC.
Source: https://www.archdaily.com/907090/olea-all-suite-hotel-block722-architects-plus

Such an architectural intervention would be provision of windows to control air flow and thus temperature or shading devices to allow for manipulation depending on the sun's movement. Both passive and active cooling/heating mechanisms all work toward handing thermal comfort control to a user and this may increase the manageability of a space which in turn strengthens one's SOC (Fig. 3.22).

3.4.6 Colour

Colours have an impact on brain activity and can create a sense of well-being. To designers, colour should be of high interest as they carry with them aesthetic and cultural value which can reflect a philosophy of a given entity or people (Fig. 3.23). Warm colours, vivid and bold in nature, have an activating and evocative effect whereas cool colours are considered to have a calming effect (Dilani, 2015).

Due to the varying psychological effects of different colours, it is important for a designer to pay keen attention when choosing hues to use in a given space as the selected colours will influence emotions and perspectives of the building users. Colours should suit the contextual environment and represent the type of room or message that is being conveyed.

3.4.7 Ergonomy

The use of ergonomically sound building components is key in the health promotion school of thought. Anything within a building that is not ergonomically sound creates a safety hazard but also if the users of the building are conscious of the hazard then their stress levels within the select hazardous space will increase due to the potential occurrence of an accident. Ergonomically unfriendly design is comprehended as unsafe and understood as out of one's control. It therefore loses meaning as useful due to its unmanageability and this all works toward a weakened SOC resulting from the stress experienced (Stokols, 1992).

3.4.8 Materials & Texture

As earlier discussed in architecture for comprehensibility, 'the purpose of a place or an object is not directly cognised. Comprehension is manufactured through the filters of memory, culture and a pre-existing epistemology (Searles, 1965; Hall, 1990). Human beings therefore understand their environs by association with familiar languages, concepts, forms, materials, objects, textures, emotions and expectations.
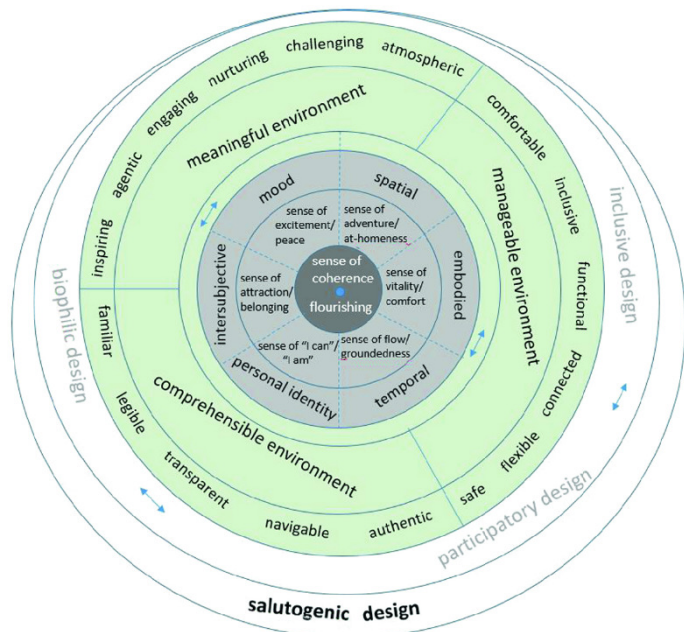
Fig. 3.24 The Salutogenic Design Framework
Source: https://link.springer.com/chapter/10.1007/978-981-13-6092-3_14

Fig. 3.25 Active design seeks to increase the physical fitness levels among space users by design that make physical activity in a place possible.
Source: https://www.sportengland.org/facilities-and-planning/active-design/

Provision of a familiar environment in form of materials and textures (Fig. 3.23) for users of spaces in order to increase the likelihood of comprehension and to reinforce messages that aren't likely to increase stress levels must be taken into account during the design process.

3.5 Key Principles of Salutogenic Design

Among the several design principles that constitute of a salutogenic framework (Fig. 3.24), three of the principles stand out due to their impact on the idea of health promotion through design and how they work together to holistically create a psychosocially supportive environment. The three principles are:

1. Active Design
2. Design for Social Support
3. Biophilic Design

3.5.1 Active Design

According to the Centre for Active Design which is the world's leading non-profit organization using design to foster healthy and engaged communities, defines active design as "an evidence-based approach to development that identifies urban planning and architecture solutions to support healthy communities." Active design builds on health research by showing how design has an impact on the physical, mental and social well-being of mankind (Fig. 3.25).

As the global population has developed into one of the most technologically advanced ages in earth's history, the physical demands of daily life on the human race in how they live, work and travel have sharply reduced. As a result, the need and importance for physical activity has shone in a different light as the absence of it has had undesirable effects on human life by becoming a leading cause of disease.

Active design principles are very important because some chronic disease arising from sedentary lifestyle choices such as obesity, diabetes, heart disease, stroke and certain cancers are the greatest epidemics of our time.

The statistics from the WHO, Centre of Active Design and other researchers have it that:

- Chronic diseases account for nearly 60% of all deaths worldwide.
- Physical inactivity is one of the key risk factors for chronic disease.
- Physical inactivity has replaced smoking as the leading cause of preventable death in the world.

WHO (World Health organization) recommendations for moderate- to vigorous- intensity physical activity

ADULTS | **CHILDREN**

22min /Day | 60min /Day
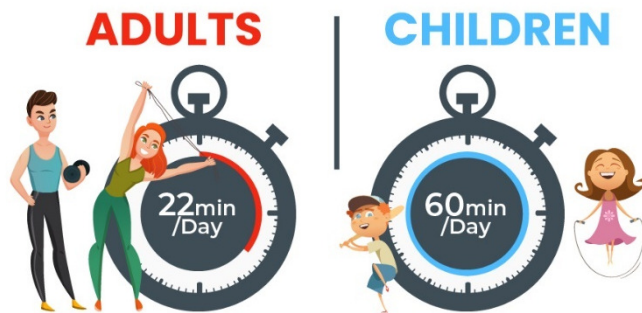
Source: http://www.euro.who.int/en/health-topics/disease-prevention/physical-activity/data-and-statistics/infographic-make-physical-activity-a-part-of-daily-life-during-all-stages-of-life

Fig. 3.26 The generally recommended minimum time spent in physical activity in both adults and children.
Source: https://www.european-business.com/infographics/sport-infographics/052018-5-who-world-health-organization-recommendations/
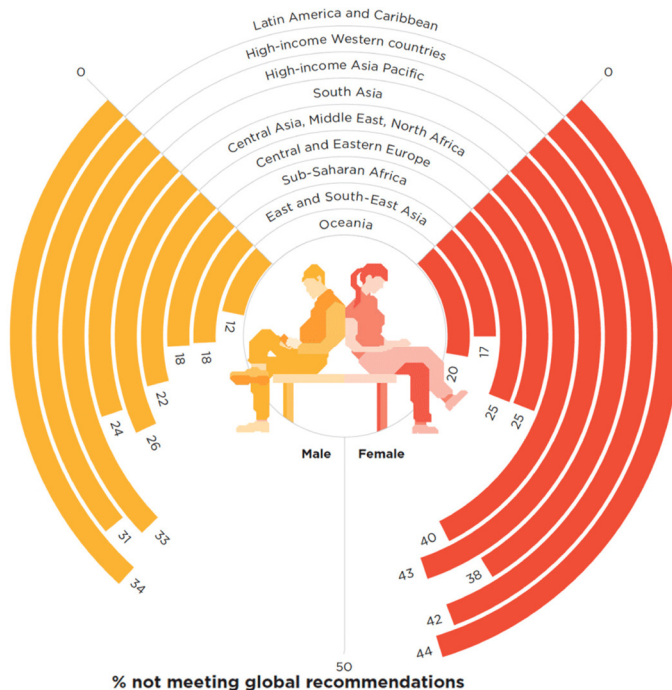
Fig. 3.27 Levels of physical activity as of 2016.
Source: https://www.who.int/health-topics/physical-activity

- Physical inactivity accounts for more than 3 million preventable deaths worldwide annually and is implicated in causing 6% of coronary heart disease, 7% of diabetes, and 10% of colon or breast cancer. (Gichu *et al.*, 2018)
- In less than 2 generations, physical activity has dropped by 32%, where less than half of adults, and children meet the recommended amount of physical activity per week.
- Chronic diseases account for global health care costs totalling $6.2 trillion in one year.
- This is the first generation in which ten-year olds are projected to have a shorter lifespan than their parents if behaviours do not change.
- 1.4 billion people are not doing the recommended 150 minutes of moderate, or 75 minutes of vigorous physical activity per week (Fig. 3.26 and Fig. 3.27).
- 15.4% of adult Kenyans are not as active as recommended by the WHO. (150 minutes of moderate, or 75 minutes of vigorous activity per week)

Relationship Between Physical Activity and Health

The Surgeon General's report of 1996 reviewed the existing literature on the role of physical activity in preventing disease. That review revealed an inverse association between physical activity and several diseases that is "moderate in magnitude, consistent across studies that differed substantially in methods and populations, and biologically plausible" People who are physically active have, on average, lower annual direct medical costs and fewer hospital stays and physician visits, use fewer medications, miss fewer days of work than physically inactive people.

Numerous studies were analysed to determine:

a) the consistency across studies of an association between physical activity and disease incidence;
b) the magnitude or strength of the association;
c) whether there was evidence that the level of activity preceded the development of disease;
d) the presence of a dose response relationship, that is, whether higher amounts of physical activity conferred greater health benefits;
e) the biological plausibility of the relationship, that is, the underlying physiological mechanisms that can explain why physical activity has a protective or restorative effect on specific health outcomes.

The Surgeon General's report concluded that physical activity is casually related to health outcomes where increasing amounts of physical activity were linked to decreasing risk of disease. The strength of the association is likened to the magnitude of the relationship between coronary heart disease and smoking, hypertension or elevated cholesterol.

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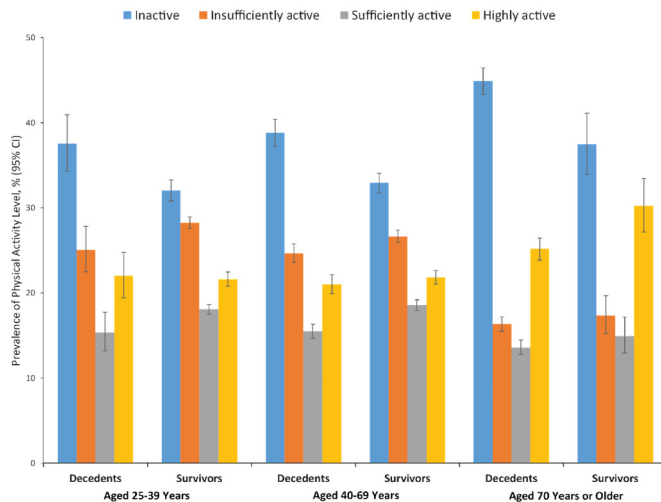
Fig. 3.28 Graph showing percentage of deaths associated with inadequate physical activity in the United States
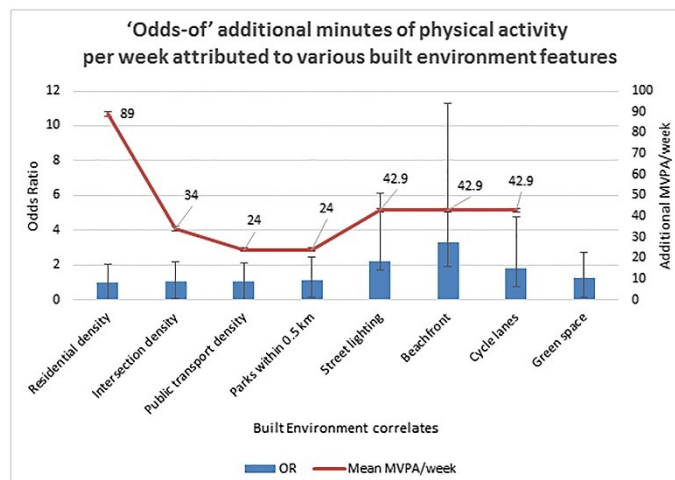
Fig. 3.29 Graph showing the potential of built environment improving physical activity levels of space users.

The listed benefits of regular physical activity according to reports (1996,2002) from the U.S Department of Health and Human Services are as follows:

- Reduces feelings of depression and anxiety and promotes physiological well-being.
- Helps maintain a healthy weight and reduce obesity.
- Helps build and maintain healthy bones, muscles and joints.
- Reduces risk of premature deaths resulting from cardiovascular diseases (Fig. 3.28).
- Reduces risk of developing colon and breast cancer
- Reduces the risk of developing osteoarthritis and osteoporosis
- Reduces fall-related injuries among older adults.
- Reduces blood pressure for already hypertensive patients.

Role of the Built Environment in human physical activity

There are a number of reasons that may cause one to fall below the ideal physical activity levels. Such reasons include personal reasons (arising from disabilities, health impairments or lack of self-drive), concerns for safety and security (unsafe and dangerous neighbourhoods), time and environmental impediments (long distances between destinations or limited travel choices). To curb reasons stemming from the environmental impediments, interventions to encourage greater physical activity should be tailored to meet specific needs and the targeted population to be segmented accordingly.

The opportunities to tailor the built environment to accommodate physical activity are numerous but the ease of such changes is subject to the nature of the interventions. Interventions that may hinge on policy making such as zoning and land use interventions may face formidable barriers that are difficult to overcome. More flexible & targeted approaches such as context-sensitive design, special overlay districts, traffic calming measures and community policing – can be implemented more rapidly.

Construction of new buildings and developments also offers promising opportunities for creating more activity-friendly environments (Fig. 3.29). The design considerations in a building affect the form of community development and travel choices which are what form the basis for the active design framework.

Fig. 3.31 Bjarke Ingels-designed apartment towers and public beach planned for Williamsburg, Brooklyn New York incorporates a mix of land uses that increases the distances travelled by people and by extension the physical activity.
Source: https://www.6sqft.com/massive-bjarke-ingels-designed-apartment-towers-and-a-new-waterfront-beach-planned-for-north-brooklyn/

Fig. 3.30 Miasteczko Wilanow District - Warsaw, Poland
Source: https://www.skyscrapercity.com/showthread.php?p=114307119

Active Design Guidelines/ Principles

The design of buildings can and will affect the physical activity habits by either encouraging or discouraging active circulation within and around a building or development. As a result, a number of guidelines that encourage physical activity have been stated by several authors which include the following:

- Incorporation of mixed land uses.
- Use of well-designed and connected pedestrian path networks at the human scale.
- Incorporation of sidewalks and enticing pedestrian-oriented streetscapes.
- Incorporation of infrastructure to support biking.
- Visible and enticing stair design to increase aesthetic value thus encourage everyday use.
- Installation of stair prompts and signage.
- Less prominent elevator design
- Provision of high-quality spaces for multi-generational play and recreation.
- Provision of play spaces for children.
- Incorporate building functions to encourage brief bouts of walking.

3.5.1.1 Incorporation of Mixed Land Uses

Mixed land use, with shops and services, as per several studies, is significantly associated with increased physical activity because it causes people to walk more in their daily lives when they can walk to different types of destinations (ULI ,2015).

A mix of uses such as residential, retail, office, recreation and community facilities in a given site increases human activity which in turn will have an impact on the physical activity (Fig. 3.30). Retail and service uses on the ground floor for multi-story buildings is ideal as this entices pedestrians and encourages non-motorized movement. This kind of interventions help sustain people's fitness without them even realizing it.

3.5.1.2 Use of Well-Designed and Connected Pedestrian Path Networks at The Human Scale

Pedestrian circulation routes between various destinations and buildings ought to be sensitively designed with the pedestrian users in mind. This is to ensure good connectivity as well as a choice of routes for walking. In order to maximize walkability, developments should favour shorter blocks of travel between 60 to 120 metres with multiple intersections within the development.

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Miasteczko Wilanow District in Warsaw, Poland (Fig. 3.31) is one such planned mixed use community characterised by sensitively designed streets and buildings responding to the human being. The buildings are 4-5 levels and the street and parking design are dictated by the layout of the sidewalks, cycling oath sand landscapes to give less priority to motorized transport.

To increase connectivity and reduce tedious movement that works against health promotion by causing frustration, cut-throughs should be used along long paths of travel.

Parking spaces should be reduced in order to devote more space to pedestrian oriented uses and activities and where possible, shared parking spaces should be leveraged as in Seoul, South Korea. The parking spaces and active driveways should also be tucked away in spaces away from pedestrian exposure such as behind buildings and provide direct sidewalk access to building entrances and lobbies.

3.5.1.3 Provide Sidewalks and Enticing, Pedestrian-Oriented Streetscapes

Well-marked crosswalks, special pavers, and curb extensions to visually highlight pedestrians and slow traffic create a conducive pedestrian experience (Fig. 3.32). Lighting on streets, trails and public spaces also enhances the sense of coherence by giving the impression of safety and making the spaces feel manageable.

Maximum ground-level façade transparency increases visual interest both for users indoors and outdoors and promotes walkability of a given development.

Plants, trees and benches along pedestrian paths to provide respite for pedestrians and slow down movement and turn into points of interest and nodes that in turn provide social support.

Within large projects, maps and signage oriented to pedestrians – with mileage and key destination points in the area – to help people feel at ease about walking or biking.

Maximising visibility of points of interest from the pedestrian circulation routes increases the human activity and further enhances the pedestrian experience.

3.5.1.4 Provision of Infrastructure to Support Biking

Where possible, bikeways should be provided within the street network and connections to existing bicycle networks to be maximised and continued into large developments (Fig. 3.33). Within a given development, provision for bicycle parking and storage should be provided to provide security for cyclists from the possibility of theft and weather protection.

Fig. 3.33 Mariahilfer Straße in Vienna, Austria by Bureau B+B Urbanism and Landscape Architecture was redesigned as pedestrian oriented streetscape.
Source: http://landezine.com/index.php/2014/11/mariahilferstrasse-by-bureau-bb/mariahilferstrasse-by-bureau_bplusb-06/

Fig. 3.32 Facilities such as racks, lanes and bike storage support the active lifestyles of cyclists.
Source: http://www.calzolarisrl.it/bike.racks.html

Fig. 3.34 Making a stair an enticing destination by incorporating unusual design details such as a slide next to a staircase by RMW, turned the stair into a fun zone. Interactive elements in particular increase stair use.
Source: https://rmw.com/your-offices-hidden-exercise-tool/
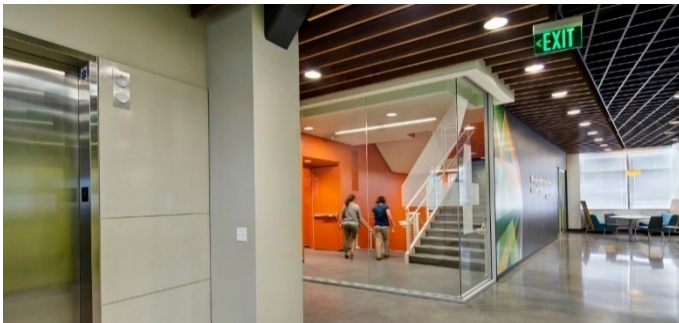
Fig. 3.36 Making the stairs visible even though they may be fire escape stairs makes them much more attractive than if within opaque enclosures.
Source: https://rmw.com/your-offices-hidden-exercise-tool/

Fig. 3.35 Visual highlights such as lighting on a stair as well as conspicuous stair designs make the stair a beacon.
Source: https://www.breyi.com/4287/the-importance-of-interior-lighting-design-in-life/27/

Locker rooms with showers are also important in the making of a development cyclist friendly for refreshment and storage purposes so that the use of a bicycle is not thought of as a hustle.

Where possible, a bike-share program is encouraged especially in a region without a larger bike-share network in order for tenants or residents of a given development to have access to bicycle use on an as-need basis.

3.5.1.5 Design of Visible and Enticing Staircases

Buildings that encourage stair use enhance physical activity opportunities and reinforce environmental sustainability goals through reduced energy expenditure from elevators and escalators. Recognizing this symbiosis between health and sustainability, in 2013 the U.S. Green Building Council released a new pilot credit called Design for Active Occupants, which aims to increase physical activity in building occupants. The credit was developed in collaboration with New York City agencies and private sector firms involved with developing the Active Design Guidelines.

To qualify for the Design for Active Occupants pilot credit, a project must have at least one main stairway that enables building occupants to travel freely between the entrance floor, occupant destination floors, and common use floors. (As necessary, access may be restricted to floor occupants through the use of security devices such as access keys and codes.) Additionally, the credit outlines a menu of suggested features related to stairway location, visibility, and design elements; signage prompting stair use; and the provision of exercise space and equipment.

In the past, buildings had beautiful and elaborate staircases that people used on a daily basis but over time, with technological advancement, the stairs have been relegated to tucked and undesirable spaces within buildings that have greatly discouraged their use in buildings and given emphasis to escalators and elevators.

The stairs ought to be open and unobstructed (Fig. 3.35) by unnecessary turns or other obstacles and should be within 25 feet (22.86 metres) of an entrance and before any elevators.

Incorporation of aesthetic treatments such as vivid colours, artwork, and music among other elements aimed at creating visual interest (Fig. 3.34) contribute to the level to which a staircase entices building users. Use of natural lighting through windows and skylights as well as natural materials to make enclosed stairs appealing is recommended. Besides use of windows for natural lighting, they become very important in highlighting interesting outdoor prospects or indoor gathering areas (Fig. 3.36).

To emphasize a staircase as a dominant circulation route, they should be treated with the same finishing standards as other public corridors in the building.

Stair prompt signage at elevator banks and at the base of entrance to staircases and anywhere else where they will be most visible is recommended. Wayfinding signage to direct visitors to nearest stairways along circulation routes should be provided. Signage has been shown to be effective at encouraging people to use the stairs.

3.5.1.6 Incorporation of Less Prominent Elevator Design

Incorporation of elevators in a given development should be less prominent in comparison to the stairs for people who can use the stairs, while providing elevator access for people with disabilities. They should be located away from the building's main entrance and if possible, not programmed to return to the ground floor in an open position that will welcome and encourage their use (Fig. 3.37).

The architect should refrain from visually highlighting and articulating the elevator while visually emphasizing the stairs provided for everyday use. The number, size and capacity of elevators should be confined to the minimum required by code, as much as possible.

In high-rise commercial buildings, consideration should be made for a grand stair joining a second-level lobby accessible from ground level.

To discourage their use, consider reducing the elevator travel speeds or the lift car open-and-close speeds.

3.5.1.7 Provision of High-Quality Spaces for Multi-Generational Play & Recreation

Properly designed and maintained parks and playgrounds of all sizes serve as venues for physical activity and recreation, increase access to nature, and boost the value of surrounding properties. Parks and playgrounds shape community identity and serve as the backdrop to social interactions among different ages and groups. In one study, researchers found that those living within half a mile and a mile of a park used it for around 50% and 16% of vigorous physical activity time, respectively and playgrounds are essential resources in helping to combat the childhood obesity epidemic.

Developments should maximize access to on and off-site high-quality parks and recreation spaces with adaptable, multiuse spaces for community gathering, play and social activity for all ages while incorporating infrastructure exercise equipment for all ages (Fig. 3.38). Routes leading to recreation spaces ought to be safe, well-marked and well-lit and located in areas visible from sidewalks and other spaces with concentrated human activity in order for them to entice.

Fig. 3.37 Arbor House Development; The main entrance was relocated to make elevators less prominent and stairs more prominent.
Source: ULI, 2015

Fig. 3.38 Well designed recreation spaces shape a given community's identity for the better by servicing social connections.
Source: https://www.archdaily.com/376167/vinge-masterplan-proposal-effekt-henning-larson-architects

Fig. 3.39 Support for children who are generally the most physically active group in the society is key in successful active design.
Source: https://www.pinterest.es/pin/299137600241702022/

Fig. 3.40 Social interactions is an important factor in promotion of one's health and well-being.
Source: https://www.hksinc.com/what-we-do/case-studies/florida-international-university-parkview-housing-recreation-center/

3.5.1.8 Build Play Spaces for Children

Preserve or create natural terrain to support play like planting trees, grasses, and other greenery; make a hill to climb or cycle around; and add boulders, tree stumps, or sand. Incorporation of simple interventions such as colourful ground markings inspire more active play among children (Fig. 3.39).

Thinking beyond classic swings and slides and installing playground equipment that includes movable parts, imaginative playscapes, and opportunities for children of all abilities contributes to the appeal of children's play spaces as well as child development (Fig. 3.39).

In response to the a given local climate, provision of shelters that offer shade and wind protection become very necessary in making outdoor play for children is manageable. Drinking fountains also ought to be installed to encourage water consumption and support longer play.

Water features, such as splash pads with fountains, nozzles, and spray pipes on no-slip surfaces that use water in enhancing the experience of the children's playing, help children and families stay cool while being active even on the hottest days of summer.

3.5.2 Social Support Design

According to a London based architecture firm, SpaceShapers, based on a survey that they conducted in the summer of 2018, 1000 residents of the London were asked how many of their neighbours that they could name. On average, they could only name 2.5 people. 75% of those living in flats failed to name anybody in their block. Research shows that the loneliness is not just suffering from the elderly. Students, especially students from overseas, young moms and people with disabilities, are as likely to suffer from social isolation as the elderly, if not more. A study in 2007 by New Economies Foundation estimated that at the time of study, the cost of loneliness to employers in the UK through its impact on health and well-being was at £2,500,000 per year (Fig. 3.40).

The above-mentioned statistics show that there is an enormous amount of work architects can do to overcome isolation. Isolation may not necessarily stem from design related causes but design can and will impact isolation and loneliness either way.

In an attempt to examine the influence of social support on development of a sense of coherence, Helen Antonovsky and Shifra Sagy (Antonovsky and Sagy, 1986) make a proposition that stable social support may reflect stable community and therefore enhances the development of a stronger sense of coherence (Karaca, 2018).
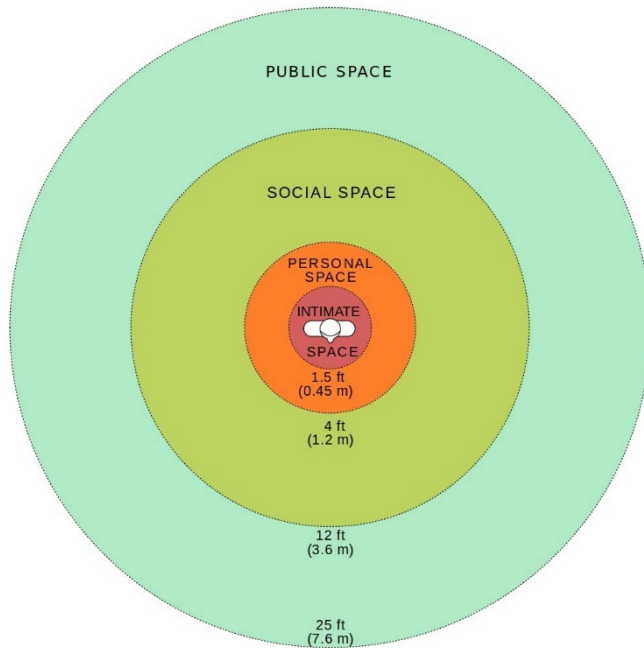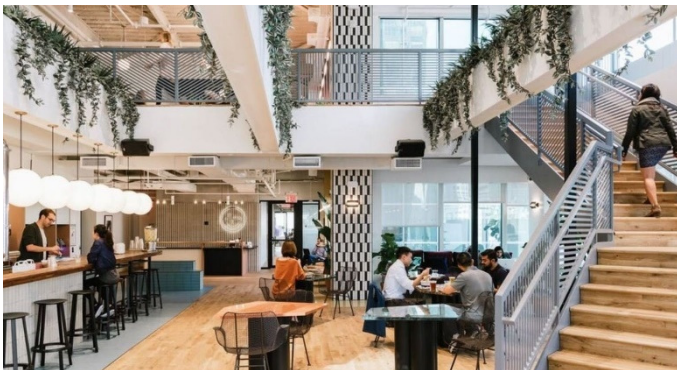
As suggested by evidence-based research, people with stronger social networks tend to be happier, stronger and healthier. This largely stems from social contact and support which are critical in fostering self-confidence and reduce isolation in communities (Karaca, 2018). As pertains to maintaining mental well-being, a strong and supportive social network is important and the built environment can facilitate opportunities for social activity.

Role of the Built Environment in Social Support

Research has shown that the manner in which the physical environment has influence on people's attitudes, emotions, motivation and behaviour is important to consider when the aim is health and well-being promotion. For this reason, identifying design factors and elements in the built environment through a salutogenic approach (Fig. 3.42) will convergence points that can promote spontaneous social interactions and support (Dilani, 2015).

At the helm of social support is conscious or subconscious meeting of human beings and people coming into direct contact and interact with one another which is the basis of human relations.

In an attempt to use design and the built environment to facilitate for social interactions, proxemics, one among several subcategories in the study of nonverbal communication, becomes necessary. In the simplest form, proxemics (Fig. 3.41) is the study of how humans use space, how it makes one feel and how one arranges objects and oneself in relation to given space. Proxemics divides our spatial surroundings in 4 categories; intimate space(0-450mm), personal space(450-1200mm), social space(1200-3600mm) and public space(3600-7600mm). As suggested in their names, it is within the outermost two concentric layers (social & public space) that a designer seeks to introduce interventions that encourage social interactions and support. The two innermost layers are reserved for family and friends whom one has had a prior connection and relationship with and infringing on this space brings territoriality into play. For this reason, designers ought to work on ensuring their interventions give a user the option to control their personal and intimate space.

Crowding is closely linked to social support and is often defined as the number of persons in a certain area of how much space every individual has received in a certain area. Crowding occurs when one's private space (intimate and personal space) is trespassed such as if one is exposed to more social interaction than is desired. However, on the other hand, if one is exposed to too little contact, there is a risk that one will feel lonely and isolated. The balance between crowding and undesirable loneliness can only be achieved and regulated if one can control his or her own levels of social interaction (Dilani, 2015).

Fig. 3.41 The understanding of proxemics is key in designing for social support.
Source: https://medium.com/@BarbMaiberger/proxemics-and-nonverbal-communication-in-emdr-therapy-f0ee5b73353d

Fig. 3.42 The built environment provides immense opportunity of bringing people together at convergence points.
Source: https://www.instantoffices.com/en/cn/available-office-space/hangzhou/xueyuan-lu-41436

Fig. 3.43 The built environment ought to be socially reinforcing in order to successfully support well-being.
Source: https://blog.thehub.io/blog/15-coworking-space-stockholm/

Fig. 3.44 Use of aesthetic, decorative and visually pleasing elements to slow down traffic to create social contact.
Source: https://www.archdaily.com/544590/godaddy-des-architects-engineers

Fig. 3.45 Cultural Centre in Nevers by Ateliers O-S Architectes; uses the bleachers at the front of the building as a tiered public square that can be used by local residents.
Source: https://www.dezeen.com/2012/11/20/cultural-centre-in-nevers-by-ateliers-o-s-architectes/

Social Support Design Guidelines/ Principles

In designing buildings, certain factors have a direct effect on the social interactions which can affect the sense of coherence of the building users as a result of social support (Fig. 3.43). A building will either encouraging or inhibit social interactions. The following are a number of guidelines that constitute of guidelines in designing for social support:

- Creation of meeting points
- Creating spaces where people can participate in social and cultural activities.
- Creation of attractive and inviting spaces.
- Provision of a range of open spaces for people to use and to observe.
- Pedestrian-friendly footpaths and socially enhancing street patterns.
- Safe and sociable play areas.
- High quality parks and recreational facilities.
- Inclusion of various activities for different groups.

3.5.2.1 Provision for Attractive and Inviting Meeting Spaces

To increase social contact in a given development, introducing aesthetically pleasing spaces to slow down movement along circulation routes will actively increase the social interactions that may otherwise have been non-existent along circulation routes (Fig. 3.44). Such spaces act as nodes that encourage building users to pause and for a moment in repose and it is in such spaces where social contact occurs with other people and social cohesion is developed within the given place.

As people go about their day to day activities, spaces to facilitate meetings that increase social cohesion should be visually and aesthetically pleasing. There should be carefully selected furniture to make it possible to rest as people interact. Decorative and aesthetic elements can also be used. As much as possible let the space be filled with views toward something whether it be nature or an artistic element as this will make it more inviting for someone to desire to be in that space and satisfy their curiosity of the experience within the space.

3.5.2.2 Provision for Spaces for Social and Cultural Activity Participation

Spaces such as plazas, parks, community rooms, roof decks and others ought to be designed on site to accommodate for social and cultural gatherings (Fig. 3.45), classes and programs that encourage social

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interaction and enhance opportunities for physical activities. Such spaces as much as possible ought to also be opened to public strengthen community ties (ULI, 2015).

Such spaces will bring together individuals form several walks of life together an a vibrant and activated social community is the result.

3.5.2.3 Pedestrian-Friendly Footpaths and Socially Enhancing Street Patterns

Just as in active design, well-marked crosswalks, special pavers, and curb extensions to visually highlight pedestrians and slow traffic create a conducive pedestrian experience (Fig. 3.46). In order to maximize walkability, developments should favour shorter blocks of travel between 60 to 120 metres with multiple intersections within the development.

Maximising visibility of points of interest from the pedestrian circulation routes increases the human activity and improves the potential of social contact.

3.5.2.4 Provision for Safe and Sociable Spaces

Security is an important aspect in making a place or space socially friendly as nobody would desire to be interacting with people in a place considered or perceived to be insecure and dangerous. The absence of safety takes away the manageability of space form its users and inhibits development of a strong SOC.

Spaces intended for people to socially interact ought to be devoid of anything that takes away the feeling of safety and security; be it industrial noise, dangerous equipment or criminal activities. As a result, the design of such spaces ought to take into consideration the potential threats to safety and security such as visual and auditory buffering against safety hazards or proper lighting design and reasonable transparency to discourage acts of crime (Fig. 3.47).

When designing a playground for children, there ought to be provision made for adult supervision to ensure child safety but the provisions made ought to also socially bring the adults in the play space together.

3.5.2.5 Provision for High Quality Parks and Recreational Facilities

Properly designed and maintained public spaces fusing with the natural environment will immediately result in more human activity as opposed to fully built-on sites (Fig. 3.48). Parks and recreational facilities shape community identity and serve as the backdrop to social interactions among different ages and groups. They more often than not result in a community's social cohesion.

Fig. 3.46 An urban garden by OFL Architecture in Favara, Italy creates a socially enhancing street response that caters for the pedestrian.
Source: https://www.contemporist.com/a-multi-sensorial-urban-garden-has-sprouted-up-in-italy/

Fig. 3.47 Safety and security within spaces through lighting and activity makes them more socially favourable.
Source: https://www.architonic.com/en/story/wanted-design-wanteddesign/7001114

Fig. 3.48 Shenzhen Talent Park by AUBE; Well designed and pleasing parks and recreational facilities generate more human interest that results in more social interaction
Source: https://www.archdaily.com/886026/shenzhen-talent-park-aube
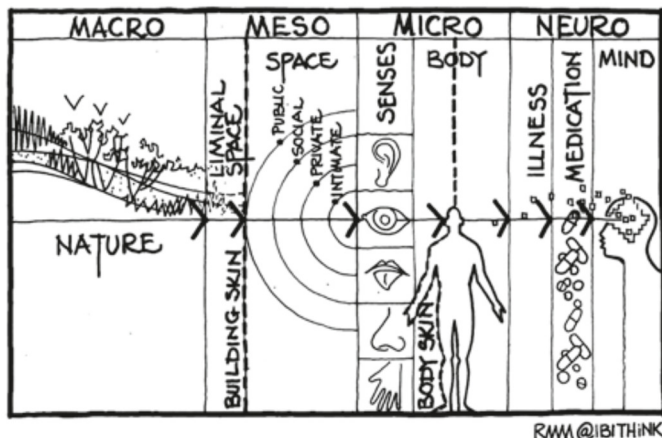
3.5.2.6 Provision for Various Activities for Different Groups and Encourage Inclusivity

A mix of multiple activities in order to accommodate for all different groups in a society is important in making a space more socially active and vibrant (Fig. 3.49). Social spaces ought to create opportunity for all age groups to exist in the same sphere and no age group or set should be isolated and confined to its own space. Both young and old together is a factor that leads to successful social architecture and design where no group feels lonely and isolated which is the reason for the generational disconnect.

3.5.3 Biophilic Design

Biophilia is a concept that introduced and popularized by biologist E. O. Wilson in his book Biophilia (1984) and is noted as biophilia is the inherent human inclination to affiliate with natural systems and processes, especially life and life-like features of the nonhuman environment (Fig. 3.50). By extension, biophilic design then becomes design that aims at restoring and enhancing people's positive relationship to nature in the built environment (Kellert, Heerwagen and Mador, 2008). Our natural environment offers various elements and features that encourage humans to be withdrawn from their everyday life and stressors and there is sufficient evidence linking contact with green space and better mental health by making it easier for one to perceive their lives as meaningful, structured and understandable (Karaca, 2018).

The 'nature nurtures, macro to neuro' graphic (Fig. 3.51) lucidly illustrates the essential dialogue between humans and the natural world together with identifying the structures and building envelopes that interrupt this relationship. Natural elements such as sunlight have to navigate through liminal spaces, building skins, public to intimate spaces and finally through the sensory receptors. This exposure in turn affects our physiology, emotions, psychological disposition and ultimately our physical condition. It is essential to note that this may be further attenuated by illness and medication (Mazuch, 2017).

The Role of the Built Environment in Biophilia

The built environment doesn't exist in a vacuum devoid of context and a surrounding environment. The built environment sits on the natural untamed environment which is at the heart of biophilia.

Essentially the natural world can be divided in two categories: 'living nature' that encompasses varieties of fauna and flora, and 'non-living nature' that includes water, soil, sunlight and many other inanimate elements in nature (Mazuch, 2017). With full knowledge of the natural relationship between mankind

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Fig. 3.49 Inclusive recreation spaces enhance the crossing over of social networks between different generations that reinforce the social support within a community.
Source: https://www.health.harvard.edu/staying-healthy/the-benefits-and-risks-of-multigenerational-fitness-parks

Fig. 3.50 Biophilia is the human love of nature.
Source: https://jennifercederstam.com/biophilia/

Fig. 3.51 The dialogue between human beings and the natural world.
Source: Mazuch, 2017

and nature, the designing and programming of the built environment creates a wonderful opportunity to respond to the essential dialogue that occurs between mankind and the natural world. Evidently, architecture has to deliver permeable design elements that allow this vital, beneficial and symbiotic dialogue to occur (Fig. 3.52).

The elements and attributes of biophilic design discussed herein are many and broad and cannot possibly be satisfactorily exhausted due to space and time limitations hence, for purposes of this thesis, they will be necessarily brief but clearly outlined to facilitate any future research that will exclusively dwell on the mentioned elements and attributes of biophilic design.

Dimensions, Elements and Attributes of Biophilic Design

According to Stephen R. Kellert (2008) in the book *Biophilic Design*, there are two basic dimensions to biophilic design followed by six biophilic design elements and further broken down to seventy biophilic design attributes (Kellert, Heerwagen and Mador, 2008). It is these specifications that assist designers in implementation of biophilic design in the built environment.

The first dimension to biophilic design is an *organic or naturalistic* dimension which is defined as shapes and forms in the built environment that directly, indirectly, or symbolically reflect the inherent human affinity for nature and this experienced in different ways. Direct experience occurs in unstructured contact with self-sustaining features of the natural world like plants, animals, daylight and ecosystems whereas indirect experience is in contact requiring human input to survive as in potted plants, an aquarium, water fountains and others. Symbolic / vicarious experience has no contact with physical and actual nature but through representation of the natural world through paintings, images, video, metaphor and more.

The second dimension to biophilic design is a *place-based or vernacular* dimension which is defined as buildings and landscapes that connect to a culture and ecology of a locality or geographic area. This refers to the sense or spirit of a place and is experienced as such by putting emphasis on how buildings and landscapes of meaning to people become integral to their individual and communal identity. This metaphorically transforms inanimate elements into elements that are almost lifelike and often sustaining life in the given locality. It is in this dimension of biophilic design that meaning through geographical and cultural identity is obtained.

Fig. 3.52 The benefits of biophilia
Source: https://www.naava.io/editorial/biophilia-love-of-life

The two dimensions are related to six design elements which are revealed in more than seventy biophilic design attributes. The six elements are as follows:

- Environmental features
- Natural shapes and forms
- Natural patterns and processes
- Light and space
- Place-based relationships
- Evolved human-nature relationships

3.5.3.1 Environmental Features

These are well-recognized characteristics of the natural world in the built environment. The 12 attributes identified under environmental features are:

a) **Plants**: Plants are essential to human life as sources of food, fibre, fodder, and other sustenance and protection aspects. Mere plant integration into the built environment may improve comfort, happiness, well-being, and efficiency (Fig. 3.53).

b) **Animals**: Animals are equally fundamental to human existence as sources of food, resources, protection, and companionship, and sometimes as precipitators of fear and danger. It can be difficult and problematic to design animal life in the built environment, although sometimes effective in aviaries, aquariums, and even the presence of free-roaming creatures associated with certain designs such as green roofs. Animals in building interiors typically occur as representations rather than in their literal forms. Through the use of decoration, art, ornamentation and I stylized and highly metaphorical disguise designers incorporate animals in design. The presence of animal forms thus evokes pleasure, stimulation, satisfaction and emotional interest (Fig. 3.55).

c) **Water**: This is one of the most basic needs and it elicits strong responses in most people. Several researchers have denoted the value and power of water in design as they note that water features are at the in almost every individual's idea of a Homeric landscape and water elicits high levels of liking or preference (Fig. 3.54).

d) **Air**: Over processed and stagnant air, people prefer natural ventilation. Important conditions include quality, movement, flow, stimulation of other senses such as feeling and smell, and visual appeal despite the atmosphere's apparent invisibility.

e) **Sunlight**: Daylight is commonly recognized by most people in the built environment as an essential and favoured feature. Simple use of natural light rather than artificial light can improve morale, comfort, health and productivity. This preference reflects the fact that humans are a largely diurnal

Fig. 3.53 Plants integration in architecture improve comfort, happiness, well-being and efficiency.
Source: https://www.go-gba.org/biophilia-design-nature/

Fig. 3.54 Water incorporated in architecture has the satisfies the human affinity for a homely experience.
Source: https://www.architecturaldigest.com/story/buildings-redefined-architecture-past-5-years

Fig. 3.55 Presence of animals evokes pleasure and stimulation.
Source: https://www.archdaily.com/879287/20-incredible-images-of-architecture-and-animals-the-best-photos-of-the-week

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Fig. 3.56 The ability of natural materials to reveal the actions of natural processes gives a peculiar satisfaction.
Source: https://www.archdaily.com/913036/jungle-keva-jaquestudio

Fig. 3.57 Kandalama Hotel by Geoffrey Bawa has multiple facades covered in plant matter that blends the structure with the surrounding context.
Source: https://www.uniqhotels.com/heritance-kandalama-hotel

Fig. 3.58 People tend to have a strong affinity for outdoor views that connect the space users to the outside world.
Source: https://architecturebeast.com

animal that relies heavily on sight to secure resources and avoid danger and hazard. People rely on visual acuity to satisfy various physical, mental, and cognitive needs.

f) **Natural materials**: People tend to lean toward natural materials over artificial or synthetic materials even when they are pretty close or seemingly exact replicas of natural products. This most likely because of the inability of artificial materials to replicate the natural processes that natural materials go through like ageing and weathering (Fig. 3.56).

g) **Colour**: Colour has been instrumental in human life and survival from time immemorial, improving the ability to locate food, resources, and water; recognizing hazards; promoting visual access; enabling mobility; and more. People are attracted to vivid floral colours, rainbows, beautiful sunsets, gleaming lakes, blue skies, and other natural world colourful features due to biophilia. Therefore, natural colours, such as earth tones, are often used by designers to have a good effect.

h) **Geology and Landscape:** Compatible connection of a building to a prominent geological feature is often an effective design strategy in crafting the experience of the building and the place hence the reason for such buildings being defined as grounded or rooted. Prairie-style architecture by renowned American architect Frank Lloyd Wright achieved particular success in part by creating strong parallel relations that emulated their savanna-type landscape as opposed to dominating them and popping out of the landscape.

i) **Habitats and Ecosystems:** Buildings and landscapes that are closely related or compatible in relation to the local habitats and ecosystems like forests, grasslands, wetlands and water sheds also tend to be highly effective and preferred.

j) **Fire:** While a complex and daunting design challenge, fire in the built environment is often a favoured feature, generally associated with heating and cooking benefits.

k) **Views and Vistas:** People express a strong and consistent preference for outdoor views, particularly when there are natural features and vegetation in the views (Fig. 3.58). Such views are often most compelling when the scale is compatible with human experience where they are not too limited or constrained, foreign or out of proportion or size as to be too large or too high.

l) **Façade Greening:** Vegetative façade buildings, such as ivy walls and green roofs, also give rise to curiosity and satisfaction. This probably reflects the historical advantages of organic materials as sources of insulation, camouflage protection, or even food. Plants on buildings and built environments can also invoke a dominant vernacular, such as the stinged or vegetative roofs of many cultures (Fig. 3.57).

3.5.3.2 Natural Shapes and Forms

These are representations and simulations of the natural world often found on building façades and in interiors and eleven attributes are associated with this element:

Fig. 3.59 A Bamboo Cathedral at Green School Bali in Bali, Indonesia structure mimics the natural tree structural support.
Source: https://trimtab.living-future.org/press-release/2019-stephen-r-kellert-biophilic-design-award-winners-announced/

Fig. 3.60 A building staircase imitates a natural shell form.
Source: https://www.farmersalmanac.com/biomimicry-nature-design-27835
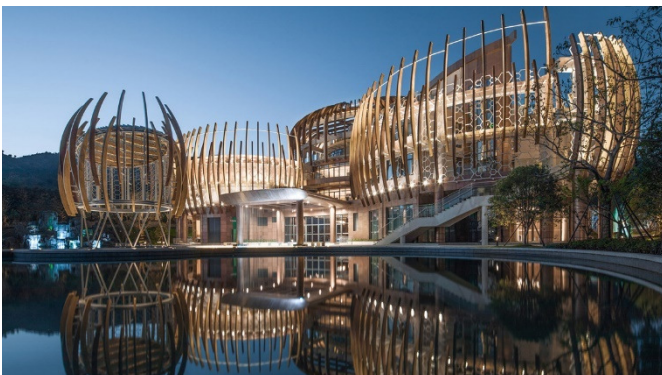
Fig. 3.61 Nature inspired forms tend to resist straight lines.
Source: https://worldarchitecture.org/article-links/ecghf/bulbousformed-bamboo-elements-form-this-organic-resort-designed-by-stylus-studio-in-zhejiang.html

a) **Botanical motifs:** Plant and other vegetative forms, shapes and patterns are a common and often important design element of the built environment. Such depictions also imitate or mimic, literally or metaphorically, plant forms such as trees, ferns, cones, shrubs, and bushes.

b) **Animal Motifs:** In building interiors and façades, animal life simulation is widespread, though to a lesser extent than with plants. Animal parts often appear, like claws or heads, rather than whole creatures. Animal images are often portrayed in shapes and forms that are highly stylized, fictionalized and sometimes contorted.

c) **Tree and columnar supports:** In human affairs, trees have played a vital role as food sources, building materials, paper products, heating supply, and other uses. A popular and often desired design feature in the built environment is the appearance or simulation of treelike shapes, particularly columnar supports (Fig. 3.59). Some of our most appealing structures include tree types and shapes that often include the capital of the plant.

d) **Egg, oval and Tubular forms:** These shapes often occur literally and metaphorically, both as important ornament expressions and sometimes for structural purposes. This leans more toward the subject of biomimicry that shall be discussed in more detail as its own attribute.

e) **Shells and Spirals:** Invertebrate creature simulations and depictions are common design features in the built environment, particularly shell and spiral shapes of actual and imagined molluscs (Fig. 3.60). Also common are the shapes and forms of bees (and their hives), flies, butterflies, moths, and other insects, as well as spiders and other invertebrates. Some building designs imitate invertebrate processes, such as the bioclimatic controls of termite mounds, the structural strength of seashells and hives, and web patterns.

f) **Arches, vaults and domes:** Arches, vaults, and domes in the built environment mimic or replicate shapes found in nature, like beehives, nest-like structures, shell shapes, and cliffs. For both artistic and functional purposes, these styles can be used.

g) **Shapes resisting straight lines and right angles:** In response to the forces and pressures found in nature, natural shapes and forms are often sinuous, fluid, and adaptive. Therefore, natural features are rarely exposed as straight lines and right angles typical of human engineering and goods and structures produced. Often, standardized and rigid shapes have characterized the large-scale modern built environment. Nonetheless, people generally prefer models that imitate organic forms to resist hard mechanical surfaces, straight lines, and angles (Fig. 3.61).

h) **Simulation of natural features:** This trait reaffirms the propensity to mimic natural forms in the built environment rather than reproduce them. In general, ornamentation and decoration employ abstract types that reflect only distinctly those present in the natural world. Such designs are often the most effective when they have a rationale that intimates practical characteristics (Fig. 3.61 and

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Fig. 3.62 ICD-ITKE Research Pavilion 2013-14 by ICD-ITKE University of Stuttgart is a biomimetic investigation of natural fiber composite shells and the development of novel robotic fabrication methods for fiber reinforced polymer structures.
Source: https://www.archdaily.com/522408/icd-itke-research-pavilion-2015-icd-itke-university-of-stuttgart

Fig. 3.63 The Kunsthaus Graz museum by Peter Cook and Colin Fournier has been termed as a baby hippo, sea slug, porcupine, whale and a "Friendly Alien"due to its biomorphic, indefinable something, a hybrid, strange and familiar at the same time.
Source: https://www.museum-joanneum.at/en/kunsthaus-graz/architecture

Fig 3.59) that occur in nature, such as forms, patterns and processes that imply structural integrity and adaptive advantage in response to environmental pressures rather than merely decoration.

i) **Geomorphology:** Many building designs imitate or metaphorically endorse landscape and geology in the context of the structure. This relationship with the earth can give the built environment the appearance of solidity, making buildings seem essential rather than separate from their geological background.

j) **Biomorphy:** Some built forms in architecture have very little to no resemblance to life forms in nature such as certain deconstructive works of architecture yet they are clearly viewed and defined as organic (Fig. 3.63). These resemblances of abstracted forms to forms in nature, usually unconscious products of design, are sometimes called biomorphy. One such example is the birdlike shape of the Sydney Opera House.

k) **Biomimicry:** Several successful designs borrow from adaptations functionally found in nature, particularly among other species such as the structural strength and bioclimatic properties in shells, crystals, mounds, hives and crystals as used in the built environment (Fig. 3.62). Knowledge of biomimetic properties has steadily gained traction over the years and continues to revolutionise product development with significant biophilic design implications.

3.5.3.3 Natural Patterns and Processes

This element stresses the integration of natural properties into the built environment, rather than the depiction or emulation of physical forms and shapes and fourteen attributes are associated with this element:

a) **Sensory variability:** Human health and longevity have always required a highly sensuous and variable natural environment to deal with, in general, light, noise, touch, scent, and other sensory environmental conditions. Human happiness and well-being tend to rely on perceiving and reacting to sensory variation, especially when it arises in the built environment in a structured, coordinated and ordered manner.

b) **Information richness:** The natural environment within which mankind is a part of is cognitively rich and this reflects that it is likely to be the most intellectually challenging environment people will ever encounter even in the modern information age. This value is one of its most beguiling attributes and can inspire interest, creativity, experimentation, learning, and problem-solving if successfully integrated in the built environment in real and metaphorical form. Therefore, most people respond positively to buildings and landscapes with a wealth of information, variety, texture and detail that imitate coherently revealed natural patterns.

Fig. 3.64 Norman & Doris Fisher House (1967) by Louis Khan is a house finished in cedar wood cladding and masonry stone which bring a high aesthetic value due to the materials revealing the age and change the materials have undergone.
Source: http://architectuul.com/architecture/fisher-house

Fig. 3.65 Courtyard House by RMA Architects in Awas, India uses the courtyard as central focal point around which the whole house is organized.
Source: http://rmaarchitects.com/architecture/courtyard-house/

c) **Age, change and the patina of time:** Organic forms age through time which is a fundamental aspect to the natural world. The dynamic progression of the natural world as a result time and age evokes a peculiar sense of familiarity and satisfaction (Fig. 3.64) among people notwithstanding the eventual occurrence of senescence, decay and culmination in death. A patina of time is a unique characteristic of organic and inorganic natural materials and is the reason that artificial products, even when exactly copied, rarely evoke a sustained positive response of satisfaction and pleasure.

d) **Growth and efflorescence:** Growth and development are specific expressions of aging that typically result in pleasure and satisfaction when found in the built environment. Efflorescence marks the progressive creation of a phase of maturation that is often highly appealing when seen in buildings and landscapes, especially through ornamentation. Such spatial and transient qualities also give the built environment a complex quasi-living quality given its unchanging structure.

e) **Central Focal Point:** A natural ecosystem's navigability is often improved by the existence of a central focus. This point of reference also converts what is otherwise a possibly chaotic and messy setting into a structured environment that makes it easier to transfer and find a way (Fig. 3.65). Most successful structures and built environments achieve similar continuity given difficulty and large-scale incorporation of a tightly ordered reference point.

f) **Patterned Wholes:** Once variation has been unified through organized and patterned wholes, people respond favourably to natural and constructed environments. What may have been perceived historically as an inchoate is organized in a manner that fosters comprehension and often feelings of mastery and control.

g) **Bounded Spaces:** Humans have a natural predisposition for bounded spaces. This territorial inclination has likely fostered resource control and protection over evolutionary time. In the built environment, people often appreciate delineated areas that promote understanding of clear and consistent borders and location demarcations.

h) **Transitional spaces:** By providing access from one area to another, transitional spaces within and between built and natural environments often foster comfort. Important passages are thresholds, portals, doors, bridges, and fenestrations in the built environment.

i) **Linked series and chains:** Clear physical and temporal movement in both natural and built environments is often facilitated by linked spaces, especially when occurring in connected chains. These relational spaces convey meaning and organization, as well as sometimes a sense of mystery that both stimulates and entices.

j) **Integration of parts to wholes:** People prefer the sense that discrete parts consist of an overall whole in natural and built environments, particularly when the whole is an emerging property composed of more than the sum of the individual parts. This integrative value fosters a sense of structural integrity even in large-scale and comprehensive complexes.

Fig. 3.66 Indian Institute of Management Ahmedabad by Louis Khan exhibits complementary contrasts in the play between light and shadow.
Source: https://divisare.com/projects/259229-cemal-emden-louis-i-kahn-cemal-emden-indian-institute-of-management-ahmedabad
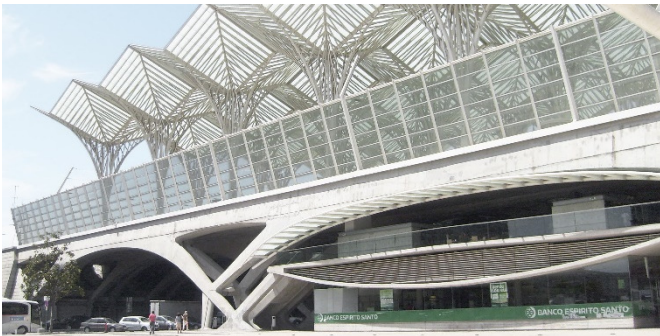
Fig. 3.67 Oriente Station, Lisbon by Santiago Calatrava exhibits orderly variation of a basic pattern in emulation of fractals that occur in nature.
Source: https://divisare.com/projects/322036-santiago-calatrava-lucia-giannecchini-oriente-station
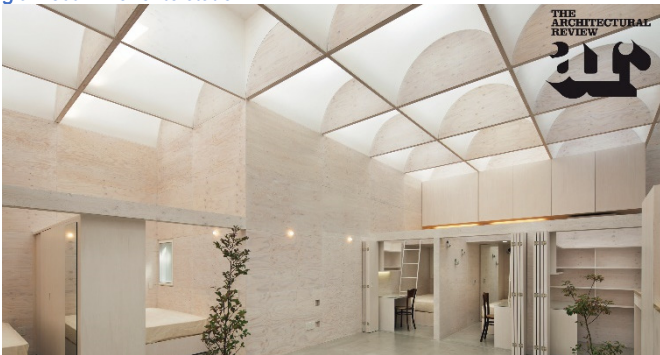
Fig. 3.68 Daylight House by Takeshi Hosaka Architects, Yokohama, Japan filters skylight to natural light the entire house.
Source: https://www.architectural-review.com/awards/ar-house/daylight-house-by-takeshi-hosaka-architects-yokohama-japan/8617662.article

k) **Complementary Contrasts:** This can happen by compatible rendering of apparent opposites, such as light and dark, high and low, or open and closed (Fig. 3.66).

l) **Dynamic balance and tension:** In both natural and built environments, the dynamic balance of different and sometimes contrasting forms often fosters a sense of strength and durability. This mixture of different forces often produces a creative tension quality that transforms static forms into organic entities.

m) **Fractals:** Elements in nature are rarely if ever exact copies of one another, even among highly related entities. Snowflakes or leaves of a single species or tree may be highly similar but never the same. Orderly variation on a basic pattern is the norm, whether it be thematic diversity based on size, or spatial or temporal scale. Related and similar forms are often called "fractals", and these patterns are found in some of our most successful buildings and landscapes (Fig. 3.67). These structures frequently include repeated but varying patterns of a basic design, such as ornamentation in parallel or closely linked rows that differ slightly from one another.

n) **Hierarchically organized ratios and scales:** Natural forms often occur in hierarchically connected ways, arithmetically or geometrically. The same is true for successful built forms. This thematic congruence may promote the assimilation of highly complex patterns that could otherwise be perceived as being overly comprehensive or even chaotic. The golden proportion and the Fibonacci ratio are the arithmetic and geometric expressions of this trend in both natural and built settings.

3.5.3.4 Light and Space

This element focuses on lighting and spatial relationships. There are twelve design attributes to this element where seven of them look at qualities of light and five focus on spatial relationships:

a) **Natural Light:** This quality contains the influence of sunlight as mentioned above, as well as the addition of natural light's full colour spectrum. Natural light is beneficial for people both physically and psychologically, also adding to their health, performance, and well-being in the built environment (Fig. 3.68).

b) **Filtered and Diffused Light:** To get the best out of natural lighting, daylight is on many occasions modulated by mitigating the effects of glare. In order to attract people to observe and stimulate feelings of connection, filtering or diffusing sunlight (Fig. 3.68 and Fig. 3.67) by providing a variable and mediated connection between spaces, a vestibule of sorts, more so between the outdoors and indoors.

c) **Light and Shadow:** The contrast between light and dark spaces complements in both buildings and landscapes and elicits significant satisfaction (Fig. 3.66). The play between light and shadow by a
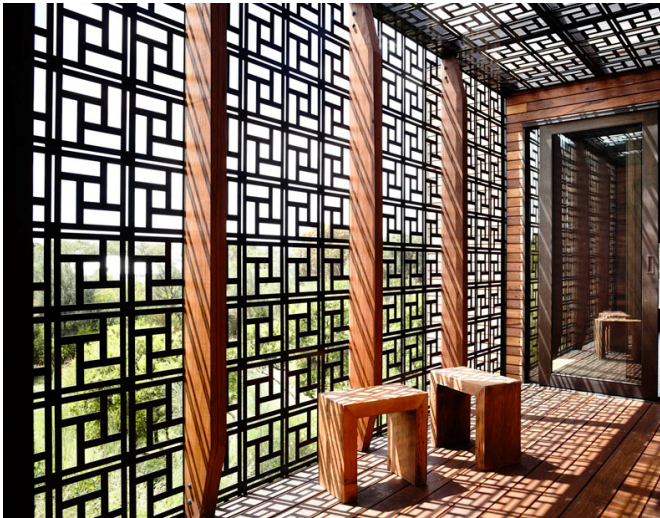
Fig. 3.69 Etham South Project by Wolveridge Architects uses screens to manipulate light and give it a shape and form.

Fig. 3.70 Jungle Keva by Jaquestudio uses visual and physical connectivity to the outside in order to satisfy the users.

designer through creative manipulation stimulates, creates mystery and triggers curiosity. It is this same attribute that enhances human movement and lends to the ability to perceive objects over long distances.

d) **Reflected Light:** Reflective surfaces like lightly coloured walls, ceilings and reflective bodies like water are usually incorporated as part of lighting design to reflect natural light. Functionally it serves to increase the depth of penetration of the natural light and mitigates glare.

e) **Light Pools:** These serves as an attraction to people as they are drawn into and through interior spaces with light pools (Fig. 3.68) of connected light and they assist in way finding, movement and giving a sense of security. The pools provide patches of light in dark, obscured and shadowy areas as it would be in a forest with a canopy cover that opens in certain parts to let light down.

f) **Warm Light:** Warm light psychologically creates a feeling of a secure, encapsulated and inviting interior space. The colour temperature of warm light is between 2700K – 3000K.

g) **Light as a shape and form:** To enhance aesthetic value in architecture, natural light can be manipulated to create dynamic and stimulating shapes and forms (Fig. 3.69). Such manipulation is done using objects like screens. The resultant light forms not only enhance the aesthetic of a place but serve for imagination, exploration, discovery and mobility.

h) **Spaciousness:** Though some people are specifically claustrophobic than others, generally, the feeling of openness within a space, more so when the openness occurs on the edges of a sheltered and protected refuge. Spacious settings tend to be closely linked, physically and visually, to smaller spaces. This is well demonstrated in transportation projects like train stations, airports and some educational and commercial institutions.

i) **Spatial Variability:** This fosters stimulation intellectually and emotionally and is most successful in complementary relation to organized & united spaces.

j) **Space as a Shape and Form:** To convey shapes and forms, designers can playfully and creatively manipulate space. This effect can add beauty to the built environment, encouraging interest, curiosity, exploration, and discovery.

k) **Spatial harmony:** The most successful manipulation of space happens when light, mass and scale are bent within a clearly demarcated surrounding and context. The resultant effect is sense of harmony that gives the psychological impression of security and it aids movement in various settings.

l) **Inside-Outside spaces:** For an enhanced appeal within the built environment of an interior space, apparent connectivity to the outside environment tends to be one of the key highlights of such appealing spaces and such areas also mark the changeover of nature with culture (Fig. 3.70). Design elements like interior gardens, porches, colonnades, foyers and atria within the built environment evoke this quality.

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Fig. 3.71 Fallingwater by F. L. Wright has a geographical connection in its response to the site by stepping down the steep slope and its cantilevering over the river below.
Source: https://franklloydwright.org/site/fallingwater/
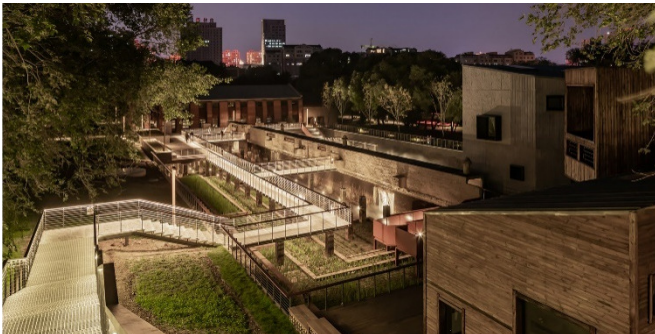
Fig. 3.72 Changchun Culture of Water Ecology Park by W&R GROUP seeks to reinforce the existing ecosystem on site.
Source: https://www.archdaily.com/907400/changchun-culture-of-water-ecology-park-w-and-r-group
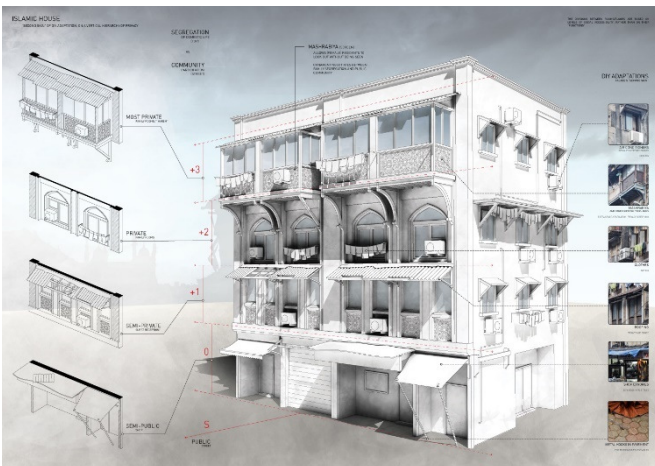
Fig. 3.73 The Islamic residential architecture tends to screen spaces cultural intervention to maintain privacy.
Source: https://ukhomedesign.blogspot.com/2019/06/islamic-architecture-home-design.html

3.5.3.5 Place – Based Relationships

This biophilic design element focuses on the success of marriage of culture with ecology in a geographical context. The bond between people and places serves to show an inherent human need to establish territorial control. The desire to be in a familiar place and satisfy a desire for a place to consider home is a deeply held need for most people.

Eleven attributes are identified for place-based relationships and the last one, place-lessness, serves as an antithesis of the first ten and not to be regarded as a stand-alone attribute.

a) **Geographic connection to place:** An individual's psychological link to the geography of a given place elicits feelings of familiarity and predictability which in turn foster a strong sense of coherence by altering the comprehensibility and meaning of a place to the individual in question. To connect people within the built environment to a geographical location, emphasis is made on prominent geological features in the context associated with siting, orientation, and views of buildings and landscapes (Fig. 3.71).

b) **Historic connection to Place:** This attribute works toward enhancing the meaning obtained through the built environment. Obtaining of meaning from a place tends to mark the elapsing of time, where an awareness and a sense of participation in the culture and collective memory is nurtured. In order to foster the meaningful relation to a place, buildings and landscapes ought to elicit a continuity with the past in order to encourage the belief that the present and future are meaningfully linked to the history of a place.

c) **Ecological Connection to Place:** A positive and complementary connection to the ecology of a place is one of the things that sustains a place (Fig. 3.72). This is more so from prominent ecosystems such as watersheds and dominant biogeographical features like forests, deserts, mountains, rivers, oceans and estuaries. Human interventions that give rise to the built environment, unavoidably remodel the natural environment but this does not necessarily have to diminish the overall ecological integrity, biological productivity and biodiversity of surrounding ecological communities. Human beings are undeniably an ecologically transformative organism as they are capable of significantly adding and subtracting value form the natural systems and the aim herein as pertains to ecological connection to a place is for the built environment to achieve net ecological productivity.

d) **Cultural Connection to Place:** This focuses on the integration of the geography, history and ecology of an area in order to form a core component of identity, communally and individually. The need of people to align themselves to a culture is universal, and can be satisfied within the built

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Fig. 3.74 Msambweni Beach house uses makuti roofing and coral rag in its finishes which are both indigenous to the Kenyan coast.
Source: http://www.beyondkenyasafaris.com/msambweni-beach-house
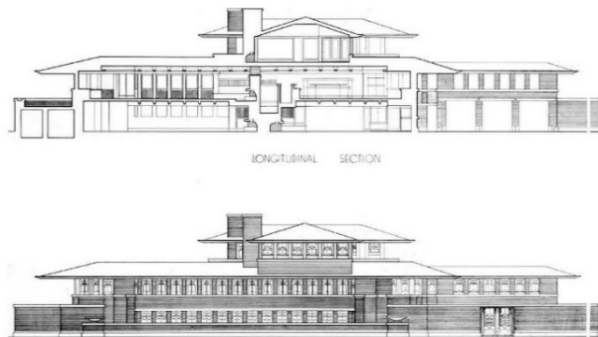
Fig. 3.75 Robbie House by F. L. Wright, a prairie style house takes its form from America's native biophysical prairie context.
Source: https://www.studyblue.com/notes/note/n/lecture-07-city-suburb-and-the-anti-industrial/deck/6716311

Fig. 3.76 Notre Dame Du Haut, Ronchamp by Le Corbusier takes on the life of its site and its history and thus plugs into the spirit of the place.
Source: https://herschelsupply.co/stories-design-spotlight-le-corbusier/

environment by preservation of the architectural heritage of a people manifested in their treasured and distinctive vernacular forms (Fig. 3.73).

e) **Indigenous materials:** Use of local and indigenous materials in the built environment results in a complementary relation to a place. Beside reducing the energy used and resultant carbon footprint arising from manufacturing and transportation in the construction process of built environment, local and indigenous resources are a vivid reminder of a local culture and environment that the people in question can so clearly resonate with (Fig. 3.74).

f) **Landscape orientation:** The built environment ought to complementarily sit on a local environment if at all to contribute to its sense of place. The structures on a given place that respect landscape orientation take advantage of biometeorological conditions such as slope, aspect, sunlight, sounds and wind direction. The landscape orientation considerations embed the buildings in the local setting as a part of the place and not separate from it.

g) **Landscape features that define building form:** The built environment should not be isolated from its biophysical context such that it should integrate with it and respond appropriately to the existing landscape features (Fig. 3.75). Building forms can be determined by prominent geological features and natural objects and water. When isolated form it's biophysical context, what would otherwise be excellent and iconic buildings are not cordially received as they are perceived as divorced from their context and treated as barren.

h) **Landscape Ecology:** Successful place-based designs reinforce landscape ecology for posterity. It is achieved through sensitive design that takes into consideration, landscape structure, pattern and processes such as ecological connectivity, biological corridors, resource flows, biodiversity, optimal scale and size, ecological boundaries, and other parameters of functioning natural systems.

i) **Integration of culture and ecology:** In order to achieve long term sustainability, culture and ecology ought to be fused. The fusion of the two demarcates the junction where humanity and nature are positively transformed and mutually enriched by their association. As a result, the people who reside within buildings and landscapes that integrate culture with ecology develop a sense of loyalty, responsibility and stewardship toward that particular built environment.

j) **Spirit of place:** This is the level of commitment and meaning that people extend to both natural and built environments when they become cherished components of individual and collective identity making the place more than just inanimate matter (Fig. 3.76). It is a metaphoric sign of the built environment taking on life and creates a motivational basis for long term stewardship and responsibility because they give rise to and sustain human culture and ecology over their life time.

k) **Avoiding place-lessness:** Much of modern architecture has been characterised by divorce of design from cultural and ecological connection to the given place. The divorce form biocultural context has resulted in the corrosion of human-nature relationships that have affected the sense of

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Fig. 3.77 A sense of security and protection from potential threats to well-being make one's surrounding manageable.
Source:
https://www.webpages.uidaho.edu/larc301/lectures/archAndSpace.htm

Fig. 3.78 Cathedral of Santa Maria del Fiore, Florence, Italy - A mastery of ordered complex elements is desirable.
Source: https://blog.interface.com/complexity-and-order-biophilic-design/
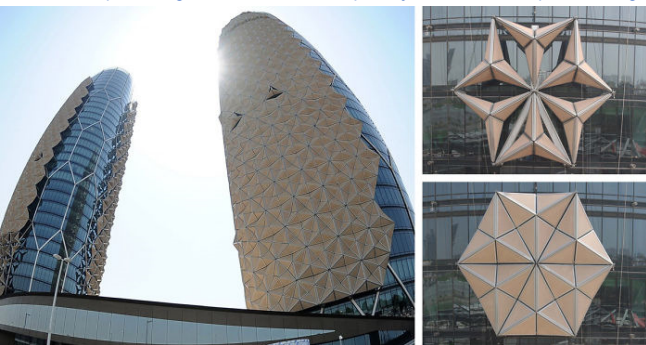
Fig. 3.79 Al Bahar towers by Aedas Architects in Abu Dhabi offers protection from the harsh sun through sun shading and orientation thus making spaces manageable.
Sources: https://www.boredpanda.com/geometric-sun-shades-al-bahar-towers-abu-dhabi/?utm_source=google&utm_medium=organic&utm_campaign=organic

responsibility and stewardship developed towards our environment hence the need to discuss environmental sustainability.

3.5.3.6 Evolved Human-Nature Relationships

The last biophilic design element at a glance may seem to not be in the right place as all the previously discussed elements major on biologically based human affinities for the natural world. However, the attributes under evolved-human nature relationships, specifically focus on fundamental aspects of the inherent human relationship to nature. The Twelve attributes are discussed where the last eight are derived from a typology of environmental values developed by Stephen R. Kellert (2008).

a) **Prospect and Refuge:** Refuge reflects the ability of a structure or natural environment to provide a safe and protected environment. This often happens in the built environment by designing comfortable and nurturing building interiors and secret landscape sites (Fig. 3.77 and Fig. 3.81). Prospect, emphasizes discerning distant objects, habitats and horizons, evolutionarily instrumental in locating resources, facilitating movement and identifying sources of danger. A complementary relation between prospect and refuge in the built environment results in more satisfying buildings and landscapes as they work together to make our environment more manageable.

b) **Order and Complexity:** Order comes by establishment of structure and organization. The order however ought to be controlled as too much of it results in vainly repetitive, monotonous, boring and mundane structure. In sharp contrast is complexity which dwells upon the occurrence of detail and variety. Just like order, the excess of complexity is exasperating and assimilation of detail becomes very hard. Excessive complexity potentially runs the risk of giving a sense of chaos. The perfect balance between order and complexity gives forth successful and sensual designs (Fig. 3.78) that elicit a desire for variety but in ways that seem controlled and comprehensible. This attribute works for all the 3 components of a sense of coherence; comprehensibility, meaning and manageability.

c) **Curiosity and enticement:** Enticement fosters curiosity which is the human desire for discovery, mystery, exploration and creativity which all work together to aid in problem solving. The built environment should tap into these complementary tendencies that have the potential of engaging human intellect and imagination (Fig. 3.82 and Fig. 3.84).

d) **Change and metamorphosis:** Change is inevitable and constant in both human and natural systems as is seen in the growth, metamorphosis and maturation processes. Capturing this developmental and dynamic quality in a design where one form, space or state appears to

Fig. 3.80 Rural House by RCR Arquitectes opts for a sensitive and minimal intervention; revealing mastery and control in building within the natural environment.
Source: https://www.archdaily.com/635710/rural-house-rcr-arquitectes

Fig. 3.81 Therme Vals by Peter Zumthor incorporates the natural environment with architecture with evokes exploration and discovery.
Source: https://www.archilovers.com/projects/70375/therme-vals.html

Fig. 3.82 Church of Light by Tadao Ando uses light and shadow to evoke the reverential feeling.
Source: https://www.youtube.com/watch?v=7ZtfYOD5I8M

develop, grow and flow into another as though form one stage to another in evolutionary sequence results in a successful and powerful solution in the built environment.

e) **Security and Protection:** Protection against dangers and threats in nature (Fig. 3.79) is a very important objective in the built environment. It ensures a space is manageable as it is safe and no harm looms. This, however, like order and complexity, ought to be balanced so as not to excessively isolate and insulate against the natural world.

f) **Mastery and Control:** The built environment is a reflection of the innate desire of human beings to have mastery and control over nature. The most successful works of mastery and control aren't those that have the greatest manipulation of the existing natural world, rather they are the most sensitively designed interventions (Fig. 3.80) that moderately and respectfully touch the natural world. Mastering nature gives a sense of satisfaction in expression of human ingenuity and cleverness which boosts self-confidence and self-esteem.

g) **Affection and Attachment:** Buildings and landscapes that trigger strong emotional affinities for nature receive lasting loyalty and commitment because affection for the natural world has been a critical component in spawning the potential of human beings to bond and be attached.

h) **Attraction and Beauty:** The human attraction to nature due to the aesthetic in it is one of the strongest inclinations in human beings. This biologically embedded phenomenon has been integral in cultivating curiosity, innovation, ingenuity, discovery, and problem-solving. Some of the most successful buildings and landscapes in the built environment promote an aesthetic appreciation of natural processes and forms (Fig. 3.83).

i) **Exploration and Discovery:** As pertains to abundance of information and intellectual stimulation, no other environment that people encounter can compare to nature. Built environments that facilitate opportunities for natural process exploration and discovery generate considerable interest and appreciation, even when these environmental features are largely revealed in representational ways.

j) **Information and Cognition:** Designs that put emphasis on the complexity of natural forms and shapes nurture cognitive prowess and intellectual satisfaction. Such design nurture critical thinking and problem solving by direct and indirect experience of nature and creative use of ornamentation in the built environment.

k) **Fear and Awe:** As stated earlier in the security and protection attribute, protection against dangers and threats in nature is a very important objective in the built environment. However, fear of natural dangers and risks can be a motivating factor in designing for perilous adventure in the built environment. Such elements like cliff edges, overhanging precipices and near proximity to fearsome forces like rushing water trigger feelings of awe for the natural world. These feelings further can combine reverence with fear as seen with some celebrated structures

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that extol majestic natural features to produce in the users a feeling of awe in appreciation of powers greater than ourselves.

l) **Reverence and Spirituality:** Some of the more cherished buildings and landscapes affirm the human need for a meaningful relationship with One greater than themselves. Such designs trigger feelings of transcendence (Fig. 3.82) and connection that defy the notion of aloneness of an individual in space and time where one is drawn to imagine and believe the existence of one greater. Built environments that achieve this reverential feeling of connection are sustained generation after generation.

3.6 Synthesis

In this chapter, a theory first coined by Prof. Aaron Antonovsky known as Salutogenesis is introduced and forms the basis of the research as a viable solution to health promotion through the built environment; architecture. The history and theory of Salutogenesis is discussed and the key construct in the salutogenic model which is the SOC is broken down and each of its 3 components (manageability, comprehensibility and meaningfulness) applied to architecture and how through architecture a strong SOC is obtainable by catering for the 3 components of an individual's SOC.

The general principles of salutogenic design are further listed and described, they constitute of culture, aesthetics and décor, daylighting, sound and noise control, thermal comfort, colour, ergonomics and materials & textures.

The 3 key principles of salutogenic design; active design, social support design and biophilic design, which form the basis of the thesis are discussed in depth to bring out their complementary relationship such that active design gives rise to nodes that facilitate for socially supportive design where biophilic elements through environmental psychology promote a healthy and conducive environment in which the human being can thrive.

Fig. 3.83 Under Pohutukawa House by Herbst Architects seeks to maintain the Pohutakawa tree forest around and even draws inspiration from the tree forms.
Source: https://www.archdaily.com/230172/under-pohutukawa-herbst-architects?ad_source=search&ad_medium=search_result_all

Fig. 3.84 Tree House by Malan Vorster Architecture Interior Design inspires curiosity and enticement by its integration with its natural environment.
Source: https://www.archdaily.com/873882/tree-house-malan-vorster-architecture-interior-design

Salutogenic Design Principle	Parameter	Variable
Active Design	Mixed Land Uses	Land Use Types
	Well Designed & Connected Paths	Path Connectivity Path Aesthetics Path Distances
	Pedestrian Oriented Streetscapes	Streetscape Typology Building Height
	Biking Infrastructure	Bike Storage Cycling Routes & Paths
	Stair Design	Stair Aesthetics Stair Visibility Stair Ergonomics & Anthropometrics Stair Prompts Stair Location Stair Material & Finish
	Elevator Design	Elevator Location Elevator Visibility
	Multi-Generational Play & Recreation Spaces	Recreation Space Types
Social Support Design	Meeting Spaces	Aesthetics & Décor Location of Nodes/Meeting Spaces Cultural Activity Participation
	Well-designed & Connected Paths	Path Connectivity Path Aesthetics Path Distances between Buildings
	Safety & Security	Defensibility Lighting Acoustic Buffering
	Multi-Generational Play & Recreation Spaces	Recreation Space Types

Table 1: Summary of Active Design and Social Support Design Guidelines
Source: Author and ULI (2015)

Salutogenic Design Principle	Element	Attributes	
Biophilic Design	Environmental Features	Color Water Air Sunlight Plants Animals	Natural materials Views and vistas Façade greening Geology & landscape Habitats & ecosystems Fire
	Natural Shapes & Forms	Botanical motifs Tree & columnar supports Animal (mainly vertebrate) motifs Shells & spirals Egg, oval, & tubular forms Arches, vaults, domes	Shapes resisting straight lines & right angles Simulation of natural features Biomorphy Geomorphology Biomimicry
	Natural Patterns & Processes	Sensory variability Information richness Age, change, and the patina of time Growth & efflorescence Central focal point Patterned wholes Bounded spaces	Transitional spaces Linked series & chains Integration of parts to wholes Complementary contrasts Dynamic balance & tension Fractals Hierarchically organized ratios & scales
	Light & Space	Natural light Filtered & diffused light Light & shadow Reflected light Light pools Warm light	Light as shape & form Spaciousness Spatial variability Space as shape & form Spatial harmony Inside-outside spaces
	Place-Based Relationships	Geographic connection to place Historic connection to place Ecological connection to place Cultural connection to place Indigenous materials Landscape orientation	Landscape features that define building form Landscape ecology Integration of culture & ecology Spirit of place Avoiding placelessness
	Evolved Human-Nature Relationships	Prospect and refuge Order and complexity Curiosity and enticement Change and metamorphosis Security and protection Mastery and control	Affection and attachment Attraction and beauty Exploration and discovery Information and cognition Fear and awe Reverence and spirituality

Table 2: Summary of Biophilic Design Elements and Attributes
Source: Author and Kellert et. al (2008)

4 RESEARCH METHODOLOGY
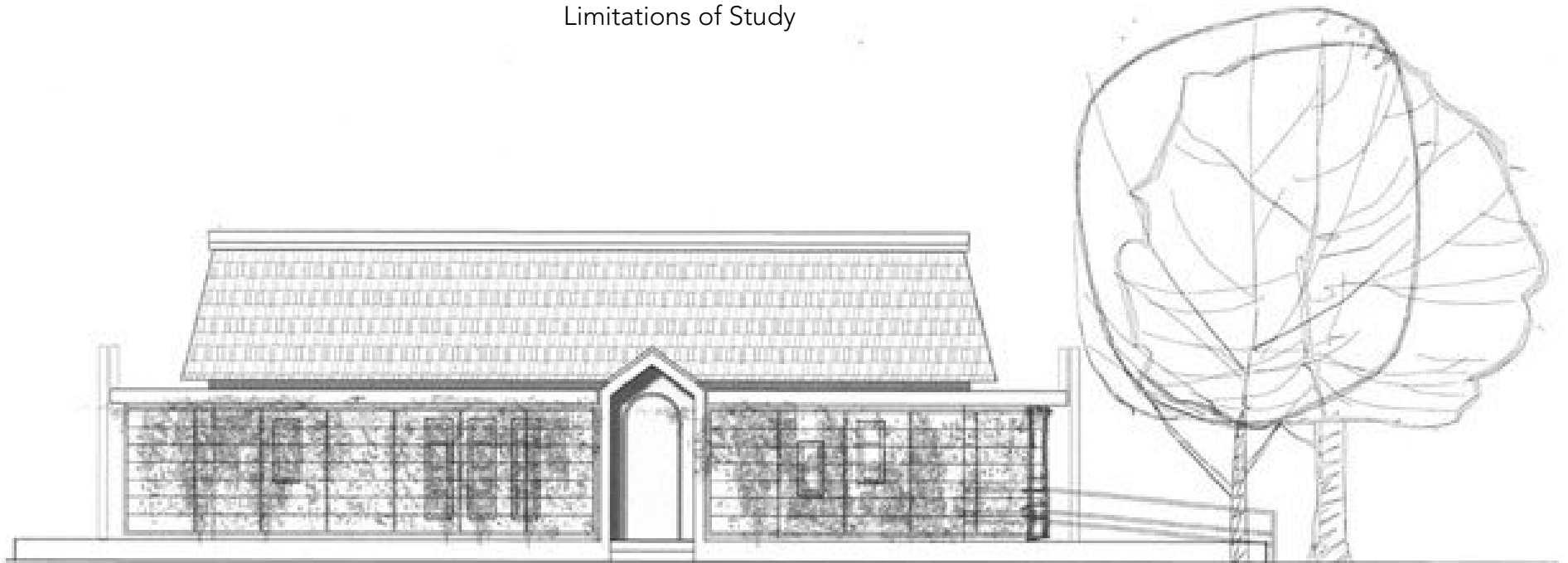
4.1 Introduction

In this chapter, the process of inquiry in this architectural research, its structure and procedures so as to achieve the aims and objectives in Chapter 1 of this study are articulated in a logical order. The chapter further outlines the research strategies that were used in data collection, collation, analysis and interpretation.

As stated in the Chapter of Introduction, the research questions that this study seeks to answer are;

1. What is psychosocially supportive design?
2. What architectural framework constitutes psychosocial support in retreat centre design?
3. How can psychosocial support be achieved in all architectural design not confined to healing environments?

4.2 Research Purpose

This research is descriptive as the core objective of this study is to investigate what defines psychosocially supportive or salutogenic design in architecture for retreat centres in Kenya (Fig. 4.1). Based on the study outcomes, architecture for retreat in Kenya is critiqued for its level of success in provision of psychosocially supportive environments necessary for effective retreat. The study outcomes are tested further for feasibility in environments outside of retreat centres so as to determine the potential of an all-round salutogenic built environment.

The qualitative nature of the study seeks to provide data on real life situations and make sense of human behaviour and understanding within a given retreat or restorative context.

4.3 Research Design

This is the conceptual plan and structure adopted in order to guide, test and determine how one operationalizes the research problem and achieve the envisioned results (Rukwaro, 2016). The research design guides in identifying and developing of the processes and logistical arrangements required to undertake a study so that the selected procedures are valid, objective and accurate.

Retreat centres fall under the hospitality industry constituting of a broad category of fields within the service industry that includes accommodations, food and drink, tourism and travel. Such developments in the hospitality sector include; Bed & Breakfasts, Hotels, Motels, Hostels, Resorts, Serviced Apartments, Time-sharing plans, restaurants, catering, bars and cafés, nightclubs, tea & coffee shops among other less prominent ones. All the mentioned parts of the hospitality sector tend to overlap as

Fig. 4.1 Arjiju Resort, Laikipia, Kenya - The research seeks to describe what constitutes salutogenic architecture in Kenyan retreat centres.
Source: http://www.archidatum.com/projects/arijiju-resort-life-grand-group/`
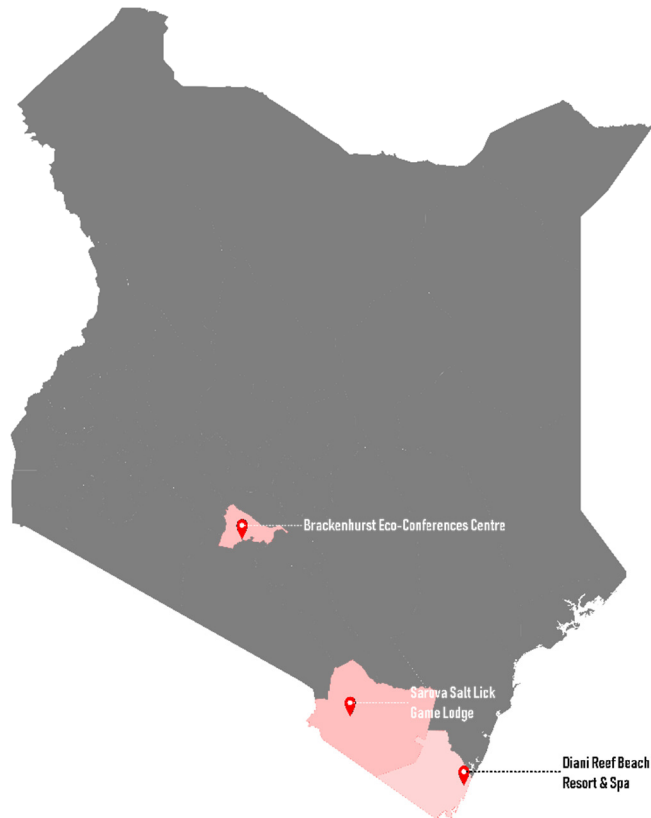
Fig. 4.2 A case study research strategy is used in conducting this research.
Source: Author

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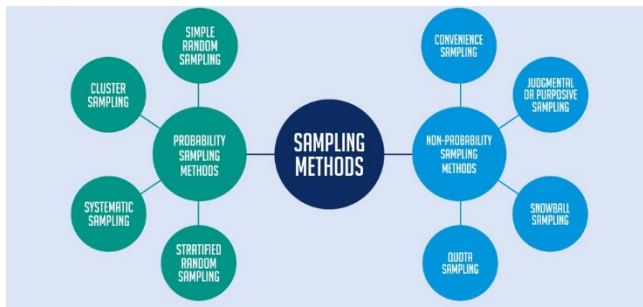
Fig. 4.3 To achieve the desired results, probabilistic sampling methods are used in this study
Source: https://www.scribbr.com/methodology/sampling-methods/
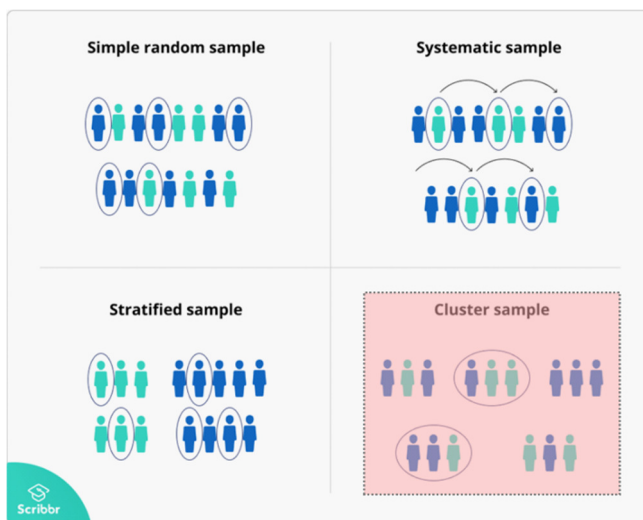
Fig. 4.4 Due to the size of the samples available, the cluster sampling method is used.
Source: https://www.questionpro.com/blog/types-of-sampling-for-social-research/

some of them are complementary. Retreat centres fall in the resort bracket where resorts are defined as the high end of the hospitality spectrum such as yoga retreats, wellness centres and properties designed to provide unfettered views of nature.

Based on the literature review it has been established that the case study research strategy (Fig. 4.) is the most appropriate method to conduct the research as it would give a detailed examination of the phenomena under study in given cases as examples of the greater class of retreat centres in Kenya (Rukwaro, 2016).

4.4 Sampling Design

Sampling design is basis and definitive plan by which the researcher adopts a representative sample from a given population determined before data collection such that the results from the data collected can be generalized for the whole population (Rukwaro, 2016). There are two sample design types (Rukwaro, 2016), that is;

1. Probabilistic or Random Sampling
2. Non-Probabilistic or Purposive Sampling

In order to achieve the envisioned results in this study, probabilistic sampling methods (Fig. 4.3) were implemented in the critiquing of retreat centres as a general architectural typology makes all retreat centres in Kenya have the same probability of being included in the final sample chosen. The probabilistic sampling methods include the following (Rukwaro, 2016); simple random, cluster, stratified and systematic sampling.

4.5 Sampling Criteria

For purposes of this study, the cluster sampling method (Fig. 4.4) is to be used due to the large-scale nature of the study covering multiple retreat establishments in Kenya. This sampling method seeks to group all retreat centres in Kenya in non-overlapping units based on their varying functions as clusters where one cluster has retreat centres similar in delivery of retreat function.

The case studies are then selected from the cluster typologies based on the willingness of retreat management to grant access and their relative popularity which could be a direct reflection of the success of the retreat destination in delivering the desired restorative experience.

Fig. 4.5 The sample unit of analysis in the study is the retreat serving centres and developments.
Source: https://towardsdatascience.com/data-samples-and-error-visualization-techniques-832c4a7fbcb2

Fig. 4.6 The sample frame from which samples are selected are the 3 designated retreat typologies in Kenya as per this study.
Source: https://www.amritaakhouri.com/single-post/2018/01/23/Sampling-process

Fig. 4.7 One retreat facility from each sample clusters that make up the sample frame is selected as a representation of each cluster.
Source: https://towardsdatascience.com/ab-sample-size-calculation-in-r-ad959a4443a2

4.6 Sample Unit of Analysis

The study samples were selected based on the fact that they function retreat centres (Fig. 4.5) hence expected to embody architecture for retreat required for this study. They all are within the same national context that is Kenya but not restricted to only a particular region of the country or climate because the parameters in question are not specific to a given local neighbourhood or climatic context but are measurable across the board regardless of the part of the country measured from. The entire retreat landscape of the country offers a great deal of varying psychosocially supportive interventions that offer a causal link worthy of explanation in the findings.

4.7 Sample Frame

 The sample frame is the complete listing of all the units of the target population from which the samples are chosen (Rukwaro, 2016). Retreat centres can be classified by different categories such as by size, location, designation (function), seasonality and ownership. These categories can overlap however and one retreat facility can be classified in more than one group such as a mega ski retreat (size and designation) or boutique mountain retreat (size and location).

For purposes of this study, the retreat centres in question are classified by designation or function as it is most practical in clustering the retreat centres in the Kenya with clear differences in service delivery and they are classified into three categories based on their main function in delivery of a retreat experience (Fig. 4.6). The three sample frames are;

4. Spiritual Retreats: Established by religious groups and organisations that aim to provide their users with an experience aimed at deepening their connection with their respective supreme or supernatural being.
5. Game excursion Retreats: Established as game viewing excursions nature walk retreats that aim to put their users in withdrawn natural environments to observe and appreciate flora and fauna not common to the urban setting.
6. Scenic Retreats: Established with an aim of immersing their users in withdrawn locations around particular scenery such as mountainous, coastal or forest regions which are in retired destinations away from urban hustle and bustle of the city.

4.8 Sample Size

The sample size would consist of 3 buildings, one from each sample frame (Fig. 4.7). Each case study will represent the other cases falling under the same frame in order for the data collected to equally demonstrate the different or similar ways in which the different retreat facilities are designed to satisfy differing experiences yet have similar effects on their users. The reason behind the sample size is stated in the scope and limitations under Chapter One.

4.9 Data Collection

This study was conducted using both primary and secondary methods of data collection.

4.9.1 Primary Data (Field Study)

a) Observation

This was the main method of primary data collection. The various case studies were analysed to deduce human behaviour in the given developments so as to understand the impact of various architectural interventions aimed at creating a restorative experience. Observation of social interactions among the users of the spaces played a great role in identifying spaces within social support was experienced in real life situations.

b) Physical Measurement

Architectural drawings and physical measurements of building dimensions and distances were used in establishing measurements within the developments to determine the validity of the three parameters in question within the retreat centres. This was done by use of a laser distance meter (Fig. 4.9).

c) Scientific Measurements

Establishing distances and relationship to calorie burn and elevation gain over given distances for active design investigation were conducted by use of magnetic, accelerometer, pedometer and altitude sensors in the Samsung Galaxy S8 smartphone (Fig. 4.8).

d) Digital Cameras for Photography

Digital cameras (DSLR and Smartphone) were used in capturing of photographs pertaining to active design, social support and biophilic design (Fig. 4.10).

Fig. 4.8 Samsung Galaxy S8 SM-G950F smartphone used in data collection and analysis.
Source: Author

Fig. 4.9 AvidPower Laser Distance Meter (70m) used in physical measurement of spaces.
Source: Author

Fig. 4.10 The Canon EOS 600D digital single-lens reflex camera and Canon PowerShot SX530 HS Digital Camera used in photgraphic data collection.
Source: Author
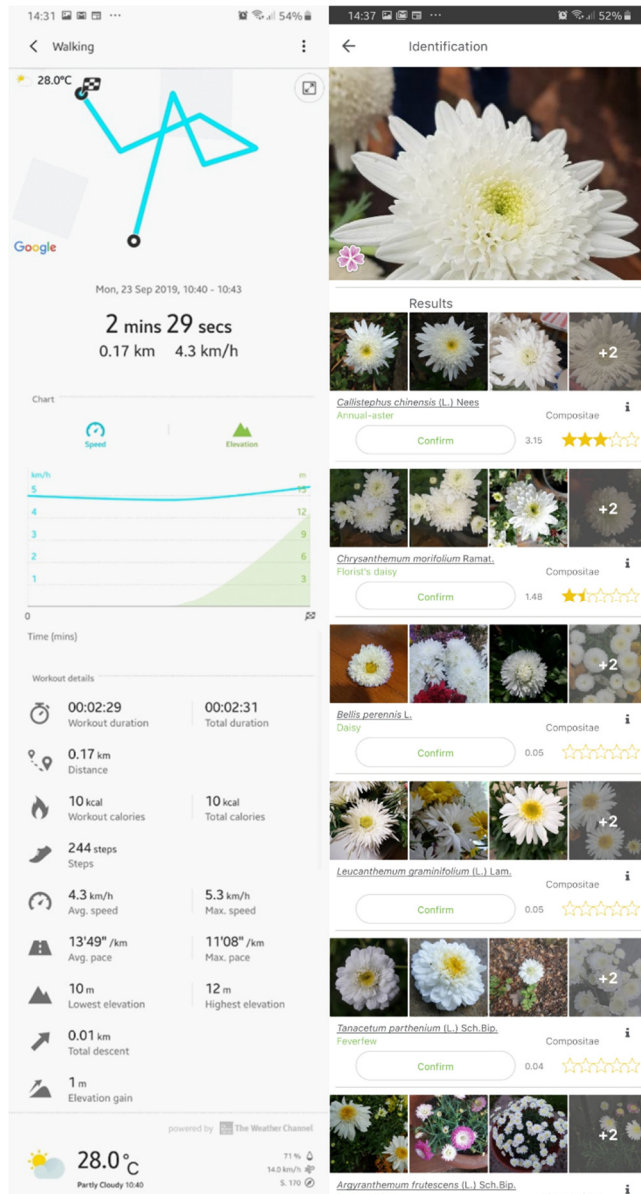
Fig. 4.11 S Health (left) and PlantNet (right) mobile applications as used in data analysis.
Source: Author

4.9.2 Secondary Data

Literature Review

The literature review content that pertains to this study was covered in Chapters 2 and 3 and provided the theoretical and conceptual basis that made the study possible where active design, social support and biophilic design were investigated. The literature review was sourced from books, journals, thesis and publications from multiple authors discussing psychosocial support as obtained through architecture.

4.10 Data Analysis and Presentation

Data Analysis

a) Descriptive Analysis

The data collected in the cases was analysed by descriptive analysis of the different phenomena observed and recorded to expound on the phenomena occurring on site that cannot be physically measured. The data is analysed and builds upon the literature review foundation to describe the implementation or lack thereof of a given variable identified in the literature review and the resultant effect that alters the experience.

b) Scientific Data Analysis

Samsung S Health mobile application has been used to generate the scientific data collected as pertains to active design. The information from the analysed data by the S Health application has been represented in the form of a table showing the Circulation ID, Distance, Calories Burnt, Lowest Elevation, Highest Elevation and Elevation Gain (Fig. 4.11).

PlantNet Plant Identification mobile application by plantnet-project.org has been used in identification of plants photographed on sites (Fig. 4.11).

Fig. 4.12 Time constraints served a hurdle in conducting the study.
Source: https://www.gettyimages.com/detail/illustration/time-clock-icon-set-royalty-free-illustration/165816849?adppopup=true

Fig. 4.14 Ease of access to conduct study in certain spaces and facilities was limited by management and administration.
Source: https://en.wikipedia.org/wiki/File:Stop_hand_nuvola.svg

Fig. 4.13 Financial constraints in conducting the study reduce the possible locations available for study and the number of visits that could be made to certain retreat facilities.
Source: http://www.restaurantmanifesto.com/restaurant-people-always-broke/

Data Presentation

The data collected and analysed in this dissertation has been presented in form of:

a) Architectural drawings
b) Tables
c) Photographs
d) Sketches
e) Notes
f) Maps

4.11 Limitations of Study

The main hurdles encountered in the study were financial constraints (Fig. 4.13), time (Fig. 4.12) and ease of access to conduct study in various locations (Fig. 4.14). This resulted in dependence upon previously done observations, descriptions and publications.

The field work was undertaken in a time frame of 7 days; 3 days at Brackenhurst Eco-Conferences Centre, 1 Day at Sarova Salt Lick Game Lodge and 3 days at Diani Reef Beach Resort & Spa.

5 CASE STUDY ANALYSIS AND FINDINGS

Introduction

Brackenhurst Eco-Conferences Centre

Sarova Salt Lick Game Lodge

Diani Reef Beach Resort and Spa

5.1 Introduction

In preceding chapters, this dissertation has been built on a theoretical base in order to establish facts for normative action as pertains to creation of psychosocially supportive environments in architecture. This chapter sets out the fieldwork conducted in 3 retreat facilities (Fig. 5.1) representing each retreat category in Kenya deduced for purposes of this study. The 3 facilities are:

- Brackenhurst Eco-Conferences Centre as a sample unit of Spiritual Retreat Centres
- Sarova Salt Lick Game Lodge as a sample unit of Wildlife/Game Excursion Retreat Centres
- Diani Beach Resort & Spa as a sample unit of Scenic Retreat Centres

The interior, exterior and landscape architecture of the 3 cases are documented and investigated by author with an aim to identify and single out design elements that contribute to the success of the 3 retreat centres in creating psychosocially supportive environments as well as the misgivings in doing the same.

To deduce the suitability of the 3 facilities in creating restorative environments, the data collected is analysed descriptively, in tables and 3D computer generated models to give an indication of the salutogenic aspect in each of the facilities.

5.2 Brackenhurst Eco-Conferences Centre

5.2.1 Historical Background

Now under the management of Muna Tree Holdings, Brackenhurst (Fig. 5.2) began as a farm in 1914 in the green hills of Tigoni that was overlooked as a sanctuary for vibrant wildlife and dazzling forests. Progressing from a farm, wartime getaway, golf-course, and a hotel into an environmentally-aware conference centre. The facility has spent over 100 years reconnecting with its beautiful natural environment.

Brackenhurst was initially known as "Three Trees Farm" due to the three large muna trees left standing on the property, and its owners at the time originally started it off with the intention of creating a coffee farm (Fig. 5.5). However, with the start of World War I, the owners of the farm soon found themselves providing holidays for battle-weary British soldiers (Fig. 5.4). This marked the beginning of Brackenhurst's heritage as a centre for hospitality.

Surviving several decades, Brackenhurst Hotel was bought by the Baptist Mission of Kenya in 1964 and several of the buildings standing on the property now were put up after the purchase by the Baptist

Fig. 5.1 Location map of retreat case studies.
Source: Author

Fig. 5.2 Brackenhurst Eco-Conferences Centre
Source: Author
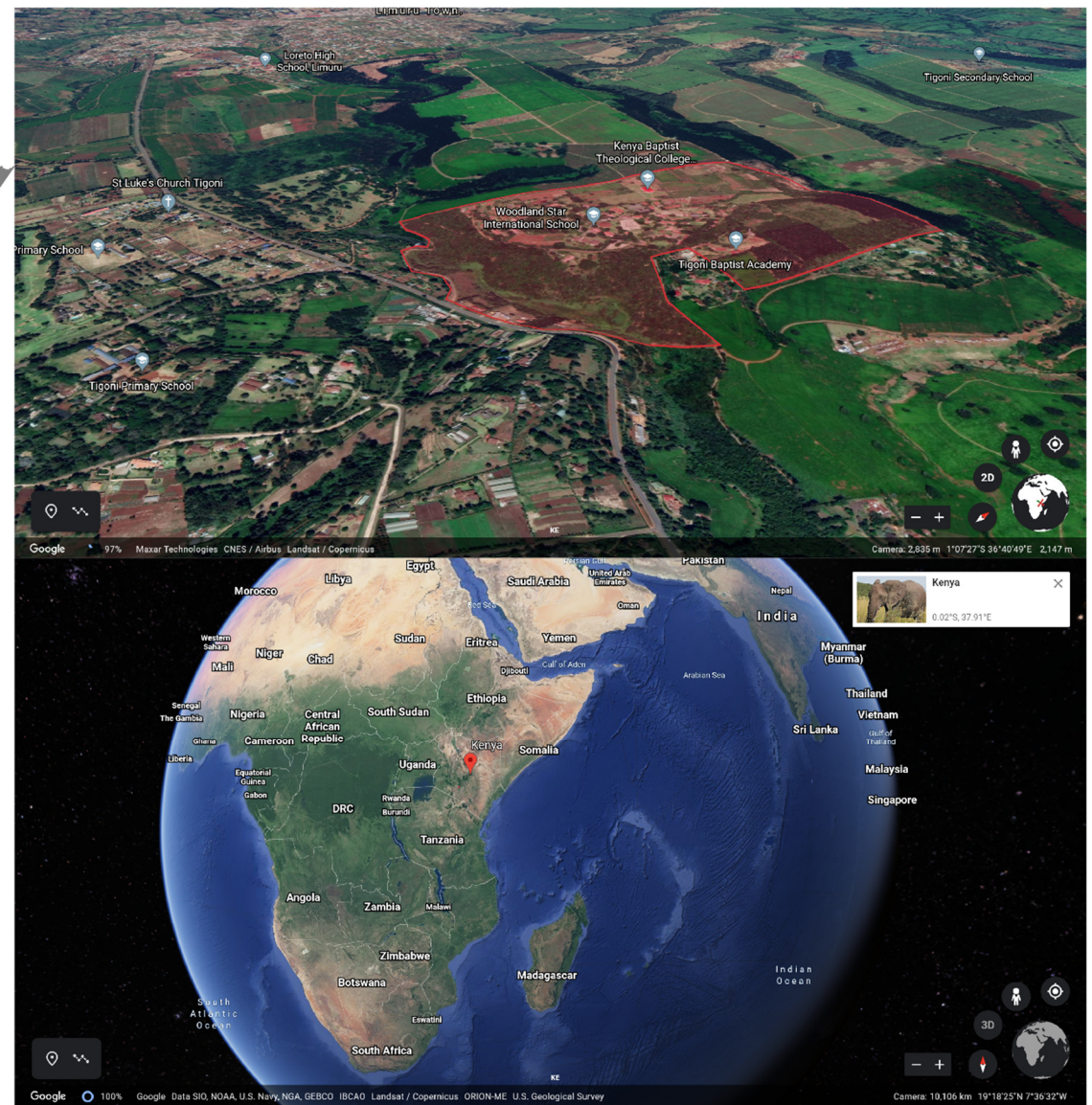
Fig. 5.3 Brackenhurst Eco-Conferences Centre Location, context and site extents.
Source: Author
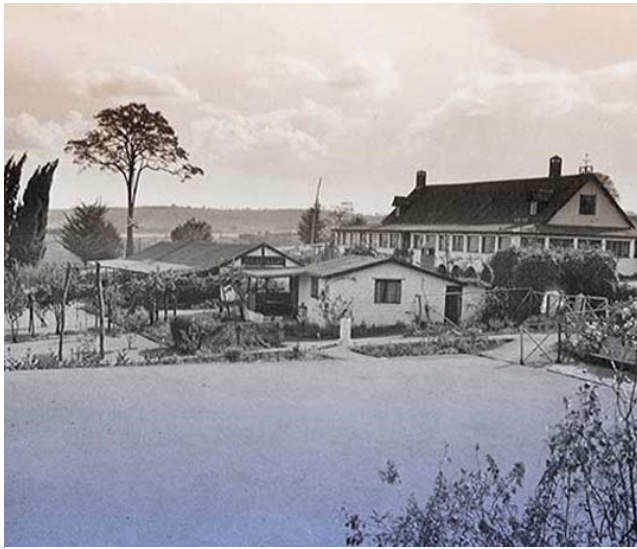
Mission of Kenya. It began to use its beautiful grounds for team-building, conferencing, and adventuring. In 2001, Brackenhurst developed a strong relationship with Plants for Life, an NGO focusing on environmental conservation. As a result, a vast indigenous forest grew on Brackenhurst soil for the first time since 1914. The forest provides a habitat for the restoration of some of the natural wildlife that once abounded in Tigoni.

The whole development has been built over several decades and continues to be developed even presently hence no particular architect has been identified as responsible for the built environment of Brackenhurst however some names worth mention that popped up during the study were architects I. E Montgomery Jr. and E. L Christian.

5.2.2 Site Description

The facility is located in The Limuru area within the Kiambu County, 6.7 kilometres from Limuru town and approximately 34 kilometres and 55-minute drive from the Nairobi Central Business District. The facility sits on 100 acres of land largely occupied by an indigenous forest and is accessed from Boma Road.

The whole site is largely surrounded by renowned Limuru tea farms and scattered human settlements all around.

5.2.3 Active Design

5.2.3.1 Mixed Land Uses

The retreat component of the facility incorporates 3 main land uses; residential, commercial and public shared green and recreational spaces. The residential buildings take up the majority of the built environment and they radiate from a central clubhouse that houses the following spaces/uses:

– Dining rooms (5); the dining rooms serve different groups within the facility namely, Staff, Residents and Muna Tree Café.
– The muna tree café
– Lounge
– Children's indoor play area
– Cybercafé
– Gift shop
– Quiet Reading Space/ Library
– Kitchen

Fig. 5.4 Three trees farm became a source for battle-weary British soldiers during World War I which marked its beginning as a retreat destination.
Source: https://www.brackenhurst.com/about-us

Fig. 5.5 The land on which the retreat presently sits on was originally farm land.
Source: https://www.brackenhurst.com/about-us

PATH ID	DISTANCE (km)(approx.)	CALORIES BURNT (kcal.)	LOWEST ELEVATION (m)	HIGHEST ELEVATION (m)	ELEVATION GAIN (m)
01	0.01	1	2133	2134	1
02	0.02	1	2131	2133	2
03	0.04	2	2126	2128	2
04	0.01	0	2127	2128	1
05	0.05	5	2127	2129	2
06	0.04	2	2123	2127	4
07	0.01	0	2123	2125	2
08	0.05	2	2126	2127	1
09	0.02	2	2125	2127	2
10	0.03	2	2129	2131	2
11	0.06	6	2130	2135	5
12	0.04	2	2131	2134	3
13	0.04	4	2133	2136	3
14	0.04	2	2095	2097	2
15	0.01	0	2095	2097	2
16	0.05	3	2097	2100	3
17	0.04	2	2106	2110	4
18	0.01	1	2111	2112	1
19	0.02	1	2107	2108	1
20	0.04	2	2106	2108	2
21	0.04	4	2108	2113	5
22	0.02	1	2109	2111	2
23	0.02	2	2108	2109	1
24	0.03	1	2108	2109	1
25	0.02	1	2107	2109	2
26	0.05	2	2109	2111	2
27	0.01	1	2111	2113	2
28	0.04	4	2103	2108	5
29	0.02	1	2102	2104	2
30	0.03	2	2102	2104	2
31	0.05	3	2099	2102	3
	AVERAGE DISTANCE (km)	AVERAGE CALORIES (kcal.)			AVERAGE ELEVATION GAIN (m)
	0.03	2			2.32

Fig. 5.6 Brackenhurst site plan showing different land uses, paths and active design data along paths.
Source: Author

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Fig. 5.8 Approach to Muturi Conference Room
Source: Author

Fig. 5.9 Saunders Auditorium Front facade and approach
Source: Author

Fig. 5.7 Path finished in cement screed beside the Shimba Cottage.
Source: Author

– Managing Director's Office

The clubhouse as a building is the single largest building in the facility by its number of functions and it is mixed use with commercial use being the most dominant use arising from the café and dining.

The rest of the commercial use is in conferencing and meeting spaces such as in Saunders auditorium. the Harrell Tea Room and the Muturi conference hall.

All the remaining land is used for recreation and landscaping in form of grass and botanical gardens with the facility management and servicing buildings sparsely situated in different parts of the land. There are 3 courts to the north western part of the site for tennis, basketball and volleyball and the blue-sky high ropes to the North eastern part of the site. These form the recreation spaces alongside the common garden gazebos, outdoor children's play area and garden between the clubhouse and the Farmhouse A.

The mix of uses increases the human activity which in turn has an impact on the physical activity however, for the clubhouse some of the functions could have probably been housed in different buildings so as to reduce the concentration of the multiple uses in one big building and further increase the potential for subconscious physical activity in the facility.

5.2.3.2 Pedestrian Path Design and Connectivity

The pedestrian circulation routes are all lined by lush grass and botanical gardens to sensorially stimulate the users of this facility by use of natural elements. Along these paths are various points of interest to provide respite for pedestrians in the form of benches and social gathering spaces that also aid in the social support component of the facility.

All the paths are finished in either of two material finishes; randomly laid mazeras sandstone paving (Fig. 5.7 and Fig. 5.8) on more dominant paths and cement screed on smaller subservient paths (Fig. 5.9).

To maximize walkability, the paths are highly connected (Fig. 5.6) and blocks of travel between buildings have been shortened to an average of 30m (Fig. 5.6) due to the multiple intersections and cut-throughs on the paths.

The human scale is respected due to the building heights as most buildings are single storey with only a few being 2 storeys. This ensures that the experience along the paths is non-intimidatory to the users and thus a sense of manageability is fostered within the users of the facility.

Fig. 5.10 Mountain biking is one of the special services offered at the facility.
Source: https://www.brackenhurst.com/services-facilities

Fig. 5.11 Grand stair entrance to the facility clubhouse
Source: Author

Fig. 5.12 Brackenhurst basketball, tennis and volleyball courts
Source: Author

With the exception of the clubhouse, the buildings in the facility do not necessarily embrace the concept of maximum ground-level façade transparency. The openings on façades are more of lighting and ventilation sources but seemingly miss on a fundamental opening function which is view framing.

5.2.3.3 Biking Infrastructure

There is no directly visible biking infrastructure within the facility that is visible to the guests and may be misleading yet the facility does offer a mountain biking service for their users to experience the fresh and crisp air of Tigoni as you ride through the pristine tea fields in Tigoni or deep forests within the 100 acres of the facility or in the surrounding area (Fig. 5.10).

5.2.3.4 Staircase Design

With the exception of the clubhouse, Mt. Meru cottage and the Woodlands star School, buildings on site are only one storey thus the use of vertical circulation has been rendered unnecessary in movement from one building level to another. However, the main entrance to the clubhouse features a noteworthy double staircase configuration (Fig. 5.11).

The staircase is the gateway to the clubhouse at the entrance porch notwithstanding the side access routes to the clubhouse which are significantly less conspicuous and liberal in space. The stairs occur as part of the existing sidewalk on the front and starts at the lower level of the clubhouse going up to the second and main level.

The stair is aesthetically highlighted by the small botanical garden that is situated at the foot of the staircase and this draws visual attention and interest to this entrance.

The stair is 3000mm wide, has a tread dimension of 470mm and a 150mm riser thus the ergonomics and anthropometrics of this particular stair make it very comfortable to travel on and wide enough to feel safe and spacious.

The location of the dominant functions of the clubhouse in the second level also ensures the need to use the stair as you access the clubhouse is inevitable unless you are accessing the lower level housing the children's indoor playing area.

5.2.3.5 Multi-Generational Play & Recreation

Brackenhurst makes provision for inclusive recreation in several multi-generational recreation and play spaces. The courts (Fig. 5.12) located on the north western part of the facility are used for sporting

Fig. 5.13 Children's playground and sand pit next to the play garden
Source: Author

Fig. 5.14 Brackenhurst's Blue Sky High ropes team building space.
Source: https://www.brackenhurst.com/gallery

Fig. 5.15 Outdoor breakout meeting space next to Saunders Auditorium and Clark Chapel
Source: https://www.brackenhurst.com/gallery

activities for all ages. There is also an expansive lot of grass right after the main entrance gate house which can be used for activities that require field space.

The blue sky-high ropes (Fig. 5.14) are a great recreation destination for team building and also just for leisure users in need of an extra ordinary experience of recreation. They are particularly popular among corporate groups.

The children's playground is situated right next to gazebos to ensure adult presence and supervision but also provide for adult recreation as they ensure safety and security of the children. Within the same area is the birds, bees & butterflies play garden which essentially is an attraction for both adults and children.

5.2.4 Social Support Design

5.2.4.1 Attractive and Inviting Meeting Spaces & Socially Enhancing Pedestrian Paths

Along paths of circulation, especially near meeting and conferencing spaces (Fig. 5.15), the facility has put in place designed and themed landscaped spaces/gardens with benches to offer repose and slow traffic between meeting and conference spaces.

These spaces are decorated with aesthetic elements such as motifs, coloured tiles, glass and carefully selected furniture so as to trigger curiosity of users and eventually pleasantly satisfy the curiosity.

The bringing together of the users of the facilities in these attractive spaces results in social interactions that foster a strong SOC.

5.2.4.2 Safe and Sociable Spaces

In order to foster a sense of security and transparency, the facility does not fence out or segregate any buildings or spaces that are accessible to the guests. This ensures an openness that strengthens the manageability of the experience within Brackenhurst.

5.2.4.3 Inclusive recreation and Well-Designed recreational facilities

As earlier mentioned in the active design component, the recreation facilities within this facility are well designed and multigenerational (Fig. 5.13 and Fig. 5.14). When the active design component is properly integrated. Most of the principles set in place for active design will in turn foster social support as is the case with Brackenhurst Eco-Conferences Centre.

Fig. 5.17 Aberdares Cottage Living Area
Source: Author

Fig. 5.16 Aberdares Cottage Approach
Source: Author
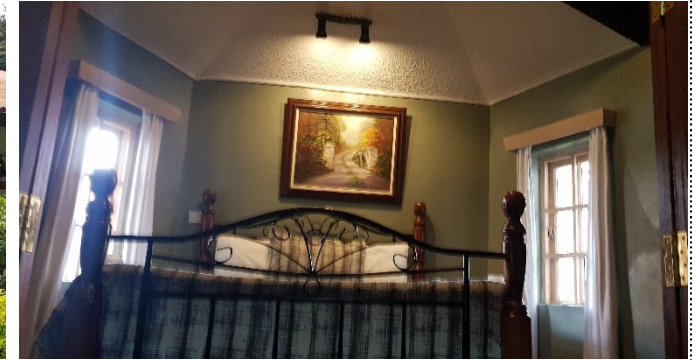
Fig. 5.20 Aberdares Cottage Bedroom Area
Source: Author
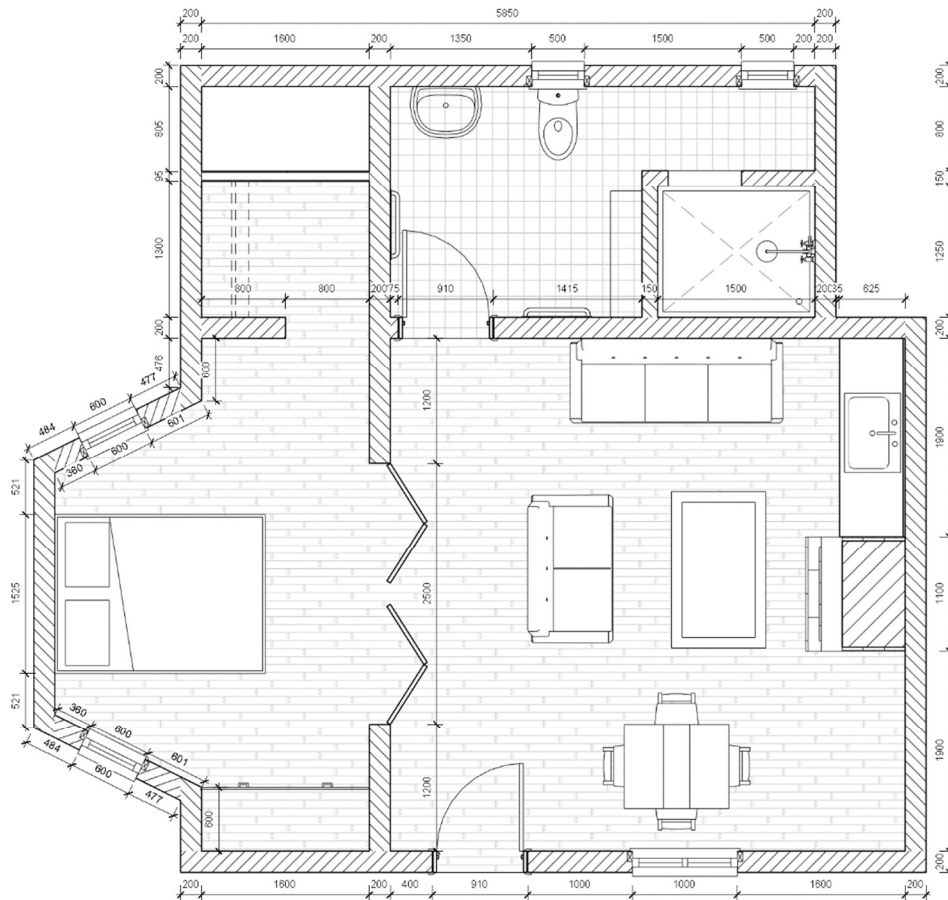
Fig. 5.18 Aberdares Cottage Floor Plan
Source: Author

Fig. 5.19 Aberdares Cottage Perspective
Source: Author

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Fig. 5.23 The Blackroom serves as an independent meeting space or a breakout space to Saunders Auditorium
Source: Author

Fig. 5.21 The Blackroom Meeting Room is located in the Saunders Auditorium building and is named after its characteristic black linoleum square tiles.
Source: Author

Fig. 5.22 The space is naturally lit on one side by 4 windows
Source: https://www.brackenhurst.com/gallery
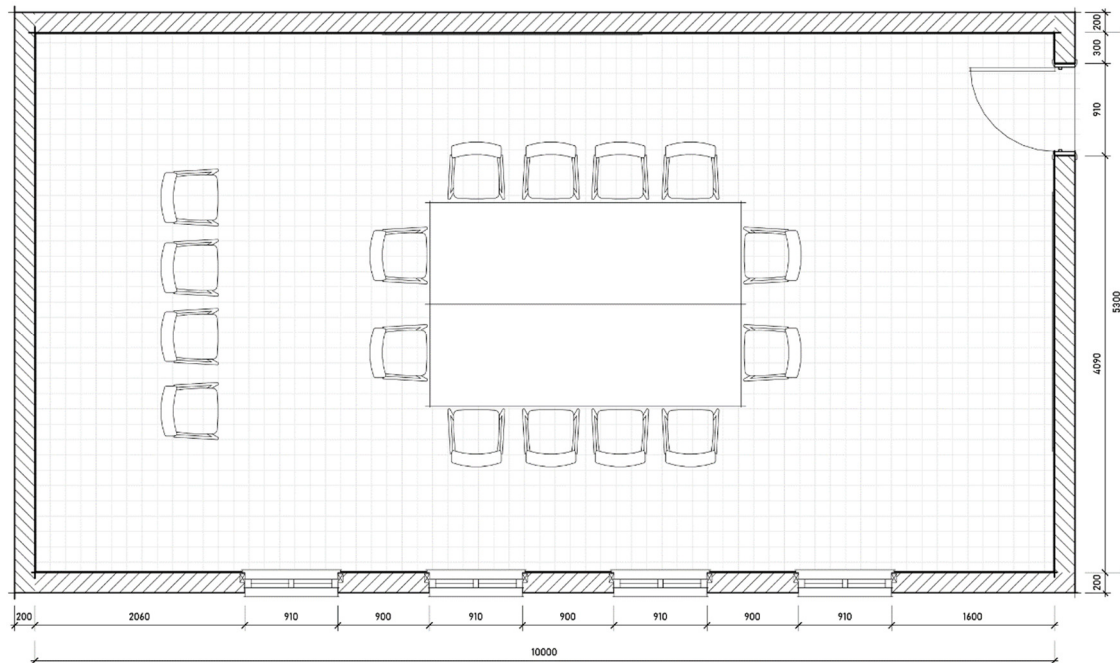
Fig. 5.24 Blackroom Meeting Room Floor Plan
Source: Author
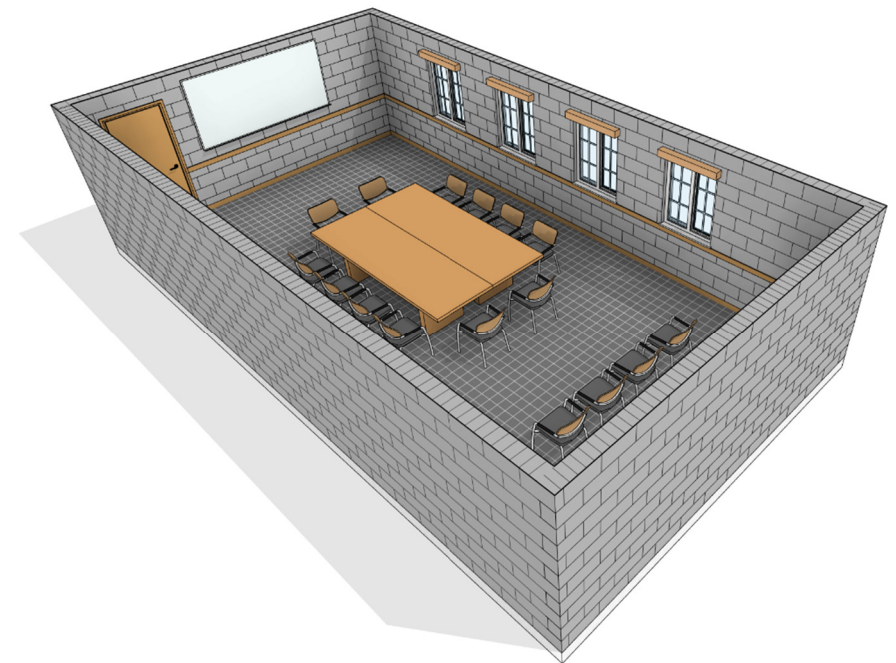
Fig. 5.25 Blackroom 3D perspective
Source: Author

Fig. 5.27 Clubhouse Floor Plan
Source: Author
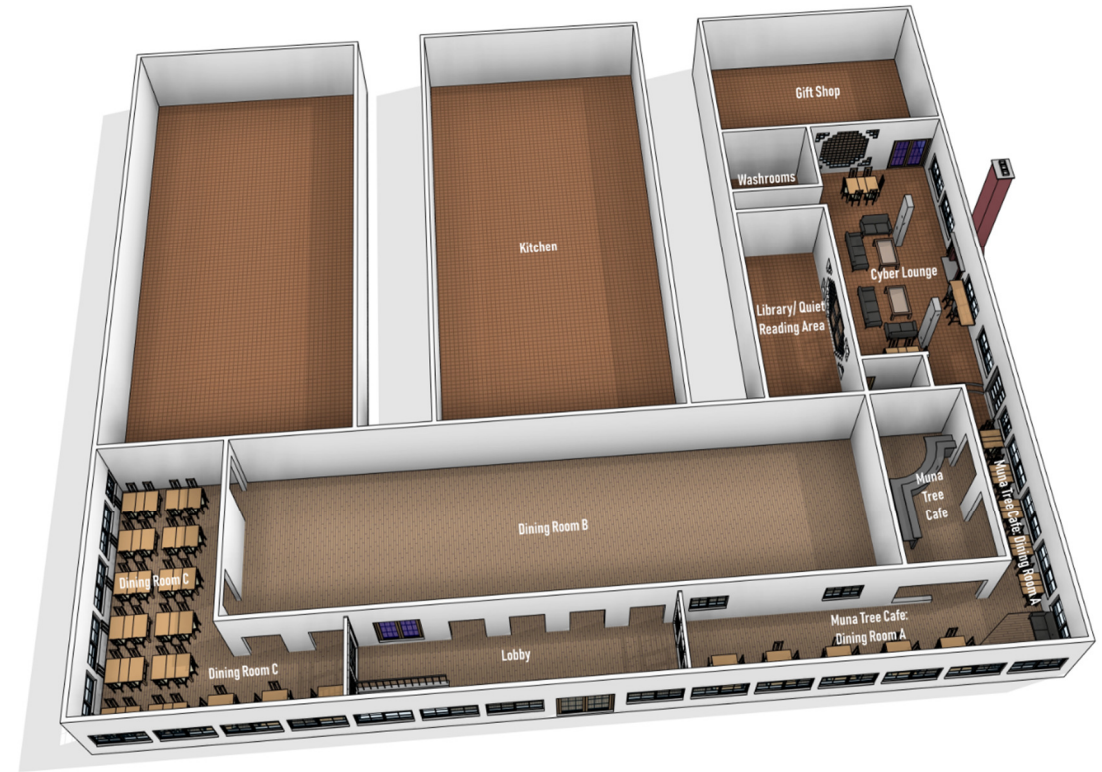
Fig. 5.26 Clubhouse 3D Aerial Perspective
Source: Author

Fig. 5.28 Clubhouse approach from Mutugi Conference Room
Source: http://bkenya.com/accommodation/brackenhurst-conference-centre/

Fig. 5.29 Clubhouse side facade.
Source: Author

Fig. 5.30 The clubhouse approach from the Harrell Tea Room.
Source: https://www.brackenhurst.com/gallery
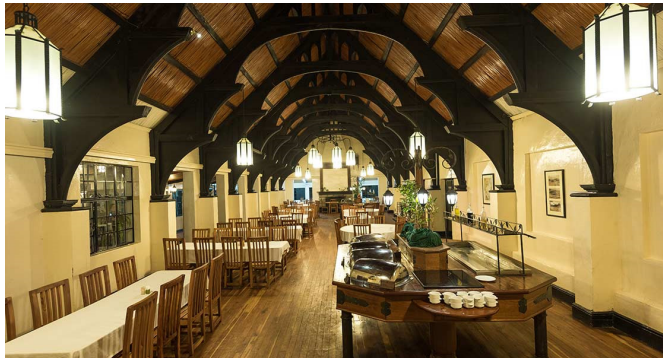
Fig. 5.34 The dining area is characterised by natural tones and finishes that have been preserved from the original construction.
Source: https://www.brackenhurst.com/gallery

Fig. 5.33 Dining Room B serves as the main Dining Area for the facilities residents.
Source: https://www.brackenhurst.com/gallery

Fig. 5.32 The choice of furniture and finishes used inside the dining complements the antique architecture well preserved and evokes feelings of satisfaction and pleasure as one experiences the patina of time embodied in this space.
Source: Author
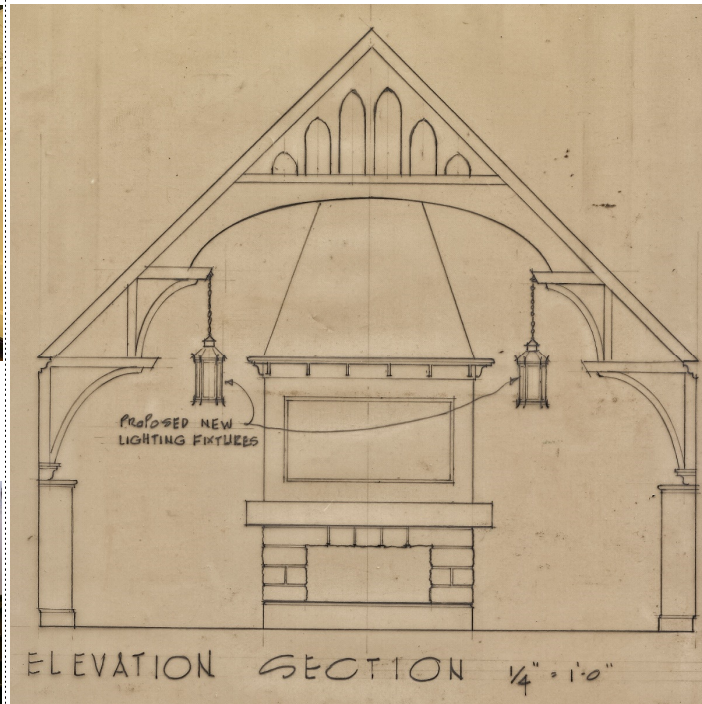
Fig. 5.36 Dining Room B Interior Elevation
Source: Brackenhurst Management
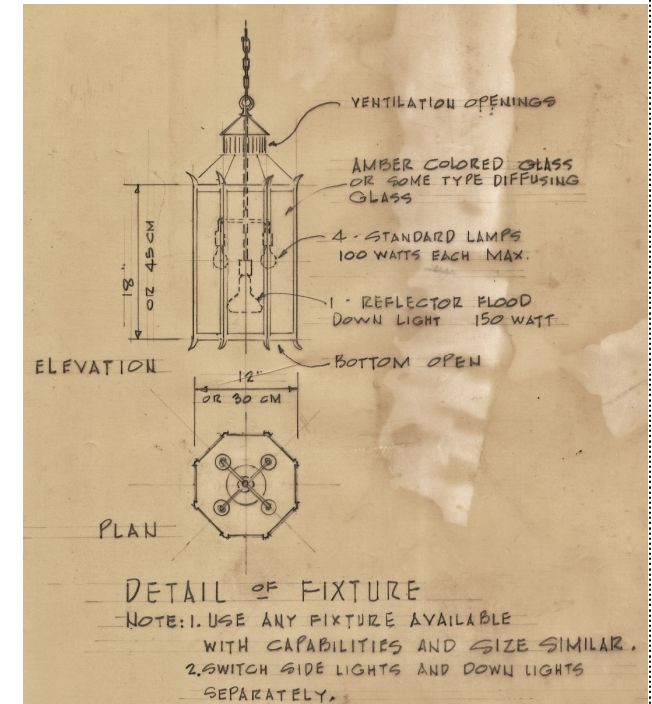
Fig. 5.35 Dining Room Lighting Fixture Detail
Source: Brackenhurst Management
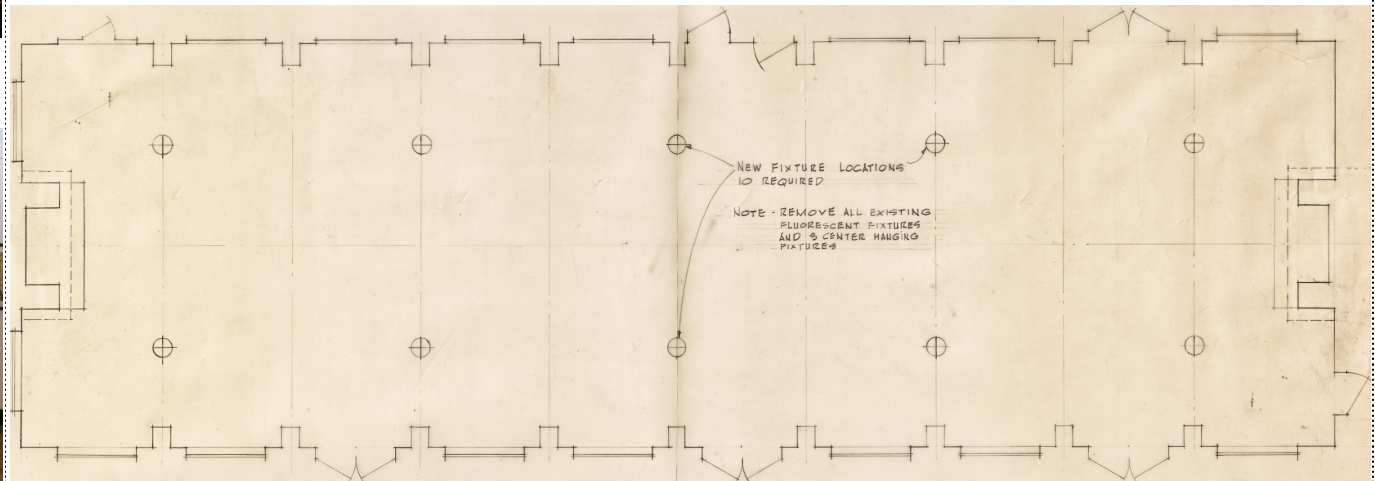
Fig. 5.31 Dining Room B floor plan.
Source: Brackenhurst Management

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Fig. 5.37 The visual transparency between the cyber lounge and the gift shop evokes interest and thus generates human traffic between the two spaces.
Source: https://www.brackenhurst.com/gallery

Fig. 5.38 View of Cyber Lounge
Source: Author

Fig. 5.39 Gift Shop Interiors are finished naturally except for a wall done in broken tile pieces as an aesthetic feature revealing plant and animal motifs.
Source: https://www.brackenhurst.com/gallery
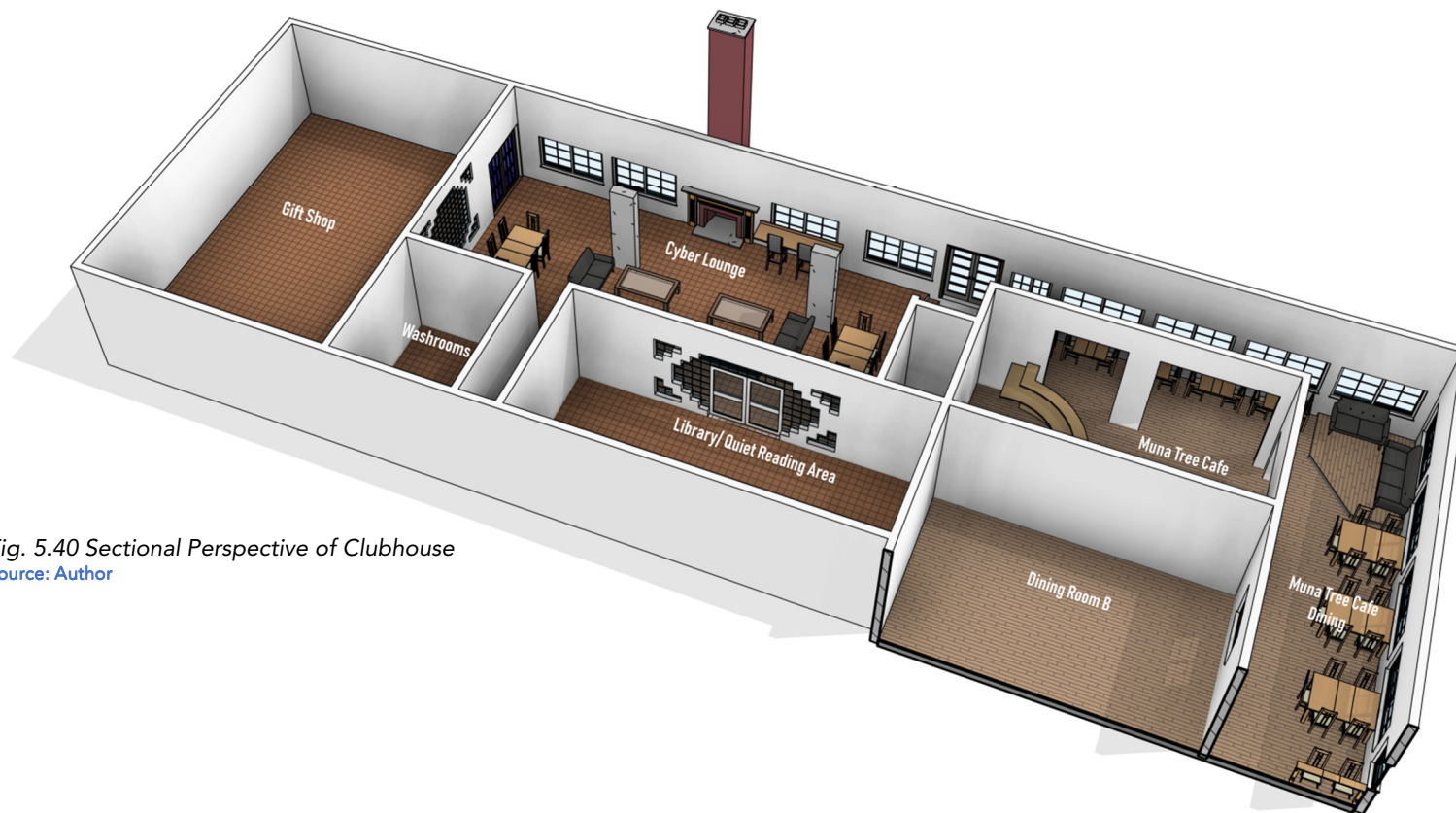
Fig. 5.40 Sectional Perspective of Clubhouse
Source: Author

Fig. 5.41 Muna Tree Cafe Entrance from Lobby
Source: Author

Fig. 5.44 Muna Tree Cafe dining area (Dining Room A)
Source: https://www.brackenhurst.com/dining/muna-tree-cafe

Fig. 5.45 Dining Room C Entrance from Lobby
Source: Author

Fig. 5.42 Muna Tree Cafe Servery
Source: https://www.brackenhurst.com/gallery
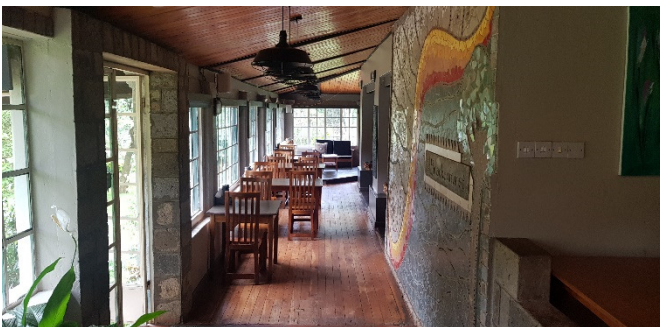
Fig. 5.46 Muna Tree Cafe: Dining Room A view from Cyber lounge and side access to clubhouse.
Source: Author
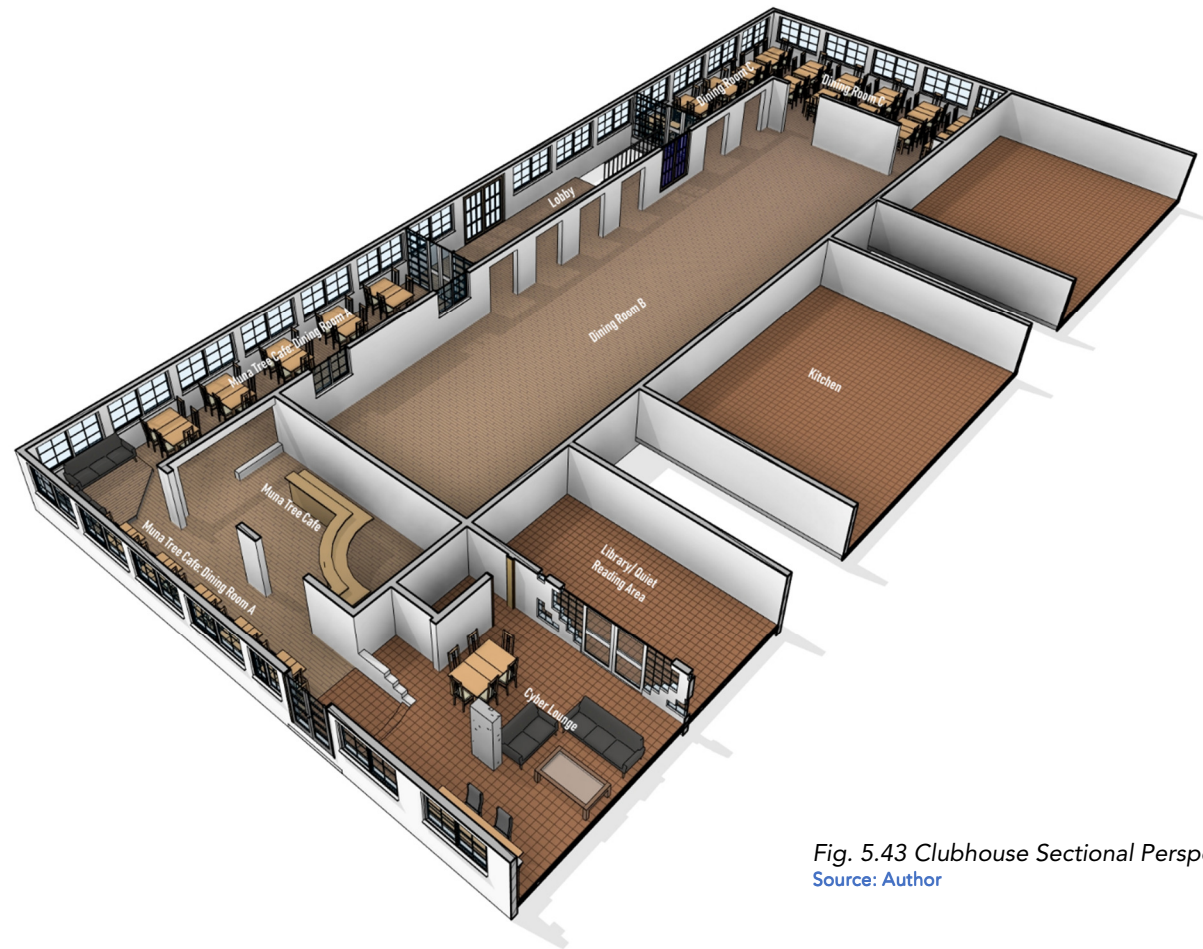
Fig. 5.43 Clubhouse Sectional Perspective
Source: Author

Fig. 5.47 Farmhouse A approach and entrance.
Source: Author

Fig. 5.49 Farmhouse A interior
Source: Author

Fig. 5.48 Some of the beds in the dormitory are made from polished logs to retain their natural aesthetic and reveal the aging process that the timber members have gone through
Source: https://www.brackenhurst.com/gallery
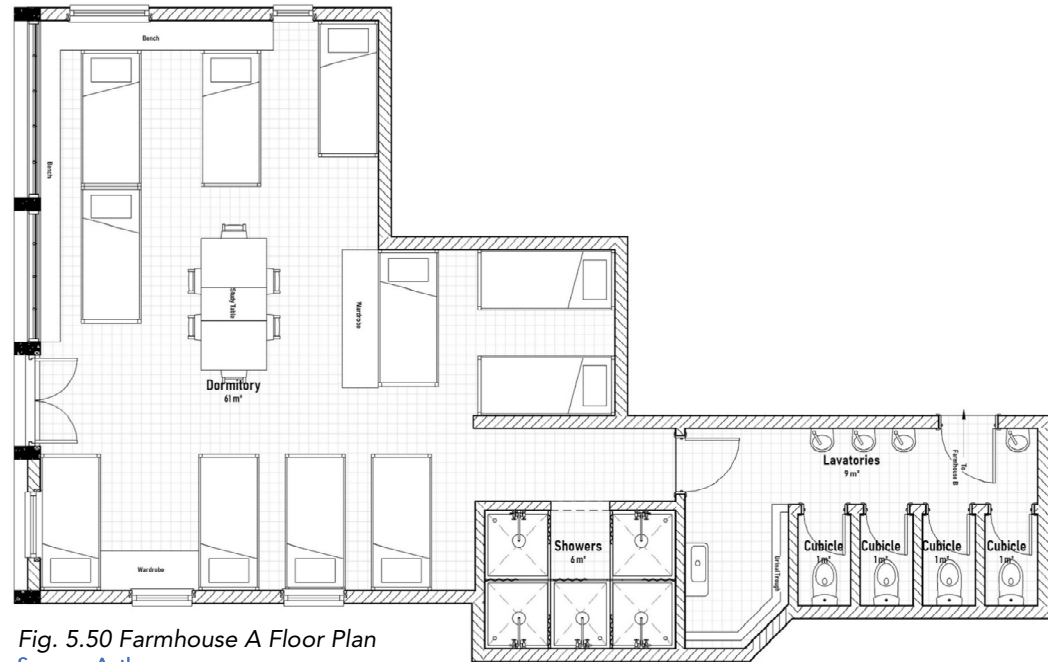
Fig. 5.50 Farmhouse A Floor Plan
Sources: Author
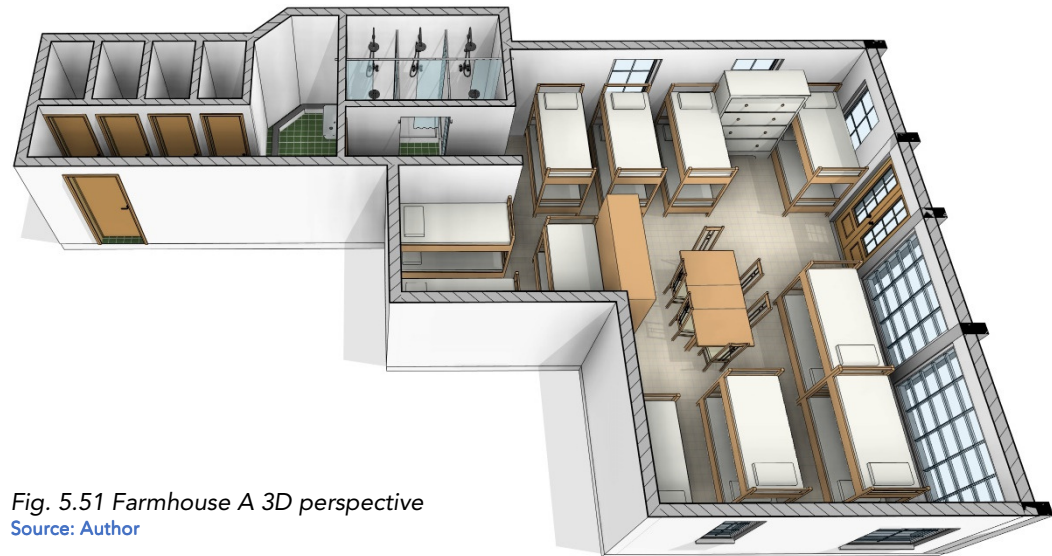
Fig. 5.51 Farmhouse A 3D perspective
Source: Author

Fig. 5.54 The Harrell Tea Room interiors
Source: Author

Fig. 5.55 Harrell Tea Room Sectional Perspective
Source: Author

Fig. 5.56 Harrell Tea Room 3D perspective
Source: Author

Fig. 5.53 The Harrell Tea Room Exterior
Source: http://bkenya.com/accommodation/brackenhurst-conference-centre/

Fig. 5.52 The Harrell Team room internal finishes are all timber giving it a more homely aesthetic.
Source: https://www.brackenhurst.com/gallery
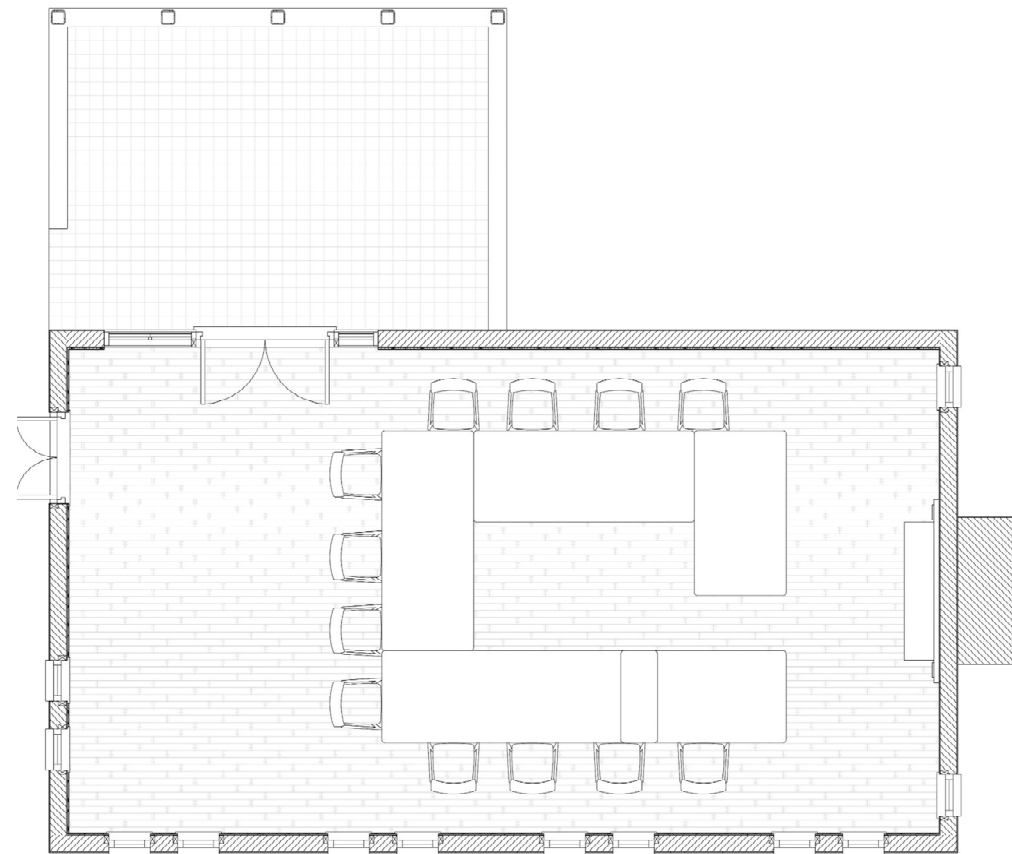
Fig. 5.57 Harrell Tea Room Floor Plan
Source: Author

Fig. 5.59 Ngong' Cottage living area.
Source: https://www.brackenhurst.com/gallery

Fig. 5.61 Ngong' cottage interior showing kitchen, dining and decker bed.
Source: Author

Fig. 5.58 Ngong Cottage Exterior
Source: Author
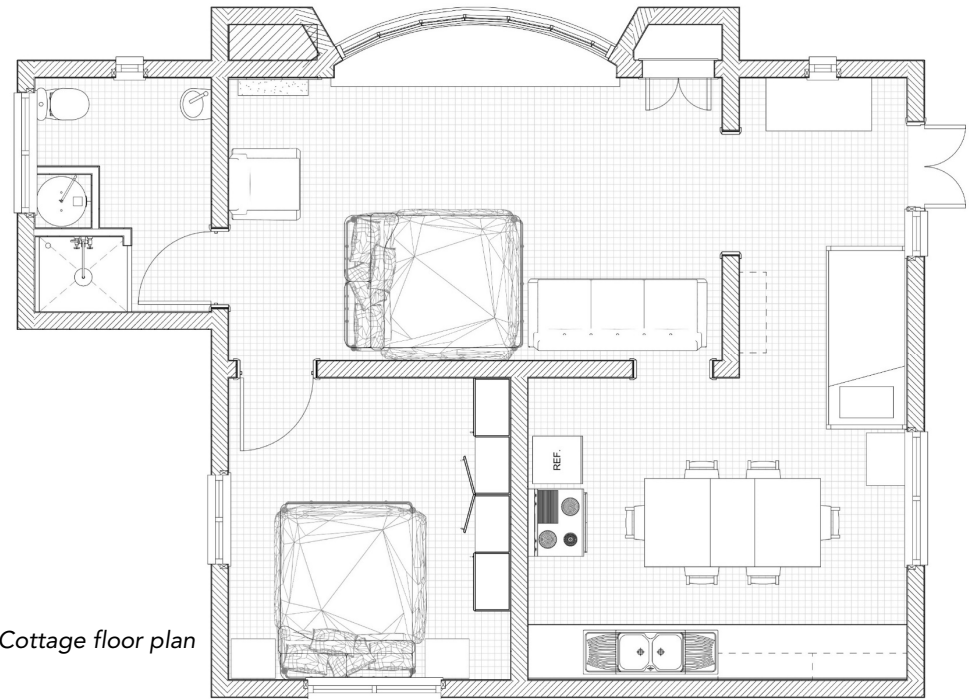
Fig. 5.60 Ngong' Cottage floor plan
Source: Author

Fig. 5.63 Ngong' Cottage 3D perspective
Source: Author

Fig. 5.62 Ngong' cottage 3D Perspective
Source: Author
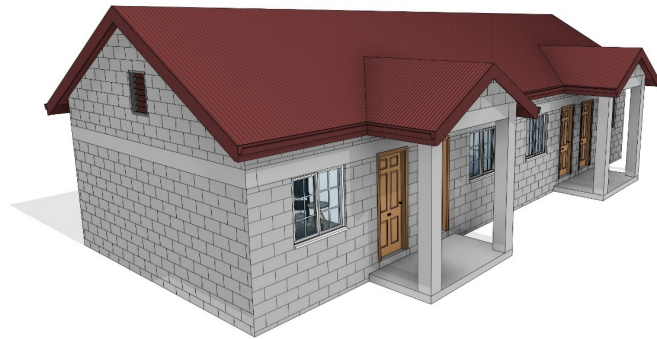
Fig. 5.69 Room 305-308 perspective
Source: Author

Fig. 5.64 Room 305 interior
Source: Author

Fig. 5.65 Room 305-308 exterior
Source: Author
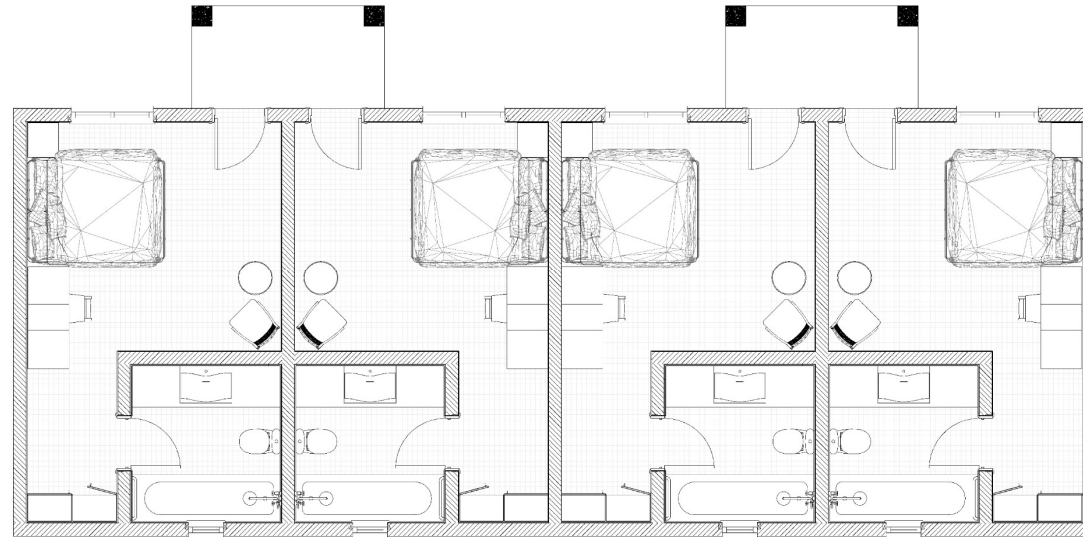
Fig. 5.66 Room 305-308 Floor Plan
Source: Author
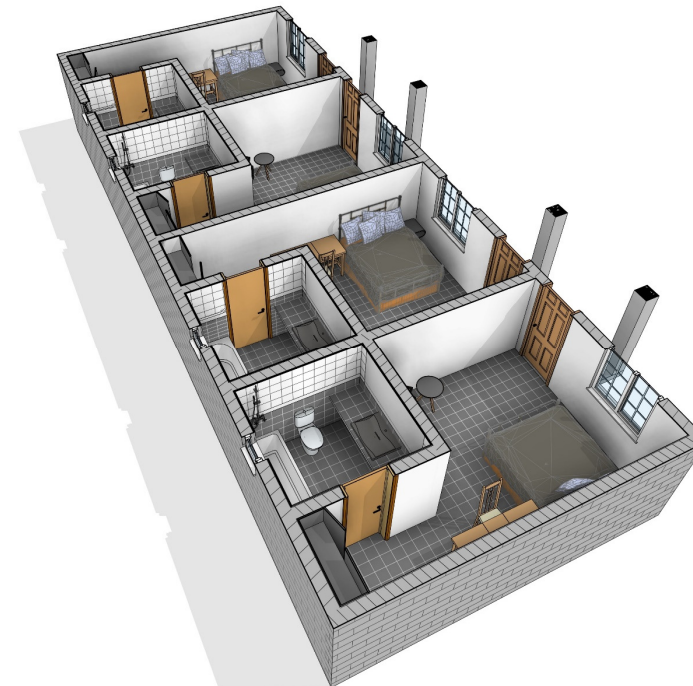
Fig. 5.67 Room 305-308 Plan perspective
Source: Author
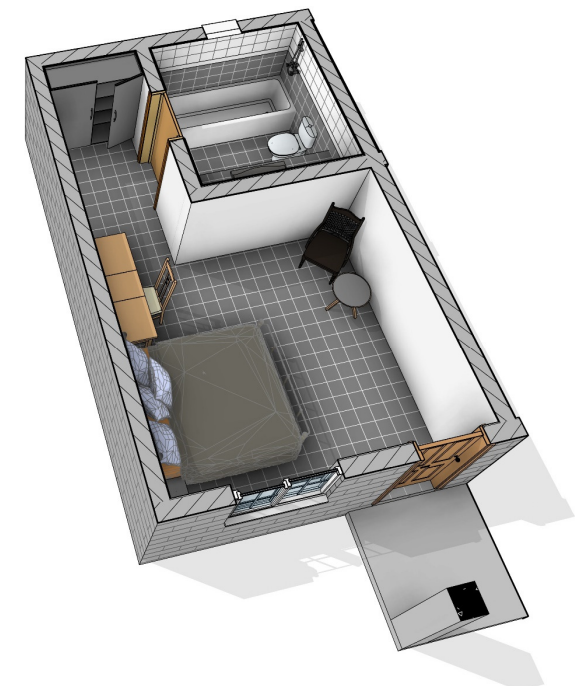
Fig. 5.68 Typical Room Layout perspective
Source: Author

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5.2.5 Biophilic Design

5.2.5.1 Environmental Features

The most outstanding thing about Brackenhurst is their commitment to nature and their careful regard for all for life forms in the form of flora and fauna. The pervading ethos in everything that the facility is involved in has to do with the natural environment hence the identity as an eco-conferences centre.

Animals: Plants as a scientific principle are source of life in that wherever they are found in abundance other life forms such as animals also spring up and take residence.

Due to the plant restoration process, there has been a remarkable increase in mammalian, avian and insect biodiversity which further highlights the remarkable success that the restoration process has brought about.

After 60 years of absence, a resident group of colobus monkeys (*Colobus gureza*) has sprung up. Other animals such as lizards and chameleons are not a rare occurrence.

The insects and birds constitute the largest groups of fauna at the facility and as a result the retreat administration have taken opportunity to give users opportunities to come in closer contact with them through bird watching and incorporating spaces such as birds, bees & butterflies play garden where the rich biodiversity is better realized and understood. The fauna in the facility (Fig. 5.70) aids in evoking pleasure, stimulation, satisfaction and emotional interest for any individual desiring an immersive retreat experience.

Plants: The flora is by far the most elaborate endeavour undertaken by the facility in their attempt to identify as an ecological destination. Through their on-site partner, Plants for Life International, they are currently undertaking a project to convert over 60 acres of their land into a completely indigenous forest supporting a wide variety of fauna.

Through the same partner, they have planted pollinator gardens consisting of flowers and shrubs with specific species to attract fauna which in turn facilitate food production within the facilities organic garden and the larger context of Limuru.

Since the beginning of their ecological restoration project in 2006 when it was registered as a Botanical garden, they have reintroduced just under 100% of the native species instead of facilitating further development of the exotic species that were on the land for over 60 years with an aim to create 40 hectares of native forest. Over 100,000 trees have been planted and natural regeneration is well on course. Presently, there are 1500 species on the accessions list including about 500 tree species, shrubs

Fig. 5.70 Brackenhurst is well populated by fauna due to the commitment of the facility in preservation of their ecosystem.
Source: Author

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Binomial Name: *Callistephus chinensis* (L.) Nees **Common Name**: Annual-aster **Family**: Compositae	**Binomial Name**: *Hydrangea macrophylla* (Thunb.) Ser. **Common Name**: Hortensia **Family**: Hydrangeacea	**Binomial Name**: *Abutilon pictum* (Gillies ex Hook.) Walp. **Common Name**: Abutilon **Family**: Malvacea	**Binomial Name**: *Euphorbia pulecherrima* Willd. ex Klotzsch. **Common Name**: Christmas Flower **Family**: Euphorbiaceae
Binomial Name: *Asparagus setaceus* (Kunth) Jessop **Common Name**: Common Asapargus Fern **Family**: Asapargaceae	**Binomial Name**: *Zantedeschia aethiopica* (L.) Spreng. **Common Name**: Altar-lily **Family**: Araceae	**Binomial Name**: *Justicia pilosella* (Nees) Hilsneb. **Common Name**: Gregg's Tube Tongue **Family**: Acanthceae	**Binomial Name**: *Begonia cucullata* Willd. **Common Name**: Clubbed Begonia **Family**: Begoniaceae
Binomial Name: *Neomarcia grascilis (Herb.)* **Common Name**: - **Family**: Iridaceae	**Binomial Name**: *Kigelia africana* (Lam.) Benth. **Common Name**: Sausagetree **Family**: Bignoniaceae	**Binomial Name**: *Hydrangea macrophylla* (Thunb.) Ser. **Common Name**: Hortensia **Family**: Hydrangeaceae	**Binomial Name**: *Pelargonium zonale* (L.) L'Her. Ex Aiton. **Common Name**: Horseshoe Geranium **Family**: Geraniaceae
Binomial Name: *Osteospermum ecklonis(DC.) Norl.* **Common Name**: - **Family**: Compositae	**Binomial Name**: *Centranthus ruber(L.)DC.* **Common Name**: Jupiter's Beard **Family**: Caprifoliaceae	**Binomial Name**: *Amaryllis belladonna* L. **Common Name**: Easter-lily **Family**: Amaryllidaceae	**Binomial Name**: *Sterelizia reginae* Banks **Common Name**: Bird of Paradise **Family**: Stereliziaceae
Binomial Name: *Cuphea ignea A. DC.* **Common Name**: Mexican Cigarplant **Family**: Lythraceae	**Binomial Name**: *Callistermom citrinus (Curtis) Skeels* **Common Name**: Crimson Bottlebrush **Family**: Mytraceae	**Binomial Name**: *Conoclinium coelestinum* (L.) DC. **Common Name**: Blue mistflower **Family**: Compositae	**Binomial Name**: *Hibiscus rosa-sinensis L.* **Common Name**: Chinese Hibiscus **Family**: Malvaceae
Binomial Name: *Fuchsia triphylla L.* **Common Name**: - **Family**: Onagraceae	**Binomial Name**: *Terminalia catappa L.* **Common Name**: Indian Almond **Family**: Combretaceae	**Binomial Name**: *Plectranthus scutellarioides* (L.)R.Br. **Common Name**: Coleus **Family**: Lamiaceae	**Binomial Name**: *Hibiscus rosa-sinensis* L. **Common Name**: Chinese Hibiscus **Family**: Malvaceae
Binomial Name: *Bidens bipinnata* L. **Common Name**: Spanish-needles **Family**: Asteraceae	**Binomial Name**: *Solanum laciniatum* Aiton. **Common Name**: Kangaroo-apple **Family**: Solanaceae	**Binomial Name**: *Iresine herbstii* Hook. **Common Name**: Bloodleaf **Family**: Amaranthaceae	**Binomial Name**: *Geranium robertianum* L. **Common Name**: Mountain Geranium **Family**: Geraniaceae
Binomial Name: *Asclepias curassavica* L. **Common Name**: Bastard ipecacuana **Family**: Apocynaceae	**Binomial Name**: *Impatiens walleriana* Hook. f. **Common Name**: Patient-Lucy **Family**: Balsaminaceae	**Binomial Name**: *Tropaeolum majs* L. **Common Name**: Garden Nasturtium **Family**: Tropaeolaceae	**Binomial Name**: *Centradenia inaequilateralis* (Schltdl. & Cham.) G. Don **Common Name**: -- **Family**: Melastomataceae
Binomial Name: *Salvia farinacea* Benth. **Common Name**: Mealy sage **Family**: Lamiaceae	**Binomial Name**: *Scaevola taccada*(Gaertn.) Roxb. **Common Name**: Sea lettucetree **Family**: Goodeniaceae	**Binomial Name**: *Begonia cucllata* Willd **Common Name**: Clubbed Begonia **Family**: Begoniaceae	**Binomial Name**: *Echeveria elegans* Rose **Common Name**: Pearl Echeveria **Family**: Crassulaceae
Binomial Name: *Crassula ovata* (Mill.) Druce **Common Name**: Japanese rubberplant **Family**: Crassulaceae	**Binomial Name**: *Aloe vera* (L.) Burm. f. **Common Name**: Curaca aloe **Family**: Xanthorrhoeaceae	**Binomial Name**: *Kleinia fulgens* Hook. f. **Common Name**: -- **Family**: Asteraceae	**Binomial Name**: *Gazania rigens* (L.) Gaertn. **Common Name**: Treasure-flower **Family**: Compositae

Table 3: Inventory of some of the flora identified at Brackenhurst
Source: Author

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Fig. 5.72 Outdoor meeting area and amphitheatre situated on a slope to take advantage of terrain.
Source: https://www.brackenhurst.com/gallery
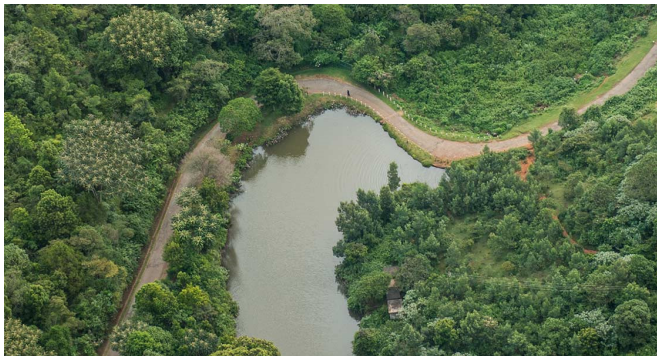
Fig. 5.71 Natural water hole along the road to the Brackenhurst facility.
Source: https://www.brackenhurst.com/gallery

Fig. 5.73 Cyber Lounge showing natural finishes
Source: Author

and lianas; 70 spp. Of indigenous Euphorbiaceae/ Phyllanthaceae; 60 spp. Of Rubiaceae and 40 spp. of Acanthaceae (See Table 3).

The idea behind all of the restoration and conservation of the plant life on this property is to turn the retreat into an arboretum of rare trees and indigenous flowers such that it shall be teeming with life and biodiversity. The mere addition of plant life to the built environment at Brackenhurst makes it capable of improving comfort, happiness and well-being as they stimulate the users sensorially through colour, fragrance, shading, altering air quality and speed which all work towards enhancing the experience at the facility.

Water: Though not directly incorporated in the inner compound of the facility, water at the lower parts of the land by the road access to the inner compound (within the 100 acres of the property) adds to the homeric and grandeur experience in the approach and drive to the facility's entrance.

Air: The air at the facility is fresh and crisp due to the plant diversity that has affected the quality, movement, feeling and smell.

Sunlight: The clubhouse happens to me the most responsive building to natural light due to its fenestration logic that opens up the interior spaces for both ventilation and lighting. However, most of the remaining buildings seem to have used window openings as more of ventilation solutions than lighting solutions. In some cases, the windows of the accommodation and conferencing buildings are small and few whereas in other cases opportunities to incorporate wide windows have been underutilised.

Natural Materials: The material palette at Brackenhurst is a mix of both natural and artificial materials. The natural materials are preferred to the artificial or synthetic materials for the simple reason that they do not stand out in contrast to their natural context.

Colour: The colour palette at the facility is within the earth tones so as to ensure positive response to context. This is achieved by either use of natural materials or painting surfaces in colours that gel together with the natural environment around.

Geology & Landscape: This is brought out primarily by the clubhouse and outdoor amphitheatre that is stepped on the sloping landscape in order to tap into the terrain as opposed to stand in opposition to the slope and dominate by intense excavation. The other buildings on the site being only one level sit along contours and require minimal interruption of the landscape gradient.

Habitats & Ecosystems: Brackenhurst have made an intentional effort to restore a previously existing ecosystem in the land on which the facility sits. The local forest habitat and ecosystem that has now

Fig. 5.74 Outdoor Concrete bench and art piece between Clark chapel and Saunders Auditorium filled with botanical motifs.
Source: Author

Fig. 5.75 Gift shop back wall decorated in broken tile with motifs depicting nature.
Source: https://www.brackenhurst.com/gallery

Fig. 5.76 Concrete Bench that depicts the springing and progress of life in nature
Source: https://www.brackenhurst.com/gallery

been partially restored has resulted in reintroduction of plant and animal species that had previously been relegated from the area. Not only does the forest restoration project conserve and revamp the immediate context but it also battles extinction of other indigenous species at the national level that would otherwise be decimated.

Fire: Though a complex design challenge, a simple and successful approach has been used in Brackenhurst by the simple addition of fireplaces to some of the cottages and in the clubhouse cyber lounge (Fig. 5.35, 5.40, 5.55 and 5.63).

Views and Vistas: Due to the liberal spread of plants in the facility, outdoor views and vistas throughout the facility are in abundance. The view framing from the inside looking out in buildings could however be better if the fenestrations were dual functioning as both ventilation and lighting strategies. As they are (except in the clubhouse), they are less of lighting openings and more of ventilation strategies.

5.2.5.2 Natural Shapes and Forms

Botanical motifs: Next to the Clark Chapel between the chapel and Saunders Auditorium is an outdoor crescent shaped concrete and masonry bench (one of the two outstanding repository spaces along the paths) finished in plant and vegetative motifs (Fig. 5.74 and 5.15). Using small fragments of glass blocks and tiles, the designer decorated the bench and the floor area enclosed in abstracted plant leaves and twigs.

Animal Motifs: Though not as highly stylized and fictionalized as the plant motifs, the top of the short concrete retaining walls in the Bees, Butterflies and Birds Play Garden have ladybird paintings (Fig. 5.13). This simulates animal life within the garden. The gift shop wall finished in broken tile art work also depicts birds flying away from a tree (Fig. 5.75).

Shells and Spirals: Along the path access to the Lion's Den and Muturi Meeting spaces is a spiralling concrete bench (Fig. 5.76 and 5.77) around a tree that acts as its point of origin. From the account of the guide to the author, it depicts the springing and progress of life in nature. This simulation draws directly from a natural process that deepens the philosophical understanding of the facility.

Arches, Vaults and Domes: For both artistic and functional purposes, arches have been used in several buildings in Brackenhurst (Fig. 5.7 showing an arched Muturi conference entrance Porch) which mimic or replicate shapes found in nature like shell shapes, hives or nest like structures.

Shapes Resisting Straight Lines and Right Angles: The concrete benches aforementioned next to the Clark chapel (Fig. 5.76 and 5.78) and Lion's Den (Fig. 5.74, 5.77 and 5.15) are both non-orthogonal and their backs are designed in as an undulating wavy form, this emulates natural features which are rarely

Fig. 5.77 Crescent concrete bench next to Saunders Auditorium and Clark chapel.
Source: Author

Fig. 5.78 The main dining room is well preserved and in it seen the patina of time and age of the facility.
Source: https://www.brackenhurst.com/gallery

Fig. 5.79 Author seated on the spiralling concrete bench outside the Muturi and Lion's Den Meeting spaces.
Source: Author

exposed as straight lines and right angles as is the case with human interventions and as a result people tend to have an inclination toward organic forms.

Simulation of Natural Features: The facility does not have any practical characteristics imitated that imply structural integrity and adaptive advantage in response to environmental pressure but they mimicry of natural forms is entirely aesthetic. Simulation of natural Features is not to be mistaken for botanical and animal motifs mentioned earlier, though may occur simultaneously in a particular design intervention, simulation refers to a practical adaptive advantage in response to environmental pressure.

5.2.5.3 Natural Patterns and Processes

Sensory Variability: Brackenhurst has a highly sensuous and variable natural environment for their users to take in. The material texture, noises, scents form several plants and visual stimulation arising from the entire physical environment both, natural and built all work together to propel human health and longevity by providing the variable and sensuous environment.

Information Richness: The amount of information to be taken in from the physical environment at the facility inspires interest, creativity, experimentation, learning and problem-solving hence restoring the life forces within the users. This is achieved by both real and metaphorical interventions. Due to time and the size of the facility, not every narrative and story behind various built forms could be covered but one such example is the social gathering spaces that use variety in material, textures and detail that imitate coherently reveal natural patterns and objects to draw interest and pass a message to the inquiring individual.

Age, Change and the Patina of Time: The passage of time starkly outlines age and change in the natural world and the built environment at Brackenhurst does this accurately. The newer buildings and materials are easily distinguishable from the older ones due to the design language, interventions and finishing. The older buildings reveal a dynamic progression of the natural world as a result of time and this evokes a peculiar sense of familiarity and satisfaction which strengthens the meaningfulness experienced in Brackenhurst that in turn reinforces the SOC.
The main dining space (Fig. 5.79 and 5.31-5.36) is the best part of the facility to experience the patina of time where the interior environment has been very well preserved almost like an artefact and the feeling within the space speaks for itself.

Growth and Efflorescence: Brackenhurst as it is known today has been built over five decades and the buildings on the property clearly show this growth, development and maturation. This makes the facility a historical development with efflorescence marking the progressive creation at every phase. These

Fig. 5.80 Clubhouse approach from main entrance.
Source: https://www.brackenhurst.com/gallery
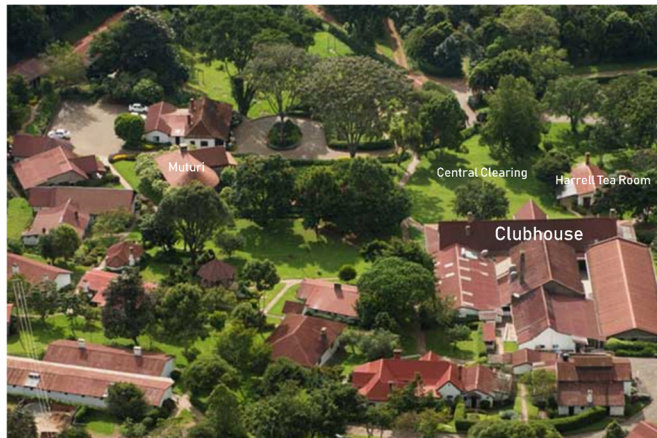
Fig. 5.81 Site aerial photograph.
Source: www.brackenhurst.com

Fig. 5.82 Saunders Auditorium Approach showing the front façade and porch as a transition space between the exterior and interior.
Source: Author

spatial and transient qualities that are expressions of aging result in satisfaction and pleasure resulting from the complex quasi-living quality created.

Central Focal Point: The success of the navigation and way-finding in Brackenhurst can be largely attributed to the existence of a central focal point. What has been termed as the clubhouse by author in the fieldwork data collection and analysis. It acts as a point of reference (Fig. 5.6 and 5.80) and orientation in what would have been very complicated and chaotic due to the number of buildings in the facility.

Bounded Spaces: The open lawn in front of the clubhouse (Fig. 5.80 and 5.82) and also entrance of the Brackenhurst is the only clearly bounded space other than the building interiors. This is relatively due to the sporadic nature of the growth of the facility over the decades.

Transitional Spaces: Access provision for users to move between the built environment in most buildings at Brackenhurst fosters comfort and ensures change between different spaces is not abrupt and overwhelming in change (Fig. 5.81). This fosters comfort for users.

Linked series and chains: There is a clear physical and temporal movement in the built environment at Brackenhurst. The zones seem to be arranged in concentric circles where the innermost zone at the open lawn in front of the clubhouse is the most public and the outermost zone is most private. The conferencing and meeting rooms are all within the more public zone of the land which is around the open lawn in front of the clubhouse and then the residential buildings are spread out and increase in frequency as you move away from the clubhouse. These relational spaces convey meaning and organization.

Integration of Parts to Wholes: The discrete parts of Brackenhurst with different uses all put together form a greater whole which then becomes the Brackenhurst Eco-Conferences Centre just as is the case with cities. This integrative value fosters a sense of structural integrity in what may have been a complex facility and this results in a stronger the SOC for the users.

Complementary Contrasts: It is no coincidence that the largest and bulkiest building in Brackenhurst is right next to a large and open lawn (Fig. 5.80). This is an attempt by the site planners at compatible rendering of apparent opposites of open and low to high and closed.

Fractals: The buildings have no buildings that are exactly the same. They are related in configuration but they vary in form and shape. There is an orderly variation achieved through a basic pattern in the material finish or material palette and the accommodation style but the buildings are not identical, just closely related.

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5.2.5.4 Light and Space

Reflected Light: All building exteriors in Brackenhurst are either finished in the natural material used in construction or painted white (Fig. 5.83). The white colour illuminates the landscape as it reflects light into a space that may have otherwise been darker and dull as result of the extensive tree cover.

Light Pools: The cyber lounge (Fig. 5.85 and 5.39) and gift shop ceilings are fitted with light pools that provide patches of light in an otherwise dark, obscured and shadowy area that results from the use of natural finishes in small space. This alters the perception of the space and opens it up and makes the use of natural materials possible as they are psychosocially supportive as opposed to causing a dark and insecure feeling in the space.

Spaciousness: Due to the narrow size of the seating area on the periphery of the clubhouse constituting of the Muna Tree Café, the walls demarcating the clubhouse extents are fitted in many large windows that open up the interior space to an expansive open lawn and make the small interior space feel less intense (Fig. 5.84).
This same effect is achieved by the light pools in the cyber lounge (Fig. 5.85).

Inside-Outside Spaces: The Harrell Tea Room (Fig. 5.53) meeting space has an enhanced appeal within its interior space due to its apparent connectivity to the outside environment in the use of a curtain wall and covered porch linked to the meeting space. This appeal is also realised in Brackenhurst by the use of porches at the entrance of certain buildings.

5.2.5.5 Place-Based Relationships

Geographic, Historic and Ecological Connection to Place: The facility elicits strong connection to the physical place in which it is located by it response to the existing geological, historical and ecological features.
The buildings on site are accordingly stepped or located on contours to ensure minimal disruption of the slope and they are located in a manner such as to maximise views of the forest green around the area.
Historically, the narrative of a world war retreat is upheld in the sustenance of the facility as a retreat location and this works toward further development of the myth and the legend around the facility that really adds to the story behind Brackenhurst.
The facility does not seek to disturb the existing ecosystem but it seeks to restore, emphasize and complement the pre-existing ecosystem that was previously shaken up to make way for farmland. This is seen in the preservation of the muna trees that have been on the lot of land for decades as well as the active reintroduction of fauna and flora that have been endangered within the area.

Fig. 5.83 The buildings at Brackenhurst are finished in white paint if not a natural finish which in turn reflects light to darker areas that are shaded by the dense tree canopies.
Source: https://www.brackenhurst.com/gallery

Fig. 5.84 The Muna Tree Cafe dining area is characterised by large windows closely spaced between columns so as to create a strong link to the outside and make a small space more spacious.
Source: https://www.brackenhurst.com/gallery

Fig. 5.85 Light Pools in the cyber lounge
Source: Author

Fig. 5.86 The Brackenhurst built environment is designed for the natural environment to stand supreme and the built environment as servant space.
Source: https://www.brackenhurst.com/gallery

Fig. 5.87 The buildings in the retreat facility are built using locally available and sourced materials.
Source: https://www.brackenhurst.com/gallery

Fig. 5.88 Forest seating within the forested section of the development inspires adventure and elicits curiosity and enticement.
Source: https://www.brackenhurst.com/gallery

Indigenous materials: A complementary relation is established with the place by use of natural local materials available in the immediate context and familiar wider context. The naturally finished exterior walls of Saunders Auditorium (Fig. 5.87) and Block 305-308 (Fig. 5.69) are constructed in a locally sourced stone masonry block.

Landscape Orientation: The buildings of the facility are embedded in the local environment (Fig. 5.86) as part of the place and not separate from it such that they respond positively to the landscape features which in this case is mainly the forested versus open areas and the slope. This helps contribute to the sense of place.

Spirit of Place: The experience at Brackenhurst etches in memory an identity of the Tigoni area as a lush place teeming with biodiversity worthy of our care and protection as opposed to the indiscriminate clearing that has given Tigoni an identity as a highland covered in vast tracts of tea plantations. The experience at Brackenhurst takes on a life of its own though it be inanimate matter and motivates the users to take responsibility and be worthy stewards of the ecosystem in our context as they sustain human life, culture and ecology for as long they are in place.

5.2.5.6 Evolved Human-Nature Relationships

Order & Complexity: A perfect balance between these two attributes is relatively successful in that there is apparent structure and organization in concentric zoning but this is controlled by ensuring that though buildings similar in function maybe located within each other's immediate context, the individual buildings are not necessarily the same and there is a variety in accommodation and meeting building typologies. The composition as a whole is not repetitive, monotonous, boring or mundane but it is also not chaotic.

Curiosity and Enticement: The mix of different activities and building types, shapes and forms situated amongst trees on different parts of the vast land (Fig. 5.88) fosters a desire for discovery, mystery, exploration and creativity which enhance an individual's intellectual potential at problem handling and solving. The facility thus engages human intellect and imagination.

Change and Metamorphosis: The growth, metamorphosis and maturation process at Brackenhurst is seen in the building typologies on the site due to the continuous development of the facility. The developmental, dynamic and inevitable quality of design that is change, is seen over the different periods of architecture represented in the different buildings on the site.

Mastery and Control: The design interventions at Brackenhurst moderately and respectfully manipulate the existing natural world to show mastery and control over nature with a balanced satisfaction of the

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innate desire of human beings to master and control nature. This gives a sense of satisfaction in the human ingenuity to be in a controlled environment yet still preserve the wild untamed natural fabric.

Affection and Attachment: The investment that has gone into preservation of the natural eco system at Brackenhurst and the detailed account of the journey triggers strong emotional affinity for the natural environment. This increases the potential of Brackenhurst to receive lasting loyalty and commitment as a facility that spawns the potential of human beings to bond and be attached as a result of the sensitive consideration of nature in their creation of a built environment.

Attraction and Beauty: The integration of nature as part of the built environment at the retreat facility gives it an impressive aesthetic appeal. Over decades, nature has been integral in cultivating curiosity, innovation, ingenuity, discovery and problem-solving.

Exploration & Discovery and Information & Cognition: The abundance of information within the retreat facility through nature and built forms that are based on processes and forms in nature stimulate the mind intellectually. The outdoor benches and the children's play garden are suitable as ensamples of built forms that generate considerable interest and appreciation by facilitating opportunities to explore and discover natural processes and forms.

Reverence & Spirituality: The environment and phenomenology at the retreat facility affirms the human need for a meaningful relationship with a greater entity. The calm and quiet resulting from the integration of nature in the built environment at the facility that buffers visually and acoustically triggers a transcendent reverential feeling that lifts thoughts and feelings from oneself to a greater person.

Salutogenic Design Principle	Parameter	Variable
Active Design **12/15**	Mixed Land Uses	✔ Land Use Types
	Well Designed & Connected Paths	✔ Path Connectivity ✔ Path Aesthetics ✔ Path Distances
	Pedestrian Oriented Streetscapes	✔ Streetscape Typology ✔ Building Height
	Biking Infrastructure	✘ Bike Storage ✔ Cycling Routes & Paths
	Stair Design	✔ Stair Aesthetics ✔ Stair Visibility ✔ Stair Ergonomics & Anthropometrics ✘ Stair Prompts ✔ Stair Location ✘ Stair Material & Finish
	Elevator Design	N/A Elevator Location N/A Elevator Visibility
	Multi-Generational Play & Recreation Spaces	✔ Recreation Space Types
Social Support Design **10/10**	Meeting Spaces	✔ Aesthetics & Décor ✔ Location of Nodes/Meeting Spaces ✔ Cultural Activity Participation
	Well-designed & Connected Paths	✔ Path Connectivity ✔ Path Aesthetics ✔ Path Distances between Buildings
	Safety & Security	✔ Defensibility ✔ Lighting ✔ Acoustic Buffering
	Multi-Generational Play & Recreation Spaces	✔ Recreation Space Types

Table 4: Summary of Brackenhurst Eco-Conferences Centre Active & Social Support Design Performance
Source: Author

Salutogenic Design Principle	Element	Attributes	
Biophilic Design **59/72**	Environmental Features **11/12**	✔ Color ✔ Water ✔ Air ✔ Sunlight ✔ Plants ✔ Animals	✔ Natural materials ✔ Views and vistas ✘ Façade greening ✔ Geology & landscape ✔ Habitats & ecosystems ✔ Fire
	Natural Shapes & Forms **5/11**	✔ Botanical motifs ✘ Tree & columnar supports ✔ Animal (mainly vertebrate) motifs ✔ Shells & spirals ✘ Egg, oval, & tubular forms ✔ Arches, vaults, domes	✘ Shapes resisting straight lines & right angles ✔ Simulation of natural features ✘ Biomorphy ✘ Geomorphology ✘ Biomimicry
	Natural Patterns & Processes **11/14**	✔ Sensory variability ✔ Information richness ✔ Age, change, and the patina of time ✔ Growth & efflorescence ✔ Central focal point ✘ Patterned wholes ✔ Bounded spaces	✔ Transitional spaces ✔ Linked series & chains ✔ Integration of parts to wholes ✔ Complementary contrasts ✘ Dynamic balance & tension ✔ Fractals ✘ Hierarchically organized ratios & scales
	Light & Space **11/12**	✔ Natural light ✔ Filtered & diffused light ✔ Light & shadow ✔ Reflected light ✔ Light pools ✔ Warm light	✔ Light as shape & form ✔ Spaciousness ✔ Spatial variability ✘ Space as shape & form ✔ Spatial harmony ✔ Inside-outside spaces
	Place-Based Relationships **9/11**	✔ Geographic connection to place ✔ Historic connection to place ✔ Ecological connection to place ✔ Cultural connection to place ✔ Indigenous materials ✔ Landscape orientation	✘ Landscape features that define building form ✔ Landscape ecology ✘ Integration of culture & ecology ✔ Spirit of place ✔ Avoiding placelessness
	Evolved Human-Nature Relationships **12/12**	✔ Prospect and refuge ✔ Order and complexity ✔ Curiosity and enticement ✔ Change and metamorphosis ✔ Security and protection ✔ Mastery and control	✔ Affection and attachment ✔ Attraction and beauty ✔ Exploration and discovery ✔ Information and cognition ✔ Fear and awe ✔ Reverence and spirituality

Table 5: Summary of Brackenhurst Eco-Conferences Centre Biophilic Design Performance
Source: Author

5.2.6 Psychosocially Supportive Design Performance Summary

The retreat facility scores 80%, 100% and 81.94% in active design, social support design and biophilic design respectively. This is considerably good considering the nature of growth that has occurred on the property over the years with continual development being their model of growth over the years as opposed to a pre-determined plan at the inception of the facility.

The facility's greatest success is in its incorporation of the natural environment as a part of its design. The buildings in and of themselves cannot achieve the same level of success as has been realised by the use of the natural outdoor environment to create the experience on site.

Fig. 5.89 Taita Hills Wildlife Sanctuary entrance.
Source: https://www.julius-safaris.com/taita-hills-wildlife-sanctuary/

Fig. 5.90 Google earth image showing the lodge on the plains below Taita hills.
Source: Author

Fig. 5.91 Sarova Salt Lick Game Lodge
Source: https://www.goplacesdigital.com/its-time-for-a-new-adventure-at-sarova-salt-lick-sarova-taita-hills-game-lodge/

5.3 Sarova Salt Lick Game Lodge

5.3.1 Historical Background

The Salt Lick Game Lodge currently under the Sarova Hotels management is one of the two lodges within the Taita Hills Wildlife Sanctuary (Fig. 5.89) established in 1972 by Hilton International. The lodge was designed by British engineer John Corry Firth and built between 1972 -1975 in an area with two natural watering holes within the sanctuary. The name originates from the large number of animals that have historically flocked the area for their daily dose of salt as they graze and drink.
The nearby Kaisugu Hills were the battle ground of the German forces and the British Army led by General Smuts in 1914-1918 war, and it is here that the formidable Lord Grogan built his home which is locally known as Grogan's Castle.

5.3.2 Site Description

The Taita Hills Wildlife Sanctuary, a privately owned sanctuary, is on the plains below the Taita Hills that lie to the south of Tsavo West (adjacent to Tsavo West National Park) in Taita-Taveta county (Fig. 5.90 and 5.92) approximately 220km form Mombasa and 374km from Nairobi. The sanctuary covers a small area of 28,000acres (110km^2) compared to the much larger Tsavo East & West Parks and it is one of the reasons it was an ideal spot for wildlife viewing from a lodge as it has a large variety of animals in a relatively small piece of

The sanctuary provides a safe home to over 50 species of mammals and 300 species of birds within the 28,000acres of rolling savanna and woodland habitats. The most notable of the animals and commonly seen in the sanctuary include African Bush Elephants, Lion, Oryx, Lesser Kudu, Cape Buffalo, Maasai Giraffe, Leopard, Cheetah, Zebra, Hartebeest, Impala Waterbuck, Thomson's Gazelle and Dik Dik.

The Salt Lick Game Lodge (Fig. 5.91) is built upon a unique architectural concept consisting of 96 distinctive oval-shaped rooms in units of 2 floors elevated on stilts made of 49 twin, 32 double and 15 triple accommodation options. The units cluster together to form 5 villages on either end of the clubhouse to form of the Eastern and Western Wing and are linked by suspended walkways. The walkways and units make uninterrupted views of animals in close proximity possible.

The largest and centrally located building that links the lodge's 2 wings consists of the reception lobby, offices and waiting lounge (ground level), Bura restaurant serving international and local cuisine (First level) and Vuria Bar & Lounge, a shaded roof terrace overlooking the main waterhole (Second level).
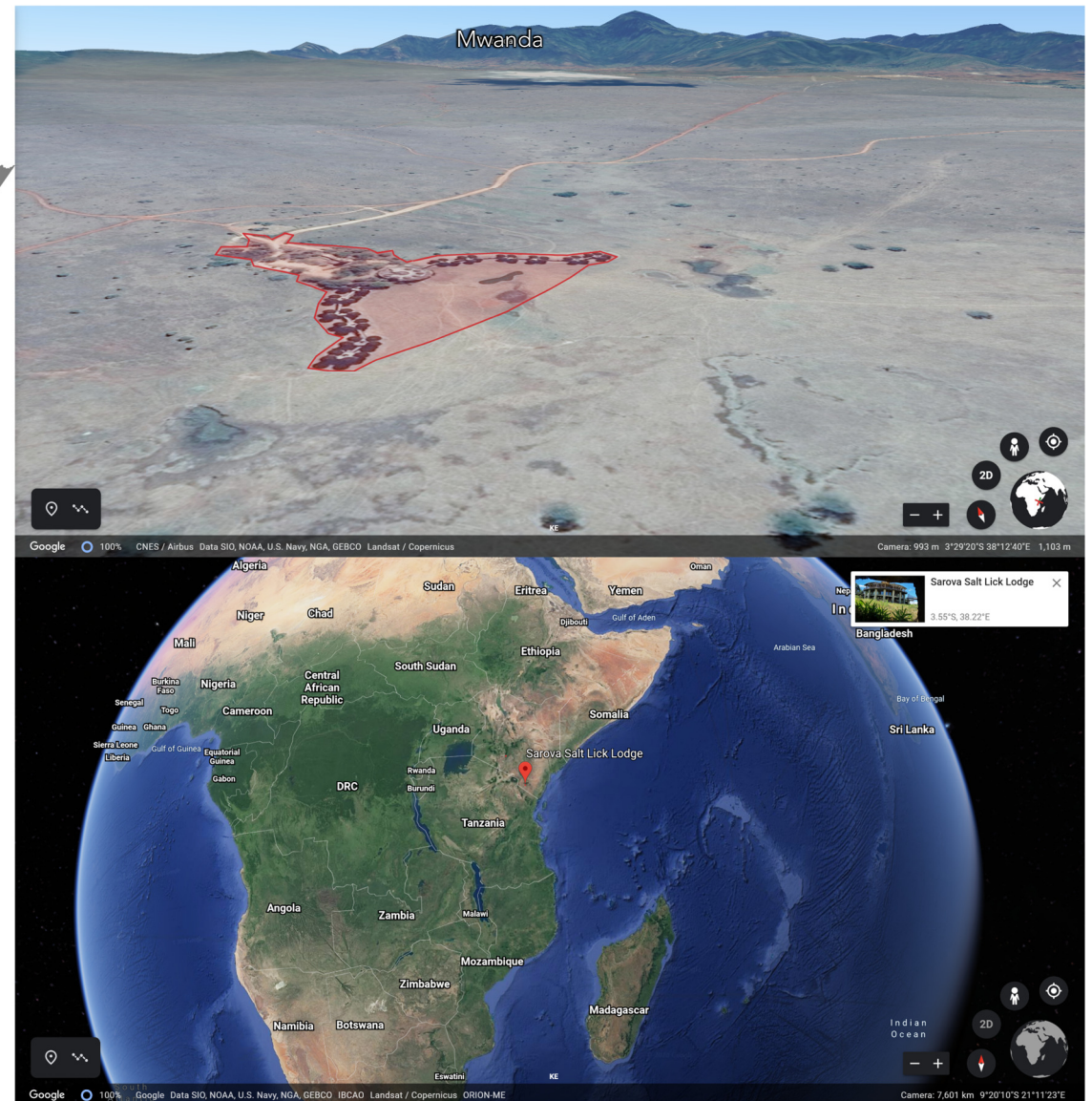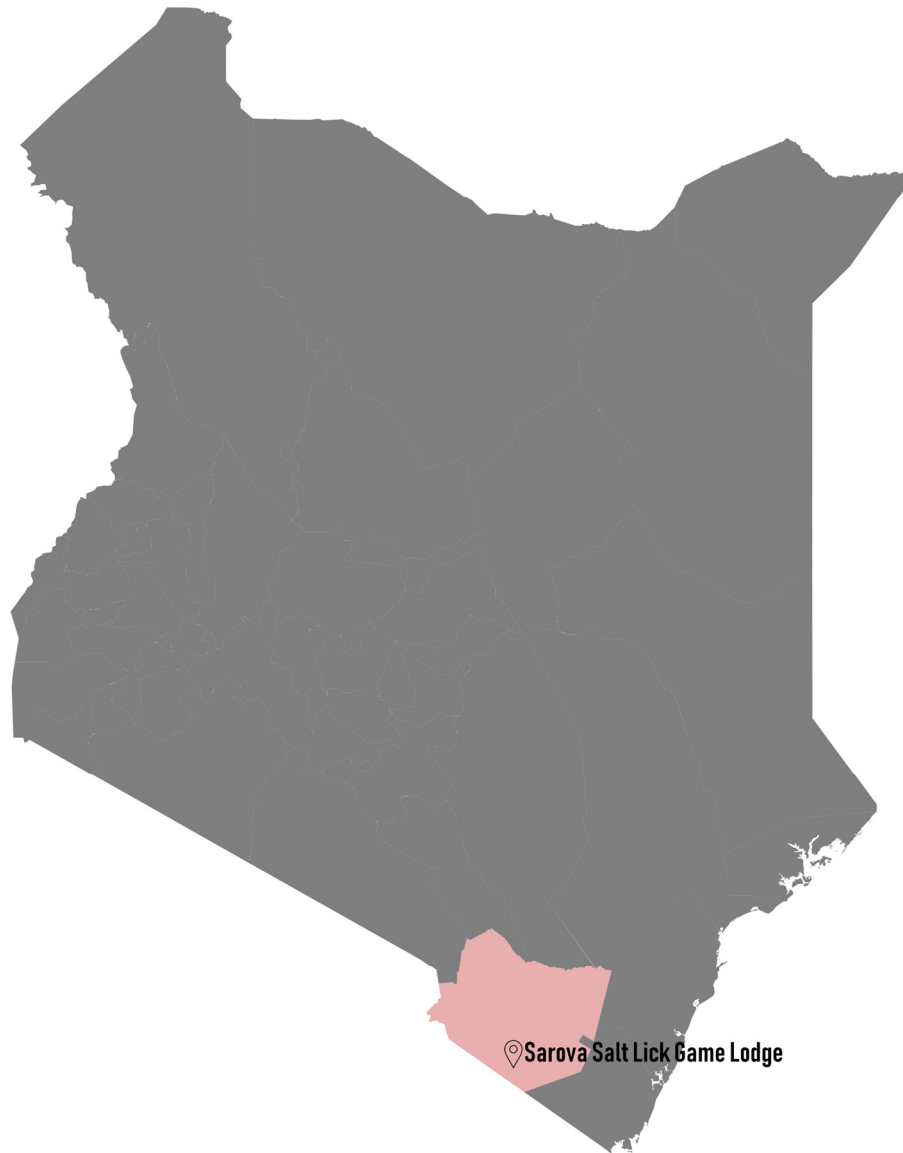
Fig. 5.92 Sarova Salt Lick Lodge location, context and site extents.
Source: Author

PATH ID	DISTANCE (km)(approx.)	CALORIES BURNT (kcal.)	LOWEST ELEVATION (m)	HIGHEST ELEVATION (m)	ELEVATION GAIN (m)
01 (Clubhouse - Cluster 1)	0.019	1	839	839	0
02 (Cluster 1 - Cluster 2)	0.009	1	839	839	0
03 (Cluster 2 - Cluster 3)	0.011	1	839	839	0
04 (Cluster 3 - Cluster 4)	0.009	1	839	839	0
05 (Cluster 4 - Cluster 5)	0.018	1	839	839	0
01' (Clubhouse - Cluster 1)	0.019	1	839	839	0
02' (Cluster 1 - Cluster 2)	0.009	1	839	839	0
03' (Cluster 2 - Cluster 3)	0.011	1	839	839	0
04' (Cluster 3 - Cluster 4)	0.009	1	839	839	0
05' (Cluster 4 - Cluster 5)	0.018	1	839	839	0
	AVERAGE DISTANCE (km)	**AVERAGE CALORIES (kcal.)**			**AVERAGE ELEVATION GAIN (m)**
	0.01	**1**			**0.00**

Fig. 5.93 Sarova Salt Lick Game Lodge site plan and active design data
Source: Author, adopted from Ndalo, 2017.

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Fig. 5.94 The suspended walkways are as much a part of the game viewing experience.
Source: https://zpskenyasafaris.com/hotel/sarova-salt-lick-game-lodge-taita-hills-kenya/

Fig. 5.95 Human scale is maintained due to the perceived ground plane being raised above ground.
Source: Author, 2017

Fig. 5.96 Main staircase that services all levels from the main building.
Source: Author, 2017

5.3.3 Active Design

5.3.3.1 Pedestrian Path Design and Connectivity

The circulation within the lodge is one of the reasons for success of Salt Lick as game viewing retreat centre. The suspended walkways offer a great view of the watering hole as a part of the accommodation clusters.

The walkways offer a continuous viewing deck (Fig. 5.94) that allows for the guests to have a wide range of view of the animals and environment around the watering hole.

The villages are placed at an average of 13.2m (Fig. 5.93) apart as intersections to ensure shortened blocks of travel that require no extra structural support on the walkways and the distances are comfortable to travel between. However, the blocks are linear in direction and not highly connected due to the desire to stretch the lodge longitudinally for panoramic and unobstructed views.

Though the lodge be elevated 10m above ground, the human scale is observed and maintained (Fig. 5.95) as the 2 storey buildings are all elevated hence the building users do not necessarily experience the lofty heights achieved in raising the lodge units. Experientially, the lodge is only 2 levels along the walkways.

Being a majorly outward looking facility and the nature of the retreat, there isn't much ground level transparency on any level other than central clubhouse which is open at the reception level to allow visitors to have a close view of the animals on the ground level.

5.3.3.2 Staircase Design

The only form of vertical circulation in the lodge is use of staircases with the main one at the central and main building as the primary circulation between the different levels of the lodge. The main staircase within the is a spiral staircase (Fig. 5.96) following a helical arc of a 2m radius with its origin at the centre of the central supporting 1000mm Ø circular reinforced concrete column and clad in sandbags.

The spiral stair is placed at a desirable and ideal location within 20m of the entrance and it is very easily distinguishable upon entry. However, the ergonomics of the stair are not ideal as it does not take human anthropometrics into account. The functional surface left for stair treads is only about 1.3m and being a compact spiral staircase, it is difficult to navigate. Walkability on the stair improves as the diameter increases thus making it very treacherous for 2 or more people to use the stairs abreast.

Fig. 5.97 Sisal rope wrapped around staircase railing.
Source: Author

Fig. 5.98 Elevated viewing deck at reception lounge and lobby for game viewing
Source: Author, 2017

Fig. 5.99 Afrocentric Wall sconce in staircase shaft sheds warm light into the stairwell.
Source: Author

The staircase is on the other hand aesthetically treated in the interior detailing. The shaft is washed in warm light from authentic Afrocentric wall sconces (Fig. 5.99) and the wrapping of sisal rope along entire length of its steel pipe railing rope (Fig. 5.97), locally common, elicit feelings of familiarity among locals and nationals visiting the facility.

The stair uses suspended treads to ensure the light from the wall sconces and from various floors is well distributed within the entire stair shaft. To reflect the light, the shaft is painted white to increase the light level. The lighting solutions for the shaft are clearly well thought out yet the shaft is still relatively darker than would be ideal and this would be solved by naturally lighting the staircase shaft.

If naturally lit, not only would the lighting issue be solved but the staircase area would be more aesthetically pleasing as it would add to the views of the watering hole and reduce the stress experienced in navigating an otherwise challenging stair to walk on.

The only other staircases along the primary circulation routes are similar and they occur on either end of the clubhouse to join the villages on both wings to the first level of the clubhouse. They are straight timber stairs painted black with 150mm risers and 300mm treads. The railing is similarly treated as the main staircase in the main building.

The fire escapes at the different villages are steel spiral staircases and they face the exact same ergonomic challenges as the main staircase if not worse. They are small and their railings are more likely to pose a hazard as opposed to a safety measure. The dynamics of the small spiral staircase makes the spiralling pipe railing shorter than safety standards would state thus making them riskier to use.

5.3.3.3 Multi-Generational Play & Recreation

The nature of the retreat facility does not necessarily allow for many options in provision of multi-generational play and recreation as the focus of the lodge is the animals in the sanctuary and thus outward looking as well as the safety hazard posed by the wildlife right within the immediate context. For this purpose, the multi-generational recreation activities are controlled and limited to only game excursions and viewing.

The reception and lobby area are the first recreation spaces as they provide an elevated viewing deck (Fig. 5.98) that brings the lodge users and visitors within metres of the wildlife and the experience for both children and adults, of whatever age, is undoubtably fulfilling. It is this same experience that the design of the lodge seeks to deliver to users on the suspended walkways and within their rooms.

Fig. 5.100 Lodge guests viewing elephants at the elevated reception lounge.

Fig. 5.101 View of a herd of elephants coming in for an evening drink as seen from a bridge linking two villages.

Fig. 5.102 Sunken lounge opposite reception with fireplace.

Though not as close as the reception and lobby area, being just 10m above the animals that come by the lodge each day is something of a rarity (Fig. 5.100).

For those desiring more than a stay in the lodge, the facility offers day and night game drives, excursions to neighbouring areas of interest and nature walks in order to acquaint their users with a rich authentic experience of the entire ecosystem of the Tsavo area.

There is however a great opportunity to have had both indoor and outdoor activities that could be integrated into the lodge and its primary focus to bring the animals closer to man than usual. The courtyards of the villages could serve as more than just circulation but themed meeting spaces to further immerse the users in the Salt lick lodge.

5.3.4 Social Support Design

5.3.4.1 Provision for High-Quality, Attractive and Inviting Meeting Spaces & Recreational Facilities

The entire lodge is built on the premise of game viewing and the wildlife around the lodge is the most inviting component of the lodge. For this reason, the social gathering spaces are located at the most prime location for viewing wildlife which is the central building. Besides being situated in close proximity to the watering hole, they are also designed to be aesthetically pleasing.

On the Ground level, the reception and lobby floors are finished in varnished mazeras sandstone and the ceiling, furniture and railings used in the area are made of varnished or painted raw timber members in attempt to seamlessly blend into the surrounding environment.

The artificially created watering hole (Fig. 5.101) at the front of the reception and lobby lounge for the animals has water gushing down the rocks that serves as both a source of water for the animals and also as a design element mimicking the natural flow and sound of water. This adds to the ambience of the place which increases the appeal of the space.

Right opposite the reception is a sunken lounge with a fireplace (Fig. 5.102) in its centre under sloped glazing. The entire monolithic central fireplace is clad in galana stone. The surrounding galana stone clad columns of the circular lounge are decorated in select crania of different animals collected within the lodge's immediate context since the lodge was built with a description below on the identity of the animal and they met their demise at the at the sanctuary. This brings a museum like interest to the lodge where users are drawn to the space in an attempt to bridge the past and present of the game lodge. On the same, columns are wall sconces that lend their light to the wildlife skull collection.

Fig. 5.105 Bridge-like suspended walkways link all the buildings on site.
Source: Author

Fig. 5.103 Bura Restaurant buffet servery organised around the sloped glazing that visually links the sunken reception lounge and restaurant.
Source: Author

Fig. 5.104 Bura Restaurant dining area is arranged around a panoramic view of the watering hole.
Source: Author

At the first level is Bura Restaurant with similar aesthetic decoration and material finish as the level below but adds timber parquet to the servery and dining area as a floor finish (Fig. 5.104). The servery is vertically above the sunken lounge and visually linked by the sloped glazing such that people down below are visually linked to the buffet dining activity and vice versa (Fig. 5.103). The visual linkage brings out the desire to actively explore and discover the facilities and experience on either level. The curving edge of the Bura restaurant dining facing the watering hole is glazed in a continuous curtain wall to open the restaurant to a panoramic view of the watering hole and sanctuary as a whole. The light that this brings in makes the space feel very spacious and appealing as the view and light combined make the space pleasant to be in. This is the same treatment on the top most level with the Vuria Bar & Lounge only that the panoramic glass is more recessed to create space for an outdoor viewing deck. The resultant deck provides a breath-taking view for users desiring a view of the distant horizon and greater sanctuary. It is the highest point in the lodge hence the deep appreciation of close contact with wild animals is reduced but the opportunity to have such an elevated view beyond just the watering hole more than makes up for the increased distance from the animals.

5.3.4.2 Provision for Pedestrian Friendly and Socially Enhancing Walkways

The walkways joining the villages and the village courtyards are finished in a ribbed screed finish with black painted raw timber railings wrapped in sisal rope for aesthetic complement of the timber balustrades (Fig. 5.105).

The villages being only two levels high from the walkways maintain the human scale though the walkways and villages are elevated 10m above ground and the user does not experience a diminished feeling.

The bridge themed suspended walkways linking the villages are as much a social space as they are circulation for the simple reason that they serve as viewing deck of the animals down below taking shelter in the shade offered by the elevated villages and also those coming in to drink at the watering hole.

5.3.4.3 Provision for Safe & Sociable Spaces

The lodge design concept of bringing the animals within very close proximity of human settlements is one that seems to be a threat to the SOC developed at the lodge however the designer uses very simple methods to keep the wildlife within close proximity yet not within striking distance that would affect the feeling of manageability and result in a weak SOC. The simple idea to elevate the villages as well as the reception lobby and lounge viewing point ensures the animals are very close but incapable of wandering into the spaces occupied by humans. At the reception besides elevation, a built water

Fig. 5.106 The artificial watering hole is well designed to ensure safety and security of the lodge guests as they interact with the wildlife.
Source: Author

Fig. 5.107 Water is the reason for the inception of the lodge due to the presence of the natural watering hole.
Source: https://travel.jumia.com/en-gb/kenya/o8300/sarova-salt-lick-game-lodge-tsavo

Fig. 5.108 The lodge is equally committed to raising awareness of indigenous flora.
Source: Author

point with a 500mm high cheek wall and rocks on either side increases the horizontal distance between the lodge inhabitants and the animals that have come in to drink water at the man-made watering hole (Fig. 5.102).

The elevated walkways and villages pose a safety hazard if the railings are not high enough but in this case the lowest railings are 1100mm sufficient enough to prevent falling over.

5.3.5 Biophilic Design

5.3.5.1 Environmental features

<u>Plants</u>: Though Salt Lick Game Lodge is primarily about fauna, the attention and recognition of plants as part of the retreat experience is not left to chance. As you approach the main entrance some plants have been identified and labelled (Fig. 5.108) as a call to attention of approaching guest for their education that they may appreciate the presence of plants within the area and acknowledge their importance as a source of life, protection and sustenance for the fauna within the area. As part of the nature walks offered by the lodge management, plants are a key element in these walks are they are of direct relevance to the animals at the sanctuary.

<u>Animals</u>: This is the key environmental feature and primary focus at the game lodge (Fig. 5.106 and 5.107). The animals in this case are a key feature in that the animals which are in abundance here are commonly precipitators of fear and danger but in the controlled environment the resultant effect is different and possibly even more satisfying than that brought about by harmless animals around human beings as the security threat is managed while still having the animals within close proximity.

<u>Water</u>: This is the determining feature for the location of the lodge. The natural watering hole is what drew the salt lick game lodge developers to locate it in this particular place and in this particular manner. The animals are drawn to quench the thirst and by extension the lodge users get a rare glimpse of the animals coming in to drink and at such close range.
The artificial watering point at the ground level of the lodge complementing the natural watering hole Has piped water flowing down rocks and into a basin that dams the water to become a pond where the animals drink from during the dry seasons. The man induced water action produces sound and visual interest that richly enhances the experience for lodge users.

<u>Air</u>: The air quality all about the lodge is rare and different olfactory experience due to the close proximity of the animals to the lodge. The air is indeed fresh but mixed with of the odour that emanates from the animals mixed with a subtle saline odour from the saline earth at the watering hole. A concentration of the odour from the animals would in other instances be a pungent and repulsive

Fig. 5.109 The materials used in construction and finishing of the lodge are largely natural as depicted in the image of Vuria Lounge and terrace.
Source: Author

Fig. 5.110 The lodge rises above the watering hole to respond to the geology and landscape by not interfering with existing natural phenomena.
Source:
https://commons.wikimedia.org/wiki/File:Salt_Lick_Game_Lodge_from_the
_south_in_the_Taita_Hills_Wildlife_Sanctuary,_Kenya.jpg

Fig. 5.111 The central building epitomises view by use of extensive glazing to create panoramic views.
Source: Author

smell but in this particular instance this is not the case, it adds to the identity and phenomenology of the space.

Being in a relatively open spot within the sanctuary the air movement is uninterrupted and the more elevated parts of the lodge like the accommodation villages enjoy sufficient natural ventilation due to the good air flow.

Sunlight: The most successful use of daylight is seen in the Bura Restaurant on the first level and Vuria Bar & Lounge on the second level with extensive use of curtain walling to bring in abundant natural lighting and allows for extensive views. This improves morale, comfort, health and productivity.

Natural materials: The use of natural materials in the lodge is extensive in an attempt to reduce the difference between the surrounding environment. These materials include galana stone (Fig. 5.102), 5.103 and 5.104), timber parquet, timber poles, mazeras sandstone and timber shingle roofing which reveal the natural processes in the environment such as weathering and ageing.

Colour: The abundance of natural materials in the lodge results in colours that synchronize with the natural environment and where paint has been used such as on the interior and exterior of the earth bag walls, the colours that have been used are neutral colours like white and near-neutral hues like browns and tans that tend to link the earth and soil within the context to the buildings.

Geology and Landscape: Though seemingly protruding out of the landscape and easily mistaken to be out of context geologically, however, the lodge actually responds to the natural depression that results in a watering hole by rising above and ensuring minimal interruption to the natural phenomenon and adding an artificial watering hole at the ground level (Fig. 5.110).

Habitats and Ecosystems: The whole essence of the lodge is to preserve and support the existing ecosystem even as humans are brought closer to the wildlife hence the reason for raising the lodge above ground.

Fire: The central fire place on the ground level is the designers attempt to incorporate fire into his built environment and it turns out successful as the fireplace serves as a critical point of focus drawing lodge users to it.

Views & Vistas: Being a game lodge, the views to the outdoors are very well crafted by extensive use of glazing and openings that result in panoramic views (Fig. 5.111). In this case, the views and vistas are extra ordinary as they incorporate the landscape, animals and the savanna.

Fig. 5.112 The lodge is built using circular forms with no orthogonal buildings.
Source: https://www.south-african-lodges.com/lodges/sarova-salt-lick-game-lodge/

Fig. 5.113 The lodge accommodation units sit on stilts that resemble structural support in trees.
Source: Author, 2017

Fig. 5.114 The original timber shingles used on the roof reveal age and the change that the lodge has undergone.
Source: Author

5.3.5.2 Natural Shapes and Forms

Tree and Columnar Supports: The lodge residential or accommodation buildings are supported on stilts 10m above the ground below and this in away simulates the capital of a tree and resembles a tree like structure (Fig. 5.112). This gives the lodge design extra appeal due to its peculiarity in building technology yet still familiar in structural support as is seen in the natural world.

Egg, Oval & Tubular Forms: All the buildings on site are circular and resonate very well with the natural environment that is filled with such geometry (Fig. 5.113).

Shapes Resisting Straight Lines and Right Angles: The human engineering tendency to have straight lines and orthogonal shapes is actively countered in the material texture (Fig. 5.114) and building forms of the lodge (Fig. 5.112 and 5.113). The buildings are circular and the choice to use earth bags as walling and cladding material creates undulating forms on the surface of the buildings to ensure the lodge imitates organic forms that resist mechanical surfaces, straight lines and angles and instead occur in sinuous, fluid and adaptive forms.

Simulation of Natural Features: The rationale behind having the lodge sit on stilts intimates the practical characteristics that occur in nature implying structural integrity and adaptive advantage as is seen in trees and not a mere show of peculiarity.

Biomimicry: The aforementioned use of columnar supports borrows from a functional adaptation found in the natural environment.

5.3.5.3 Natural Patterns and Processes

Sensory Variability: The environment at the lodge is highly sensuous offering variety of natural stimuli to respond to. The scents, sounds, textures and visual perception made possible by light at the lodge bring out positive responses in favour of the experience at the lodge as a result of the sensory variability.

Information richness: From the animals and plants in the sanctuary to the depth of design and building technology that has gone into the architecture of the lodge, the environment is intellectually challenging thus inspiring interest, creativity, experimentation, learning and problem solving.

Age, change and The Patina of time: The lodge has aged gracefully and this is revealed in the materials used in the lodge such as the timber shingles on the roof (Fig. 5.114) that only seem to aesthetically look better as years go by. This experience with the lodge evokes a sustained positive response leading to satisfaction and familiarity with the natural process of senescence and decay.

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Fig. 5.115 The lodge is organised around the central common building and the watering hole.
Source: Author, 2017

Fig. 5.116 The bridges and courtyards between the villages act as transition zones that experientially link the built and natural environment.
Source: Author

Fig. 5.117 The play between light and shadow as a result of the chain effect between villages and bridges and lightly coloured walls and darker roofs mimics the characteristic contrast in the natural environment.
Source: http://underatree.overblog.com/sarova-salt-lick-game-lodge

Central Focal Point: The success in navigability and wayfinding of the lodge rests on the use of the central common building as a central focal point (Fig. 5.115). The same theme and design principles continues to the villages where 4 rooms share a central courtyard with a spiral staircase in the centre. The use of centrally located features such as the fire place, clubhouse and village courtyards as points of reference ensure an environment is structured.

Patterned Wholes: The villages though similar in function, vary in accommodation typology. The variation is organized by clustering and unifying them into organized and patterned wholes.

Bounded Spaces: The human predisposition to be in bounded spaces in order to draw a sense of security and safety is a key feature at the lodge. Though openly within the environment of wildlife, even the spaces feel safe as the they are physically bounded but not visually.

Transition Spaces: The idea of accessing individual accommodation units and rooms from a central courtyard accessed from a suspended walkway or bridge organizes the flow of action in a sequence so as to provide comfort in transfer from one destination to another (Fig. 5.116).

Linked Series and Chains: The lodge is organised based on privacy gradient. The higher and further you go away from the central building ground level the more private the spaces. Thus, the clubhouse houses all the public and semi-public activities, whereas, the wings are private in nature and they are linked by the skywalks on either wing.

Integration of Parts to Wholes: The collection of the 10 villages and the central building which all stand in their own individuality are joined to together as one coherent whole by the circulation spine that can be navigated from end to end through the bridges, courtyards and Bura restaurant.

Complementary Contrasts: The elevation view of the entire lodge gives an appealing rendering of apparent opposites between open space at the bridges and closed space at the villages forming an undulating like playful pattern that results in a sense of pleasure (Fig. 5.117).

Dynamic Balance and Tension: The design interventions to mitigate the threat of wild animals on human beings at the lodge is a dynamic balance of satisfying the want to have close interaction with the wildlife and yet be safe from their potential threat. The mixture of the two desires results in a creative tension that transforms the experience of the space users.

Fig. 5.118 Village Cluster Floor Plan
Source: Author

Fig. 5.119 3D perspective of Village plan cut through.
Source: Author

Fig. 5.120 3D perspective of Village cluster
Source: Author

Fig. 5.121 Village Cluster Floor Plan
Source: Author

Fig. 5.123 3D perspective of Lodge Villages linked by bridge.
Source: Author

5.3.5.4 Light and Space

Natural Light: There is an abundance in use of natural light within the lodge as the biggest attraction at the facility is from without and with it comes in natural light.

Filtered & Diffused Light: On the ground level in the reception and waiting lobby at the viewing deck right across the artificial watering point, sunlight is filtered and diffused to mitigate the effects of glare that would occur by having the floor above cantilever over the viewing area.

Light and Shadow: The patterned organization of the villages and linking bridges results in a play of light and shadow both in the air space where the villages are situated and also on the ground where the subsequent shadows are formed. This adds to the appeal of the lodge and its surrounding landscape and elicits significant satisfaction.
The interplay of light and shadow also comes in the tunnel which has light pools along its ceiling at given intervals.
The colonnade of sandbag clad columns around the front arc of the central building creates a pattern of light and shadow resulting from the different depths of surfaces and it is best seen from the bunker in the watering hole.

Reflected light: The option to have the darker parts of the interior such as the stairwell painted in reflective colours is to reflect light and increase the light quantity reaching deeper parts of the building.

Light Pools: Below the ground level is a tunnel that leads out to a bunker a few meters away from the lodge that partially pops out of the ground at the watering hole. Within this tunnel, the ceiling is fitted with skylight that provide natural light pools in the tunnel to facilitate wayfinding but also adds to the mystery in the experience of travelling underground.
The central fire place within the lobby is also fitted with a light pool of sloped glazing visually linking the dark space with a much better lit first level.

Warm Light: As a complement to the natural light outside the lodge, all artificial lights in the lodge are fitted with light bulbs giving of warm daylight within the range of 2700K-3000K.

Light as a Shape and Form: The light pools within the tunnel come into the dark tunnel from small narrow spaces to grow and appear to illuminate a greater area as is seen with torches. The resultant shape is a cone of light in the tunnel and this serves the tunnel with an irresistible aesthetic inspiring imagination, exploration, discovery and mobility.

Spaciousness: The use of panoramic views by extensive use of curtain walling or inside-outside spaces such as the viewing point on the ground level lets in a lot of natural light from the outside and opens

Fig. 5.121 The panoramic views facilitate for natural light.
Source: Author

Fig. 5.122 The skylight over the sunken lounge provides a light pool for the deep-seated dark lounge.
Source: Author

Fig. 5.120 The wall sconces in the tunnel leading to the viewing bunker sheds warm light to complement the red carpet finish on the ground.
Source: Author

Fig. 5.123 View of Taita hills rolling in the background of the watering hole around which Salt lick is organised.
Source: Author
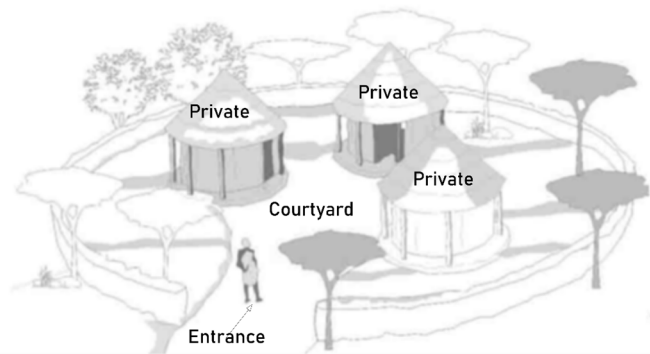
Fig. 5.124 Traditional Taita homestead and hut forms.
Source: Author Adopted from Anyamba, 1994

Fig. 5.125 The barrier between the indoors and outdoors are blurred at the lodge to merge the built and natural environments.
Source: Author

up otherwise small spaces to be perceived as much larger than they are. The same effect is achieved by use of reflective colours on the interior paints.

Spatial Variability: Within the central public building, there are several related but different spaces arranged vertically and offering very different experiences at each level. This fosters stimulation intellectually and emotionally to explore and discover.

Space as a Shape and Form: The choice to use sandbags and have circular arcs shaping the spaces of the buildings in the lodge creatively manipulates and adds aesthetic value. It encourages interest, curiosity, exploration and discovery.

Inside-Outside Spaces: The nature of the lodge reduces the barrier between the inside and outside by use of physical barriers that do not compromise the visual quality of the exterior. This apparent connectivity is a key highlight of the appeal of the lodge.

5.3.5.5 Place-Based Relationships

Geographic Connection to a Place: The lodge connects with the surrounding Geography in two key ways. In its immediate context is the low-lying watering hole which it preserves without interruption by soaring above and in its greater context are the Taita Hills and the forms resulting from the bridge connections and the peaks of the villages resembles the unfolding of the hills and ranges within the greater context.

Historic Connection to Place: The buildings of the Salt Lick Game Lodge facilitate a continuity with the past built forms to encourage the belief that the present and future are meaningfully linked to the history of Taita Hills. This foster a meaningful relation to the place, buildings and landscape by creation of an awareness and sense of participation in the culture and nurtured collective memory.

Ecological Connection to Place: The lodge has a complementary connection to the ecology of the Taita Hills Game Sanctuary and as a result sustains the lodge as a top-notch game and wildlife lodge. Prominent ecosystems are respected and thought the built environment remodels the natural environment, the overall ecological integrity, biological productivity and biodiversity of surrounding ecological communities is maintained.

Cultural Connection to Place: The built forms resonate with the culture of the Taita people in their shape, form and basic principles. This integrates the geography, history and ecology of the Taita Hills to form a core component of identity, communally and individually. Human beings have an inherent need to align to a culture and the architectural heritage of the Taita people is preserved in their distinctive vernacular forms reflected at the lodge.

Fig. 5.126 Materials used in the lodge both within and outside are sensitively selected to ensure complementary relation to the context.
Source: Author

Fig. 5.127 The lodge design seeks to complement the ecology of the landscape and not interrupt it.
Source: Author.

Indigenous Materials: The lodge is built in sandbags, Galana stone, timber parquet, timber poles, Mazeras sandstone, timber shingle roofing, concrete, steel and glass. The majority of the materials used are indigenous materials to create a complementary relation to a place, reduce the resultant carbon footprint and they serve as a vivid reminder of the local culture and environment that the people in the area can resonate with.

Landscape Orientation: Though the lodge aims to respond to the wildlife above all, the lodge still maintains reasonable landscape orientation in its orientation to the sun, predominant wind and sounds.

Landscape Features That Define Building Form: Though may not have been the key design concept, the skyline of the lodge mimics the range of hills within the greater context and the watershed below also defines the form of the building in that it rises above to preserve it. Collectively, the two concepts come together to ultimately mimic trees within the greater context that offer shade and refuge to animals all around.

Landscape Ecology: The lodge design takes into account the landscape structure, pattern and processes which include the biological corridors of animal travel to the water shed and resource flows of the saline earth and waterhole that are preserved by no planting the buildings firmly and disruptively on the ground.

Integration of Culture and Ecology: To achieve longevity, the designer of the lodge fused culture and ecology in his final design solution. The raised circular form buildings preserve ecology as well as mimic architectural heritage in slightly raised circular dwellings. The resulting sense is one of responsibility, loyalty and stewardship of this particular built environment with such depth in concurrent fusion of humanity and nature.

Spirit of the Place: The lodge takes a life of its own due to the unique and philosophical design intervention that resonates with its users such that it is a cherished component endowed with an individual and collective identity as though animate. The result is seen in the long-term stewardship that has been accorded to the facility since its inception.

Avoiding place-lessness: The Salt Lick Game Lodge distances itself from the idea of place-lessness by seeking to sufficiently connect itself to the culture and ecology of its location. This has in turn preserved the human-nature relationship and developed a sense of stewardship toward the natural world that sets in motion the sustainability discussion.

Fig. 5.130 Elephants at the water hole in front of the elevated deck at the reception.
Source: Author

Fig. 5.129 Wildlife huddled around the underground bunker ensures safety for both the viewers and animals.
Source: Author

Fig. 5.128 View from bunker; The intimacy between man and nature is reinforced by the close relationship created by close range viewing of game from spaces created by the lodge.
Source: Author

5.3.5.6 Evolved Human-Nature Relationships

Prospect and Refuge: The lodge is an excellent depiction of prospect and refuge both for the animals around and the visitors of the lodge. The lodge offers a safe and protected environment for human beings to indirectly live in the wild and the animals in turn are nourished with water resources and shelter from their potential predators as the lodge is at a vantage point ensuring a sense of safety and security for both man and beast.

Order and Complexity: Though the order be a little to structured and controlled resulting in monotonous repetition of village units at the physical level, the complexity within the lodge is sufficient to provide enough variety in minute details in the finishing and not result in chaos. The aesthetic interventions are balanced and not overly used to over complicate the design.

Security and Protection: The lodge users are safely in the wild due to design interventions put in place to protect them against the wildlife threats but not fully shielded and almost as though caged from the animals and unable to feel the human nature connection.

Mastery and Control: The lodge is great work showing the balance that ought to be there between mastery and control. Though the natural environment has been manipulated, it has been sensitively touched so as to not take control over nature but work hand in hand with it. To master nature brings satisfaction in the artistic expression of human ingenuity and cleverness which inspires the users with self-confidence and esteem.

Affection and Attachment: Due to the intimate experience with wildlife, the lodge is an object of strong emotional affinities that has received lasting loyalty and commitment over decades. The affection for nature it elicits has over the years spawned the potential of human beings to bond and be attached.

Attraction and Beauty: The lodge draws back the curtains of beauty present in the wild in flora, fauna and landscapes. It is aesthetically pleasing to behold the sights at the lodge and they then become integral in cultivating curiosity, innovation, ingenuity, discovery, and problem-solving.

Exploration & Discovery and Information & Cognition: The environment, both built and natural, at the lodge is loaded with information that intellectually stimulates the people that visit it. The lodge bridges the gap between man-made and natural which generates so much interest and appreciation that in turn nurture the cognitive prowess and intellectual satisfaction.

Fig. 5.131 The feeling of viewing game from otherwise impossible circumstances is an awe inspiring that elicits a new found appreciation for life and it's Source.

Fear and Awe: Though considerably safe, the threat in being so close to wildlife is not fully eliminated and in this case for a good reason. Navigating the walkways and viewing the game from the watering hole or bunker still comes with an eerie feeling of the fear of being so close to untamed beasts and the possibility of stumbling over to the dangerous side of the lodge, but this fear turns a motivating factor and even draws awe from the space users as the thought of perilous adventure is perceived and the wonder of what they behold right before their eyes.

Reverence and Spirituality: The awe-inspiring experience at Salt Lick Game Lodge draw out an inherent need for a meaningful relationship with an entity greater than the individual in awe. The design interventions such as the dark tunnel walk that culminates in an opening filled with light and the close-range interaction with wildlife trigger feelings of transcendence and connections defying the self-centred notion that man is the epitome of life, and the users are drawn to a greater One.

Salutogenic Design Principle	Parameter	Variable
Active Design **8/10**	Mixed Land Uses	N/A Land Use Types
	Well Designed & Connected Paths	✔ Path Connectivity ✔ Path Aesthetics ✔ Path Distances
	Pedestrian Oriented Streetscapes	✔ Streetscape Typology ✔ Building Height
	Biking Infrastructure	N/A Bike Storage N/A Cycling Routes & Paths
	Stair Design	✔ Stair Aesthetics ✔ Stair Visibility ✘ Stair Ergonomics & Anthropometrics ✔ Stair Prompts ✔ Stair Location ✔ Stair Material & Finish
	Elevator Design	N/A Elevator Location N/A Elevator Visibility
	Multi-Generational Play & Recreation Spaces	✔ Recreation Space Types
Social Support Design **9/10**	Meeting Spaces	✔ Aesthetics & Décor ✔ Location of Nodes/Meeting Spaces ✘ Cultural Activity Participation
	Well-designed & Connected Paths	✔ Path Connectivity ✔ Path Aesthetics ✔ Path Distances between Buildings
	Safety & Security	✔ Defensibility ✔ Lighting ✔ Acoustic Buffering
	Multi-Generational Play & Recreation Spaces	✔ Recreation Space Types

Table 6: Summary of Salt Lick Lodge Active & Social Support Design Performance
Source: Author

Salutogenic Design Principle	Element	Attributes	
Biophilic Design **68/72**	Environmental Features **12/12**	✔ Color ✔ Water ✔ Air ✔ Sunlight ✔ Plants ✔ Animals	✔ Natural materials ✔ Views and vistas ✔ Façade greening ✔ Geology & landscape ✔ Habitats & ecosystems ✔ Fire
	Natural Shapes & Forms **9/11**	✔ Botanical motifs ✔ Tree & columnar supports ✔ Animal (mainly vertebrate) motifs ✔ Shells & spirals ✔ Egg, oval, & tubular forms ✔ Arches, vaults, domes	✔ Shapes resisting straight lines & right angles ✔ Simulation of natural features ✘ Biomorphy ✘ Geomorphology ✔ Biomimicry
	Natural Patterns & Processes **14/14**	✔ Sensory variability ✔ Information richness ✔ Age, change, and the patina of time ✔ Growth & efflorescence ✔ Central focal point ✔ Patterned wholes ✔ Bounded spaces	✔ Transitional spaces ✔ Linked series & chains ✔ Integration of parts to wholes ✔ Complementary contrasts ✔ Dynamic balance & tension ✔ Fractals ✔ Hierarchically organized ratios & scales
	Light & Space **10/12**	✔ Natural light ✔ Filtered & diffused light ✔ Light & shadow ✔ Reflected light ✔ Light pools ✔ Warm light	✔ Light as shape & form ✔ Spaciousness ✘ Spatial variability ✘ Space as shape & form ✔ Spatial harmony ✔ Inside-outside spaces
	Place-Based Relationships **11/11**	✔ Geographic connection to place ✔ Historic connection to place ✔ Ecological connection to place ✔ Cultural connection to place ✔ Indigenous materials ✔ Landscape orientation	✔ Landscape features that define building form ✔ Landscape ecology ✔ Integration of culture & ecology ✔ Spirit of place ✔ Avoiding placelessness
	Evolved Human-Nature Relationships **12/12**	✔ Prospect and refuge ✔ Order and complexity ✔ Curiosity and enticement ✔ Change and metamorphosis ✔ Security and protection ✔ Mastery and control	✔ Affection and attachment ✔ Attraction and beauty ✔ Exploration and discovery ✔ Information and cognition ✔ Fear and awe ✔ Reverence and spirituality

Table 7: Summary of Salt Lick Lodge Biophilic Design Performance
Source: Author

5.3.6 Psychosocially Supportive Design Performance Summary

The retreat facility scores 80%, 90% and 94% in active design, social support design and biophilic design respectively. Due to the nature of the retreat facility, active design is understandably difficult to incorporate due to the environment in which the lodge is set in.

The biophilic component in the retreat facility is on the other hand is very well considered and it complementarily works to develop social support. It is the most successful principle implemented in the facility.

More provision could have been made for social support as there are opportunities to have made the shared space between rooms more than just circulation routes and vertical circulation space. To have a dedicated space where cultural activity would be incorporated in the design would also have been a nice addition to the facility in order to address the rich cultural heritage of the surrounding community.

In conclusion, the retreat facility is the world's most photographed game lodge in the world due to its ingenuity in fitting within its context which is a direct reflection of its success as a retreat facility.

5.4 Diani Reef Beach Resort & Spa

5.4.1 Historical Background

The Diani Reef Beach Resort and Spa was designed by then Triad Architects' partner David Bristow and completed on May 24, 1989. The client brief required a luxurious hotel and altogether more sophisticated hotel offering a large range of facilities and activities compared to the average coastal hotels at the time.

Based on this brief and the inspiration from the rare and beautiful topography resulted in a magnificent, more formal building standing in stark contrast to the makuti style hotels that dominated the Kenyan coastal tourism sector.

5.4.2 Site Description

The Diani Reef Beach Resort and Spa occurs on a beautiful site along the Ukunda-Diani Beach. It is built on a high coral cliff overlooking the wonderful Diani white sand beach and the Indian Ocean.
The facility is about 30km south of Mombasa Island with a gross area of 20,000m^2 on 30 acres of land at time of construction, it has however expanded since. As per the description of the architects "The design has a coordinating theme of white Swahili-style arched openings set off by red clay grills and dark mvule screens. The hotel entrance, public rooms and shops are focused around a magnificent baobab tree in an open six-sided court. The dining room, cocktail bar and conference rooms all command dramatic views across the coral cliff to the Indian Ocean.
The swimming pool, with its coral island, has a 'floating bar' set in it and generous sunbathing terraces which lead directly to the beach through a coconut grove at the foot of the cliff. There is a high standard of finish throughout the hotel with ceramic or polished terrazzo floors, terracotta clay screens in circulation areas and fitted carpets and sliding doors in guest rooms."

5.4.3 Active Design

5.4.3.1 Incorporation of Mixed Land Uses

As part of the client brief, to have multiple uses within the facility was a key feature. The facility has multiple uses that go as far as even branching further for different typologies within certain uses. The s

The spaces/uses accommodated in the facility are:

Fig. 5.132 Photograph of Diani Reef Beach Resort by night upon completion.
Source: http://triad.co.ke/diani-reef-hotel/

Fig. 5.133 Aerial photograph showing the entirety of Diani Beach Resort and Spa.
Source: https://www.easy-reisen.ch/Hotel/Afrika/Kenia/Diani-Reef-Beach-Resort-%2B-Spa.aspx

Fig. 5.134 Diani Beach Resort & Spa location, context and site extents.
Source: Author
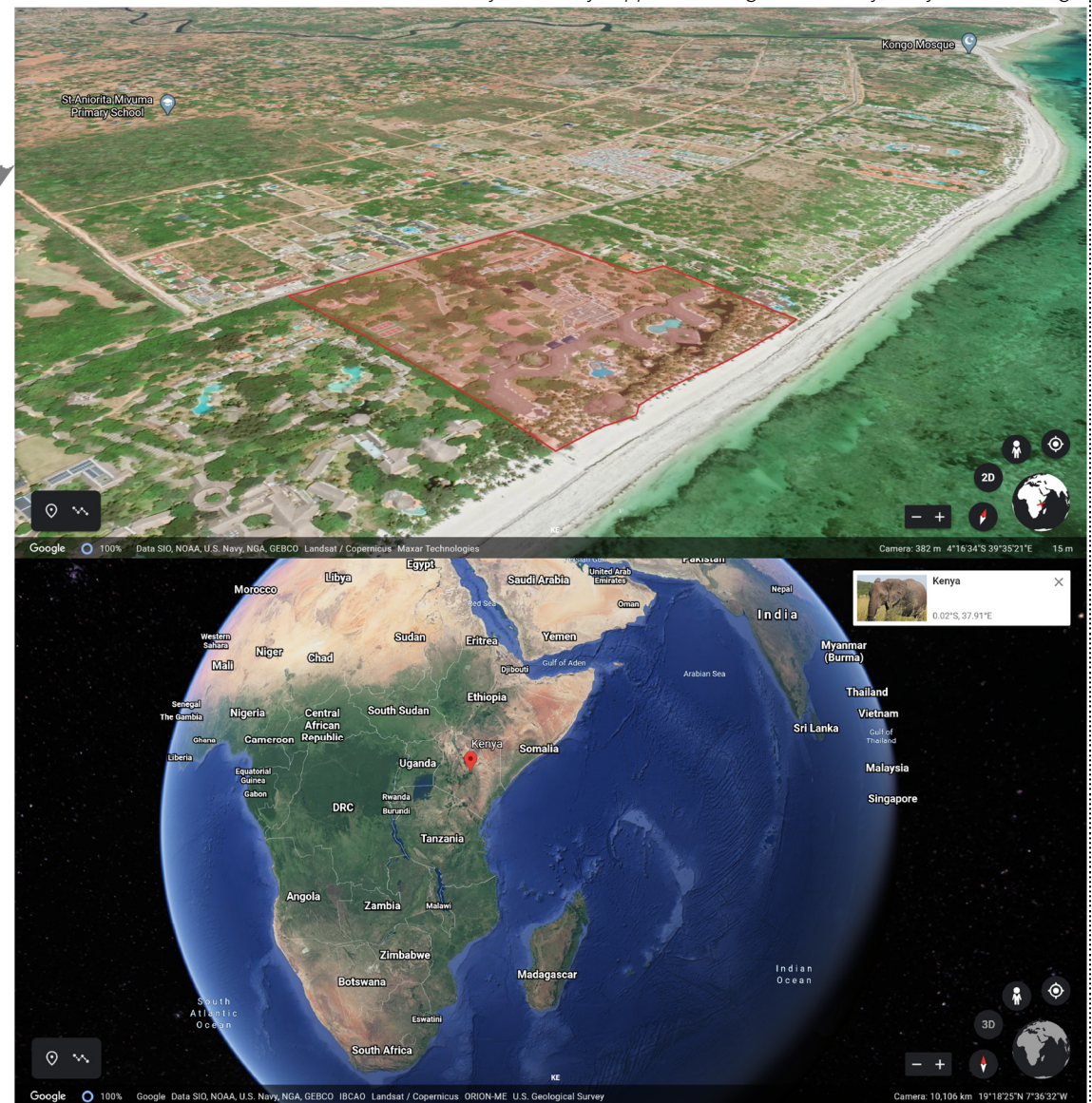
PATH ID	DISTANCE (km)(approx.)	CALORIES BURNT (kcal.)	LOWEST ELEVATION (m)	HIGHEST ELEVATION (m)	ELEVATION GAIN (m)
Reception - Room	0.01	1	2133	2134	1
Coral Rock Café - Room	0.02	1	2131	2133	2
Beach - Room	0.04	2	2126	2128	2
Fins Restaurant - Room	0.01	0	2127	2128	1
Gym - Room	0.05	5	2127	2129	2
Pool 1 - Room	0.04	2	2123	2127	4
Pool 2 - Room	0.01	0	2123	2125	2
Zebra Lounge - Room	0.05	2	2126	2127	1
Tennis Courts - Room	0.02	2	2125	2127	2
Parking - Reception	0.03	2	2129	2131	2
	AVERAGE DISTANCE (km)	AVERAGE CALORIES (kcal.)			AVERAGE ELEVATION GAIN (m)
	0.03	**1.7**			**1.90**

Fig. 5.136 Active design data based on the author's place of residence in the resort and dominant circulation routes.
Source: Author

Fig. 5.135 The pedestrian experienced is greatly enhanced by the abundance of plant life on site along these routes.
Source: Author

Fig. 5.137 The resort offers a highly sensual experience by use of natural materials and elements such as water.
Source: https://www.potentash.com/2017/10/03/travel-diani-reef-beach-resort-lifestyle/

Administration offices, Business Centre, Oyster Conference Facility, Pearl Boardroom, Coral Rock Café(Main Dining), Sake Oriental Restaurant (Themed Restaurant and dining), Fins Seafood & Grill(Beachfront dining), Zebra Square Bar & Piano Lounge, Dunes Night Spot, Floating Pool Bar, Coral Deck Bar, Waves Bar & Ice Cream Corner, Sins the Night Club, Maya Spa & Wellness Centre, Coco Jumbo Kids Club, Tennis Courts, Squash Courts, Mini-Movie Theatre, Free-form swimming Pools & Gym.

The variety of activities available within the resort generates a lot of need for movement from destination to destination.

5.4.3.2 Pedestrian Path Design and Connectivity

The width of pedestrian circulation immediately stands out with the narrowest circulation routes spanning 1800mm and the largest ones spanning up to 4000mm. This ensures comfortable walkability within the facility.

The circulation routes throughout the hotel are highly connected due to the sheer size of the facility and variety of utilities available to the hotel residents. The distances travelled to access the variety of activities would be tedious without interconnectivity and provision of multiple route options to access different spaces.

5.4.3.3 Provision for Pedestrian-oriented and enticing Sidewalks and Streetscapes

Majority of the circulation routes are inside-outside spaces if not outdoor spaces entirely and this design ensures the paths are highly sensuous and linking the interior experience to the fulfilling to the users. This ensures all 'interior' circulation routes act as transitional spaces between the exterior and interior spaces.

The exterior circulation spaces are intuitively designed to inspire by use of the landscaping features. The use of water in particular and the bridges and paths that cut across the water features on site both outdoors and indoors really excite and elicit feelings of satisfaction as you navigate through the facility.

At most nodes in the building, signage showing routes and directions are installed so as to assist the users to navigate through the large facility and easily find their desired points of interest which are also situated not too far from major circulation routes in order to maximise visibility and increase human activity thus enhancing the pedestrian experience.

Along the routes of circulation are also found benches and tree cover serving as spots to slow down traffic for repose which potentially provide social support.

Fig. 5.139 Beach Volleyball at the resort beach front
Source: https://www.youtube.com/watch?v=f4pjcr9c40k

Fig. 5.140 Tennis courts on site provide a space for recreation for all ages.
Source: Author
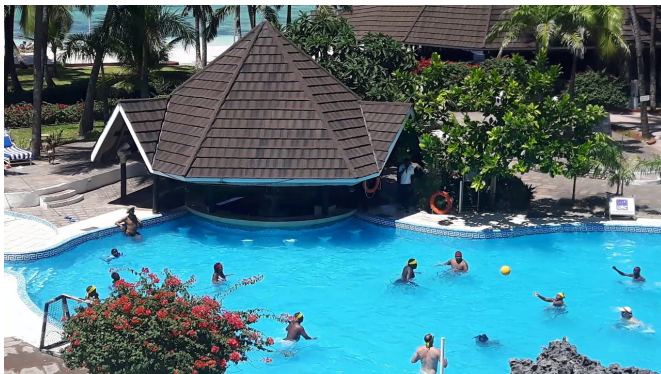
Fig. 5.138 The swimming pools are popular as spaces for multi-generational play as seen in the image of residents engaging in water polo.
Source: https://www.youtube.com/watch?v=f4pjcr9c40k

5.4.3.4 Staircase Design

Stairs are the dominant means of vertical circulation in the resort. The facility does not have one major staircase that is used to access the levels of the hotel due to its size, however, there are multiple staircases at circulation nodes where to building blocks join or sheer to facilitate for vertical circulation between levels. The stairs are 1800mm wide U-shaped stairs with a single landing that are visible. The same staircases facilitate for fire escapes.

The exterior stairs in particular incorporate aesthetic treatments by use of timber and sisal rope which creates visual interest and makes them a lot more appealing to users as the natural materials generally are more enticing.

As part of the circulation signage, stair prompts directing users to the nearest stairs along a given circulation route feature as part of the wayfinding strategy.

5.4.3.5 Less Prominent Elevator Design

The elevators within the facility are tucked in corners and not conspicuous to a physically capable user. This is the case so as to reserve the elevators for use by the physically challenged by the elderly. They aren't located next to the stairs and they are by far fewer than the stairs. The routes leading to the beach for example do not have any elevators and have to be navigated by stairs. This is a challenge as it may close out the physically challenged and elderly from access to one of the most important features of the retreat experience.

5.4.3.6 Provision of High-quality Spaces for Multi-generational Play and Recreation

The swimming pools are the most obvious space for multi-generational recreation as consideration has been made for all ages ranging from babies in the plunge pool to adults in the deeper swimming pools.

The tennis and squash courts adjacent parking also provide for multigenerational play and recreation due to their universally inclusive nature.

The Coco Jumbo Kids Club beneath the Coral Rock Café and Zebra Lounge though primarily set up for recreation for children, it is also filed with certain games that adults coming in to supervise can engage in and thus making the space multi-generational for games and activities.

The beach is the biggest multi-generational recreation spot as it draws everyone at the facility.

Fig. 5.141 The Coco Jumbo Kids Club
Source: https://gramho.com/location/the-diani-reef-beach-resort--spa/450244340

Fig. 5.142 Diani Reef Beach Resort & Spa Reception and lounge.
Source: https://www.jahnreisen.de/reise/Diani+Reef+Beach+Resort+%26+Spa-4K0206.html

Fig. 5.143 Baobab Tree at the centre of the courtyard around which the resort was designed.
Source: Author

5.4.3.7 Provision of Play Spaces for Children

As part of the free form pool adjacent to the Fins Seafood & Grill, a smaller plunge pool has been provided for use by children unable to swim in the deeper pools.

The Coco Jumbo Kids Club and Mini-movie Theatre though accommodating for all ages, are primarily set up for children to be entertained and the adult consideration is secondary as they may be in the spaces for supervision.

5.4.4 Social Support Design

5.4.4.1 Provision for Attractive and Inviting Meeting Spaces

Along the circulation routes of the resort, aesthetically pleasing spaces that slow down movement have been set up to create spaces for social connections to be established.

Right from the reception lobby, the desire to create attractive meeting spaces is seen in the interior design of the reception and lobby. The timber framed structure is filled in natural and local materials. The timber members used are raw and painted and the steel joints are tightly wrapped in sisal rope. The floor is finished in natural stone and the furniture uses contemporary design though the individual members are raw bamboo and timber.

Upon exiting the reception as you approach the main building, is a highly sensuous garden with a baobab tree at the heart of the resort planning. The baobab tree is enclosed by a dual functioning concrete bench and planter which is surrounded by a timber walkway and a water feature characterised by the coral reef rock and fish inside. This central courtyard garden elicits emotion and feeling that makes it highly attractive for repose, reflection and improve social interaction.

All public spaces such as the beach front, pools, bars, restaurants and lounges within the facility are treated as social gathering spaces hence highly decorated and aesthetically treated in natural finishes, decorative pieces and enticing furniture that draw the users to the spaces and increase the potential social connection among the resort guests.

5.4.4.2 Provision for Spaces for Social and Cultural Activity Participation

The Dunes Night Spot adjacent to the Fins Seafood & Grill and the Zuri Disco Close to the main swimming pool are the most active social and cultural activity spots on the facility. The Zuri Disco is mainly for parties and no cultural activities happen here due to capacity but the Dunes Night Spot has a

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stage like set up allowing for performances to be held as well as social activities planned and coordinated by the resort management for most nights of the week.

5.4.4.3 Provision for Pedestrian-friendly Footpaths and Socially Enhancing Street Patterns

As discussed in the active design interventions for the pedestrian experience, the resort has put in measures to ensure the aesthetic and comfort experienced by guests as they navigate the hotel is fulfilling. This is achieved through decoration to add aesthetic value along paths, ergonomic design to maximise comfort in navigating the routes, nodes to facilitate repose and social interactions and biophilic components such as plants, trees, animals and water to reinforce the experience through the resort.

5.4.4.4 Provision for Safe and Sociable Spaces

The spaces within the resort feel safe and secure as they are designed defensibly from the potential human threat that may result from the public beach. Though no physical barrier has been set up between the public beach and the resort, the spaces directly adjacent to the beach are more public and create a perceived barrier where residents have 'eyes on the street' and discourage the potential access of non-residents with sinister intentions. This is not a full guarantee of safety and security hence need for a few security personnel around the public beach access to the resort.

In order to ensure children in the Coco Jumbo Kids Club and Mini-Movie Theatre are safe, facilities accessible to adults on watch have been provided to ensure any adult desiring to be on watch over their child is able to be actively present while still enjoying the retreat experience.

One challenge to safety and security however is the abundance of wild monkeys within the resort areas. These monkeys are a threat to security and safety as they have the potential to access rooms through balconies and rummage through guest property as well as harass the guests for food within the outdoor spaces. They are both a desirable and undesirable phenomenon at the resort as they are pleasant to watch but unpleasant to come in close contact with as they are untamed and wild.

5.4.4.5 Provision for High Quality Parks and Recreational Facilities

Due to the sensitive location of the resort on a high coral cliff, the experience to be in a built space whilst still having access to the wild coral rock that occurs naturally has an outstanding appeal to it.

Fig. 5.144 A life-size chess board and pieces to facilitate for high quality recreation and active design as you approach the beach.

Fig. 5.145 The monkeys at the resort though pleasant to watch can be unmanageable and harass residents.

The primary free form swimming pool as a coral island right in its centre and a sunken 'floating' bar. These clever design solutions improve the overall aesthetic and quality of the pool as a recreational facility and the resort as a whole.

5.4.5 Biophilic Design

5.4.5.1 Environmental features

Plants: The resort abundantly incorporates plant life and trees into their built environment in an attempt to improve comfort, happiness and well-being. The resort has an evident commitment to plant preservation and education. They have made an attempt to put prompts with information on importance of plants and labelled a number of the plants on site for the education of the curious user. The plants strongly enhance the natural coral rock that the resort is built upon such that the built environment does seem to intrusively manipulate the natural environment.

Animals: The resort incorporates use of animals in its design intentionally by use of fish in their water features which evoke pleasure, stimulation, satisfaction and emotional interest. The free-roaming animals such as the monkeys and lizards though not intentionally incorporated as animal components, they also serve as a source of interest as long as they aren't within reach to scare them.

Water: The use of water as design feature is abundant as it elicits high levels of liking and preference. Both physically and mentally, water has a cooling effect that soothes and lightens the spirit by use of its properties that pertain to sounds, textures and visuals.

Air: The resort seeks to have a large amount of inside-outside spaces in an attempt to naturally cool and ventilate the interior spaces. Due to proximity to the ocean, the air quality coming into the resort is fresh and filled with the ions required to stimulate the senses.

Sunlight: The resort uses sunlight as an essential design element in their attempt to have as much of their interior spaces lit by the natural light though shade the interiors from the hot and unforgiving warm humid climate solar insolation. The interior spaces are visually opened to the exterior by use of skylights, large windows, curtain walls or having only horizontal covering in form of roofing without any vertical planes like walls on the periphery of interior spaces.

Natural materials: The idea to situate the resort on a coral cliff requires a synchronised material palette and treatment so as to blend the built and the natural. This is achieved by use of a lot of timber as railing, flooring and structural members. The floors though mostly tiled on the inside spaces, the transitional spaces acting as a bridge between the outside environment and the internal environment

Fig. 5.146 Plant conservation prompts reveal the commitment of the resort toward care for the botanical environment.
Source: Author

Fig. 5.147 Fish are incorporated in the resort water features to evoke the pleasure that arises from interactions with animals in the built environment.
Source: Author

Fig. 5.148 The use of water as landscaping element greatly adds to the aesthetic and quality of the resort.
Source: Author

Fig. 5.149 The resort is built on a high coral cliff and stepped along its terrain.
Source: Author

Fig. 5.150 Seaward view of ocean from resort.
Source: Author

Fig. 5.151 As a result of successful sitting of the resort on the coral cliff, plants have grown on the coral cliff and thus give a facade greening effect.
Source: Author

are finished in natural materials like timber floor boards and natural stone. The soffits of the buildings are also made of woven/plaited coconut palm leaves local to the region.

Colour: The predominant colours at the resort emanate from the natural materials used. The resort walls are predominantly white both to reflect light as well as to link the built environment to the white beach sand within its immediate context. All artificial materials such as the floor tiles used are carefully selected to be within the neutral hues or directly matching the natural environment so as to reduce the visual distinction between the natural and artificial.

Geology & Landscape: The compatibility of the built resort with the pre-existing coral rock cliff is clearly important in this facility as the resort was stepped and plugged into the coral cliff as opposed to excavation and destruction of the natural coral environment so as to touch the earth lightly and have low impact on the existing natural ecosystem.

Habitats and Ecosystems: As a result of the sensitive modification of the existing terrain, the existing ecosystem on site was mildly interrupted and this is seen in the life that is still sustained on the site. The wild reptiles and vegetation that is known to be supported by coral rock is still very active and the small animals are seen popping in and out of cracks and crevices on the coral cliff.

Fire: The resort implements fire as a design feature in the immediate beach front social gathering spaces through fire places and fire pits. People are drawn together to gather around the fire to keep warm as they take in the night's entertainment.

Views and Vistas: All the rooms in the facility are oriented toward the sea and beach and further fitted with curtain walls, sliding doors and balconies on the façades facing the sea so as to maximise on the breath-taking coastal views. The coconut trees and palm trees on site in turn frame the views and create vistas toward the sea.

Façade Greening: The designers did not intentionally put in place measures to have climbers and plants grow on the façades of the resort. However, due to the relatively successful sitting of the resort on the coral cliff, the plants on the coral rock have grown and are perceived as a part of the façades that have exposed the coral cliff beneath thus elicit the same feelings of curiosity and satisfaction arising from façade greening.

5.4.5.2 Natural Shapes and Forms

Botanical Motifs: Though not dominantly used and noticed, subtle details within the building interiors depict shapes and forms that mimic plant and vegetative forms. One such example is in the fans used

inside the coral rock café which mimics verticillate whorled phyllotaxis in leaves with five leaf like fan arms made of plaited palm or coconut palm leaves radiating from a central node.

Animal Motifs: The aesthetic décor in the resort elaborately and outrightly simulate animate objects in in the decorative carvings and paintings encountered within the resort. The white wall as you access Blue Bar on top of Zuri Disco has been decorated in human figures and as one navigates the corridors between the Coral Rock Café and the Zebra Lounge, there are two separate wooden carvings depicting animate objects.

Tree and Columnar Supports: This is noted right from the entrance in the structural support of the high reception roof. The timber members tower above the reception lobby intersecting each other in a forest like manner. The structural support for the cantilevered wooden decks on the steepest parts of the coral cliff also depict tree and columnar supports.

Egg, Oval and Tubular Forms: The swimming pools in the resort are free-form pools and with the main pool having an oval egg-like island with natural coral rock and vegetation. The pools serve as key ornament expressions in an attempt to mimic organic forms and shapes.

Arches, Vaults and Domes: The design has a coordinating theme of white Swahili-style arched openings set off by painted timber railings as the predominant façade treatment on majority of the resort. Though primarily drawn from the Swahili architecture, they mimic shapes found in nature like in beehives and cliffs.

Simulation of Natural Features: This is primarily seen in the structural support interventions for supporting cantilevering parts and roof structure which replicate the columnar structural support of trees.

Geomorphology: The resort sits on the coral cliff and imitates the cliff like appeal before it's construction in order to endorse and reinforce the landscape and geology before its inception.

5.4.5.3 Natural Patterns and Processes

Sensory Variability: The resort environment is sensually variable due to the variety of activities within the facility. The use of water, plants, fish, natural materials and the appropriate setting of the resort on the natural landscape as part of the design when combined with sounds, visuals and olfactory experience resulting from the ocean results in a highly sensual environment.

Information Richness: The embedding of the resort intimately within the natural environment provides a cognitively rich experience for the resort visitors. The response to the information depth, variety,

Fig. 5.152 Animal motif carving on a plant motif within the resort interior.
Source: Author

Fig. 5.153 The Coral Rock Cafe extends outdoors in to a cantilevered wooden deck that is supported off the cliff on tree like timber structure.
Source: Author

Fig. 5.154 The resort is built by use Swahili-style arched openings.
Source: Author

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Fig. 5.155 The merging of the built environment and the natural coral rock embodies the patina of time.
Source: Author

Fig. 5.156 The resort is organised around courtyards which serve as central focal points.
Source: Author

Fig. 5.157 The covered walkways and cantilevered decks serve as transitional spaces bridging the outdoors and interiors.
Source: Author

texture and detail within the natural setting is positive. This inspires interest, creativity, experimentation, learning, and sharpens problem-solving ability.

Age, Change and the Patina of Time: The choice of the designer to lightly touch the existing coral landscape has preserved the invaluable fundamental aspect of organic natural forms which is age. The result of time and age as revealed through the environment around the natural materials used evokes a peculiar sense of familiarity and satisfaction.

Growth and Efflorescence: The blend between the aged coral landscape and the relatively newer resort when compared to the landscape reveals the growth process. These transient qualities give the resort quasi-living quality.

Central Focal Point: As points of reference, the central courtyards around which the resort is organised serve as organisers that make the environment structured and orderly. The three courtyards are the Baobab tree courtyard after the reception and the two separate courtyards with the two free-form pools in the development. These central focal points serve as navigation landmarks and ease walkability.

Bounded Spaces: The resort is well demarcated by both implied and physically space defining elements. The indoor-outdoor spaces that ought to be visually linked use elements such as columns to imply vertical planes that bound spaces that appear to flow into each other. In the outdoor environment, the bounded spaces are defined by change in material finish, plants and curbs as is the case between the public beach and the more private resort. A line is implied by creation of a precast concrete block walkway that marks the last line of defence before the public realm that is the beach.

Transitional Spaces: The resort effectively put in place spaces that act as access between the inside and outside spaces. The covered walkways with arches and covered walkways act as transitional spaces.

Linked Series and Chains: Related spaces such as the Coral Rock Café, Sake Restaurant and Zebra Bar and Lounge are located within the immediate context of each other same as the beachfront Fins restaurant and Dunes Night Spot at the beachfront. The aim of zoning the related spaces together is not only for efficient servicing and access but also convey meaning and organization.

Integration of Parts to Wholes: The discrete parts of the resort accommodating various activities have are linked together to have an overall continuous whole which is one big resort under a roof. This fosters a sense of structural integrity.

Fig. 5.158 The transition spaces make the interior spaces more spacious by visually linking the interior spaces to the outdoors.
Source: Author

Fig. 5.159 View of room interior fitted with warm light
Source: Author

5.4.5.4 Light and Space

Natural Light: The design idea to have interior spaces visually flow into outside spaces ensures the use of natural light to light the interiors. Majority of interior spaces are arranged so as not to be so deep within the building and incapable of natural lighting by having a narrow plan. Where the space is a little too deep, alternative natural lighting as seen in the use of skylights at the Coral Rock Café servery is implemented.

Filtered and Diffused Light: The skylights over the Coral Rock Café servery are not transparent so as to mitigate the effects of glare as well as offer a level of sun protection for the space below. This provides a variable and mediated connection of the indoor and outdoor as the resultant light within the servery draws interest and feelings of connection due to its peculiar hue and ambience.

Light and Shadow: The use of the Swahili style arches creates a pattern between the shaded and unshaded surface of the building that elicits significant satisfaction. The play between the outermost white walls and deeper darker shaded surfaces creates mystery and triggers curiosity.

Reflected Light: The abundant use of white paint on the textured walls of the resort reflects the sun's light both to cool the building but also to illuminate the environment as the white sandy beach does. The water features within the development also reflect the light around to give an aesthetically pleasing environment.

Light Pools: The two Coral Rock Café serveries are located deep inside the resort as they occur on the edge of the narrow plan building but are obstructed by the building housing the kitchen and other support facilities, for this reason the designer opted to have them skylit using two translucent sloped glazing skylights. As a result, the serveries are well highlighted within the interior space and the provide pools of light in dark and shadowy dining area.

Warm Light: The abundant incorporation of natural light in the resort design and the use of earth tone hues in materials results in a warm light temperature (2700K-3000K). This makes the spaces more inviting and aesthetically appealing.

Spaciousness: The edges of the resort enclosure are treated porously by linking the inside and outside with semi-covered transition spaces like covered walkways, decks and verandas. This is to closely link the uncovered and seemingly limitless exterior environment to the smaller sheltered and protected refuge that is the resort.

Spatial Variability: The resort has a number of facilities for different activities but as earlier stated in integration of parts to wholes, complementarily related spaces like the restaurants, lounges and bars or

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Fig. 5.160 Zuri Bar as an inside-outside space has an enhanced appeal to resort residents.
Source: Author

Fig. 5.161 Free-form swimming pool shapes the space and makes the courtyard more interesting.
Source: https://safirinasi.co.ke/accommodations/diani-reef-beach-resort-spa/

Fig. 5.162 The preservation of the pre-existing natural environment ecologically & geographically connects the resort to its place.
Source: Author

entertainment spaces are organized and united together. The resultant apparent structure fosters stimulation intellectually and emotionally.

Space as a Shape and Form: The designer's choice to have playful free-form pools creatively manipulates the exterior courtyards, and greatly adds to the natural beauty of the raw coral environment which encourages interest, curiosity, exploration and discovery.

Spatial Harmony: The manipulation of light, mass and scale in the resort as relates to the sites topography and its boundaries has been successful and elicits a sense of harmony giving a psychological impression of security and aids movement.

Inside-Outside Spaces: One of the most successful design solutions in the resort is the apparent connectivity of the interior spaces to the outside environment which mark the changeover between nature and culture. The enhanced appeal is especially recognised in the interior gardens, atria, covered walkways & decks, arches and their resultant colonnade effect due to the closeness of the arches.

5.4.5.5 Place-Based Relationships

Geographic Connection to Place: The resort is successfully linked to the geography of the site on which it sits. The most important geological features which are the ocean relative to the sun path, the high coral cliff, the white sandy beach and the vegetation in the region are the basis of the resort design. The resort design celebrates the view to the ocean and all rooms are thus oriented but shaded and protected from the sun's harsh insolation and painted white in synchrony with the coastal beach as well as for light reflection. The entire mass of the hotel is stepped accordingly in the sites high coral cliff to respect the terrain and preserve the existing ecosystem.

Historic Connection to Place: The designer's choice to link the building to the Swahili who historically inhabited the East African Coast by use of Swahili style arches is a nod to the history of the Kenyan coast and not only the specific site which was historically inhabited by the Digo as the majority. This connection fosters meaningful relation to the place, buildings and landscape by showing an awareness and a sense of participation in the culture and collective memory of the Kenyan Coast. This encourages the belief that the past and the present are meaningfully linked.

Ecological Connection to Place: The resort designer's choice to preserve the high coral cliff by sitting and stepping the resort as per the existing terrain is a complementary relation to the ecology of the place and it has evidently sustained the place. The ecological integrity, biological productivity and biodiversity of surrounding ecological communities have been reasonably preserved.

Fig. 5.164 Some of the walls in the resort are clad in locally sourced coral rag from the coral reef.
Source: Author

Fig. 5.163 Picture of woven coconut palm leaf soffit.
Source: Author

Fig. 5.165 Structural timber members in the reception are wrapped in sisal rope at the bolted joints to conceal the less pleasant bolts and tap into the indigenous theme of the resort.
Source: Author

Cultural Connection to Place: The successful connection to the history, ecology and geography of the place renders an equally successful cultural connection to form a core component of identity. The preservation of architectural heritage is thus preserved.

Indigenous Materials: The use of local and indigenous materials in the resort has resulted in a complementary relation to the place. Such materials include coral rag cladding, woven coconut palm leaf soffits and ceilings, mangrove timber members for structural support and railings and natural stone paving.

Landscape Orientation: The resort complimentarily sits on its coral cliff to contribute to its sense of place and reinforce both outward and inward views of the place. The resort location on the terrain takes advantage of the slope, aspect, sunlight and sounds so as to embed itself in its local setting as part of the place and not separate from it.

Landscape Features that Define Building Form: The biophysical context is the determinant of the resorts form which juts upwards in mimicry of the pre-existing coral cliff whilst still treading over it lightly by integrating with it and stepping over the terrain as it rolls down toward the beach.

Landscape Ecology: Due to the sensitive handling of the site and the resort's impact on it, the landscape structure, pattern and processes like ecological connectivity, biological corridors, resource flaws, biodiversity and boundaries are not adversely affected.

Integration of Culture and Ecology: The number of decades that the resort has stood among many resorts as an outstanding retreat destination is a testament to its successful merger of culture and ecology. The fusion of the two demarcates the junction where humanity and nature are positively transformed and mutually enriched by their association. As a result, the people who reside within buildings and landscapes that integrate culture with ecology develop a sense of loyalty, responsibility and stewardship toward the resort.

Spirit of Place: There is a level of commitment and meaning associated to the resort as a cherished component of collective and individual identity of the Diani high-end hospitality sector thus giving it more than just an inanimate matter. The resort has taken on a life of its own and created a motivational basis for its long-term stewardship and responsibility due to its ability to give rise to and sustain human culture and ecology over its life time.

Avoiding place-lessness: The resort refrains from the modern architectural characteristic of divorce from a cultural and ecological connection to the place. As a result, the human-nature relationship is

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Fig. 5.166The intuitive and nurturing design of the resort impresses a feeling of safe and protected environment.
Source: Author

Fig. 5.168 The integration of the coral rock as an isand into the pool design is enticing and inspires curiosity in the space user.
Source: Author
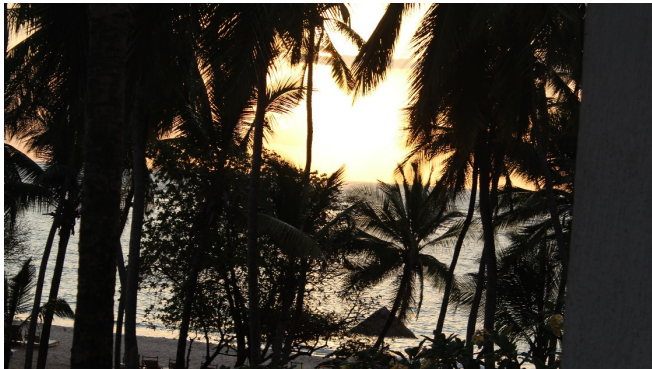
Fig. 5.167 The use of nature in the form of landscape and trees offer a sense of security and protection.
Source: Author

preserved and motivates the coming generations to have a sense of responsibility and stewardship towards the environment.

5.4.5.6 Evolved Human-Nature Relationships

Prospect and Refuge: The resort's comfortable and nurturing interiors and intuitive landscape design and manipulation psychologically impresses a safe and protected environment upon the users of the space whereas the location of the resort on the cliff to have outward views toward the distant horizon emphasizes prospect. The complimentary relation between the two results in a satisfying resort built and natural environment working together to make the place a more manageable space.

Order and Complexity: The structure and organization of the resort brings much desired order which is then controlled not to have a mundane and repetitive structure as is seen in the variation in the façade treatment in sections that project seaward. The variety of detail visually and programmatically give the resort a certain level of complexity in that everything isn't necessarily ordered. The balance of the two is the reason for a highly sensual design inspiring creativity.

Curiosity and Enticement: The ingenuity of the resort designer in stepping over the cliff and the play with the landscape such as having a coral island in the pool and 'secret' placement of spaces within the landscape satisfies the desire for discovery, mystery, exploration and creativity which enhance the human mind's ability to problem solve by engaging human intellect and imagination.

Change and Metamorphosis: The exponential growth of the resort from the Baobab tree courtyard both from horizontally and vertically captures a developmental and dynamic occurrence in both human and natural systems as seen in growth, metamorphosis and maturation processes. The spaces flow into each other progressively as though from one stage to another in evolutionary sequence.

Security and Protection: The abundance of trees and vegetation between the sea and the residential sections is not only an aesthetic treatment but also a protection measure to shield the residential section from potentially strong winds coming from the sea that could cause fear and discomfort. The shelter offered by the resort spaces both indoors and outdoors puts a significant barrier between the guest and resident monkeys that may potentially cause a security threat. Though, protective measures have been put in place, total insulation against potential threats may result in atrophy thus the animals and weather elements are not entirely controlled but they are reasonably held in check.

Mastery and Control: Though innately aspiring to have control over nature as a human race, the designer does not exercise the will freely and the manipulation of the natural world is sensitive, moderate and respectful. The mastery of the natural environment at the resort gives a sense of

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Fig. 5.169 The resort design is an attempt to touch the earth lightly and preserve the environmental character as much as possible.
Source: Author

Fig. 5.171 The context within which the resort set offers a great natural attraction and the resort takes full advantage both in views and physical setting of the resort.
Source: Author

Fig. 5.170 The merging of the natural and built brings about an abundance of information and intellectual stimulation that in turn elicits desire of exploration and discovery.
Source: Author

satisfaction in the expression of human ingenuity that boosts one's self-esteem and confidence in ability to replicate similar discipline.

Affection and Attachment: The resort relationship between the built and natural environments triggers lasting emotional ties for its users which result in lasting loyalty and commitment. The affection for the natural world is thus fundamental in generating the potential of human beings to be bonded and attached.

Attraction and Beauty: The natural environment at the resort is beautifully treated and this gives it an added appeal that speaks to the natural human attraction to nature due to its aesthetic. It cultivates curiosity, innovation, ingenuity, discovery, and problem-solving.

Exploration & Discovery and Information & Cognition: The natural environment in the resort has an abundance of information and intellectual stimulation which facilitate opportunity for exploration and discovery. The complexity of the natural shapes and forms generates considerable interest and appreciation which nurture cognitive prowess and intellectual satisfaction to inspire critical thinking and problem-solving by the experiencing of the creative natural environment.

Fear and Awe: The height of the natural coral cliff and the precipices on the rough edges of the coral are a force of nature worthy of fear as a result of the potential threat. However, designing for perilous adventure such as cantilevering over the cliff as has been done using wooden decks at the Zebra Lounge and Coral Rock Café trigger feelings of awe for the natural world that are in fact a positive factor in reinforcing of a strong SOC.

Reverence and Spirituality: As one ponders over the high ground out onto the low-lying beach and goes over the trees plant and marine vegetation growing on the dead coral cliffs and rocks, the landscape elicits of connection and transcendence that diminish ones focus on self and the mind is drawn out to a greater One as the reverential feeling is developed.

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Fig. 5.172 Room Interior Photograph
Source: Author

Fig. 5.176 Room Interior Photograph
Source: Author

Fig. 5.177 Photograph showing balcony and view from room.
Source: Author
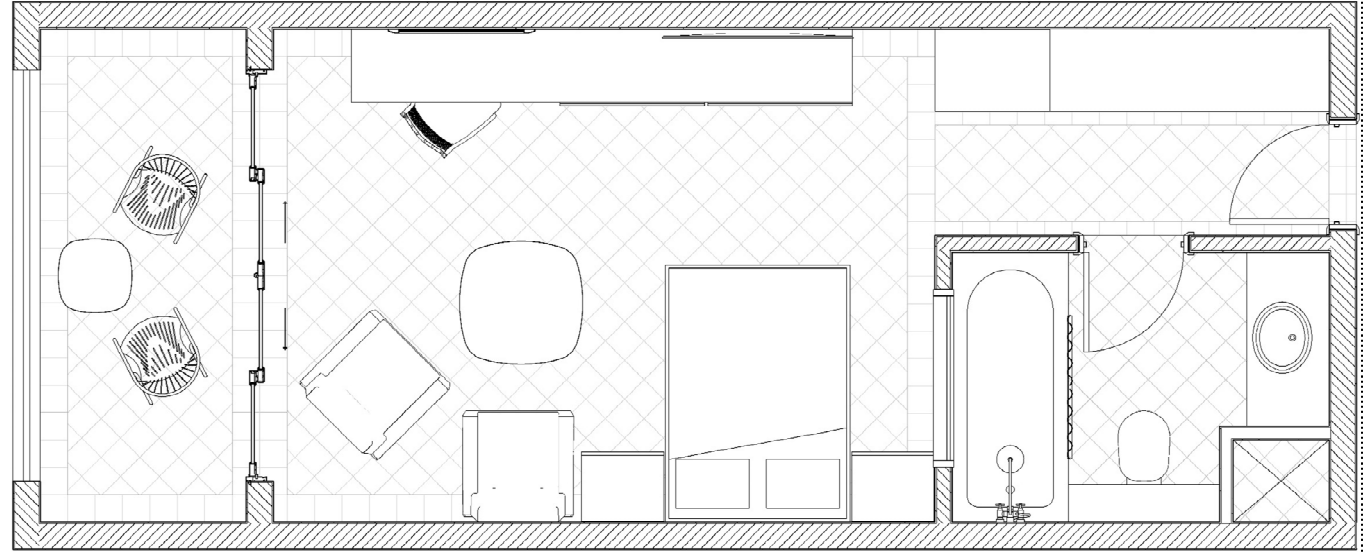
Fig. 5.175 Diani Reef Beach Resort room floor plan.
Source: Author

Fig. 5.173 Diani Reef Beach Resort room 3D Perspective
Source: Author
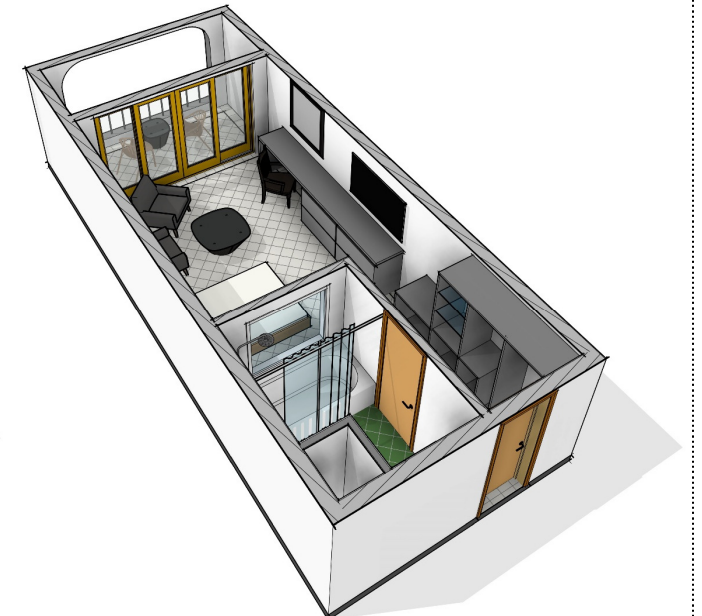
Fig. 5.174 Diani Reef Beach Resort room 3D Perspective
Source: Author

Salutogenic Design Principle	Parameter	Variable
Active Design **14/17**	Mixed Land Uses	✔ Land Use Types
	Well Designed & Connected Paths	✔ Path Connectivity ✔ Path Aesthetics ✔ Path Distances
	Pedestrian Oriented Streetscapes	✔ Streetscape Typology ✘ Building Height
	Biking Infrastructure	✘ Bike Storage ✘ Cycling Routes & Paths
	Stair Design	✔ Stair Aesthetics ✔ Stair Visibility ✔ Stair Ergonomics & Anthropometrics ✔ Stair Prompts ✔ Stair Location ✔ Stair Material & Finish
	Elevator Design	✔ Elevator Location ✔ Elevator Visibility
	Multi-Generational Play & Recreation Spaces	✔ Recreation Space Types
Social Support Design **9/10**	Meeting Spaces	✔ Aesthetics & Décor ✔ Location of Nodes/Meeting Spaces ✔ Cultural Activity Participation
	Well-designed & Connected Paths	✔ Path Connectivity ✔ Path Aesthetics ✔ Path Distances between Buildings
	Safety & Security	✔ Defensibility ✔ Lighting ✔ Acoustic Buffering
	Multi-Generational Play & Recreation Spaces	✔ Recreation Space Types

Table 8: Summary of Diani Reef Beach Resort & Spa Active & Social Support Design Performance
Source: Author

Salutogenic Design Principle	Element	Attributes	
Biophilic Design **63/72**	Environmental Features **12/12**	✔ Color ✔ Water ✔ Air ✔ Sunlight ✔ Plants ✔ Animals	✔ Natural materials ✔ Views and vistas ✔ Façade greening ✔ Geology & landscape ✔ Habitats & ecosystems ✔ Fire
	Natural Shapes & Forms **5/11**	✔ Botanical motifs ✔ Tree & columnar supports ✔ Animal (mainly vertebrate) motifs ✘ Shells & spirals ✘ Egg, oval, & tubular forms ✔ Arches, vaults, domes	✘ Shapes resisting straight lines & right angles ✔ Simulation of natural features ✘ Biomorphy ✘ Geomorphology ✘ Biomimicry
	Natural Patterns & Processes **12/14**	✔ Sensory variability ✔ Information richness ✔ Age, change, and the patina of time ✔ Growth & efflorescence ✔ Central focal point ✔ Patterned wholes ✔ Bounded spaces	✔ Transitional spaces ✔ Linked series & chains ✔ Integration of parts to wholes ✔ Complementary contrasts ✔ Dynamic balance & tension ✘ Fractals ✘ Hierarchically organized ratios & scales
	Light & Space **11/12**	✔ Natural light ✔ Filtered & diffused light ✔ Light & shadow ✔ Reflected light ✔ Light pools ✔ Warm light	✘ Light as shape & form ✔ Spaciousness ✔ Spatial variability ✔ Space as shape & form ✔ Spatial harmony ✔ Inside-outside spaces
	Place-Based Relationships **11/11**	✔ Geographic connection to place ✔ Historic connection to place ✔ Ecological connection to place ✔ Cultural connection to place ✔ Indigenous materials ✔ Landscape orientation	✔ Landscape features that define building form ✔ Landscape ecology ✔ Integration of culture & ecology ✔ Spirit of place ✔ Avoiding placelessness
	Evolved Human-Nature Relationships **12/12**	✔ Prospect and refuge ✔ Order and complexity ✔ Curiosity and enticement ✔ Change and metamorphosis ✔ Security and protection ✔ Mastery and control	✔ Affection and attachment ✔ Attraction and beauty ✔ Exploration and discovery ✔ Information and cognition ✔ Fear and awe ✔ Reverence and spirituality

Table 9: Summary of Diani Reef Beach Resort & Spa Biophilic Design Performance
Source: Author

5.4.6 Psychosocially Supportive Design Performance Summary

The retreat facility scores 82.35%, 90% and 87.5% in active design, social support design and biophilic design respectively. The resort focuses on social support and incorporation of the natural environment as its main strengths. The Diani Beach Resort and Spa mainly adopts more of a hotel approach to its layout design hence squandering potential in the room design. The choice of materials in the rooms is wanting and reveals an undesirable feat in the hotel and hospitality industry that overly focuses on monetary gain in favour of authentic and sensuous quality design.

The outdoor environment of the resort however is highly sensual and makes a noteworthy attempt to provide high quality biophilic and social support design. This makes the resort a popular retreat location along the Diani Coast and is appealing to retreat wanting clients.

6 CONCLUSIONS AND RECOMMENDATIONS

Introduction

Conclusions

Recommendations
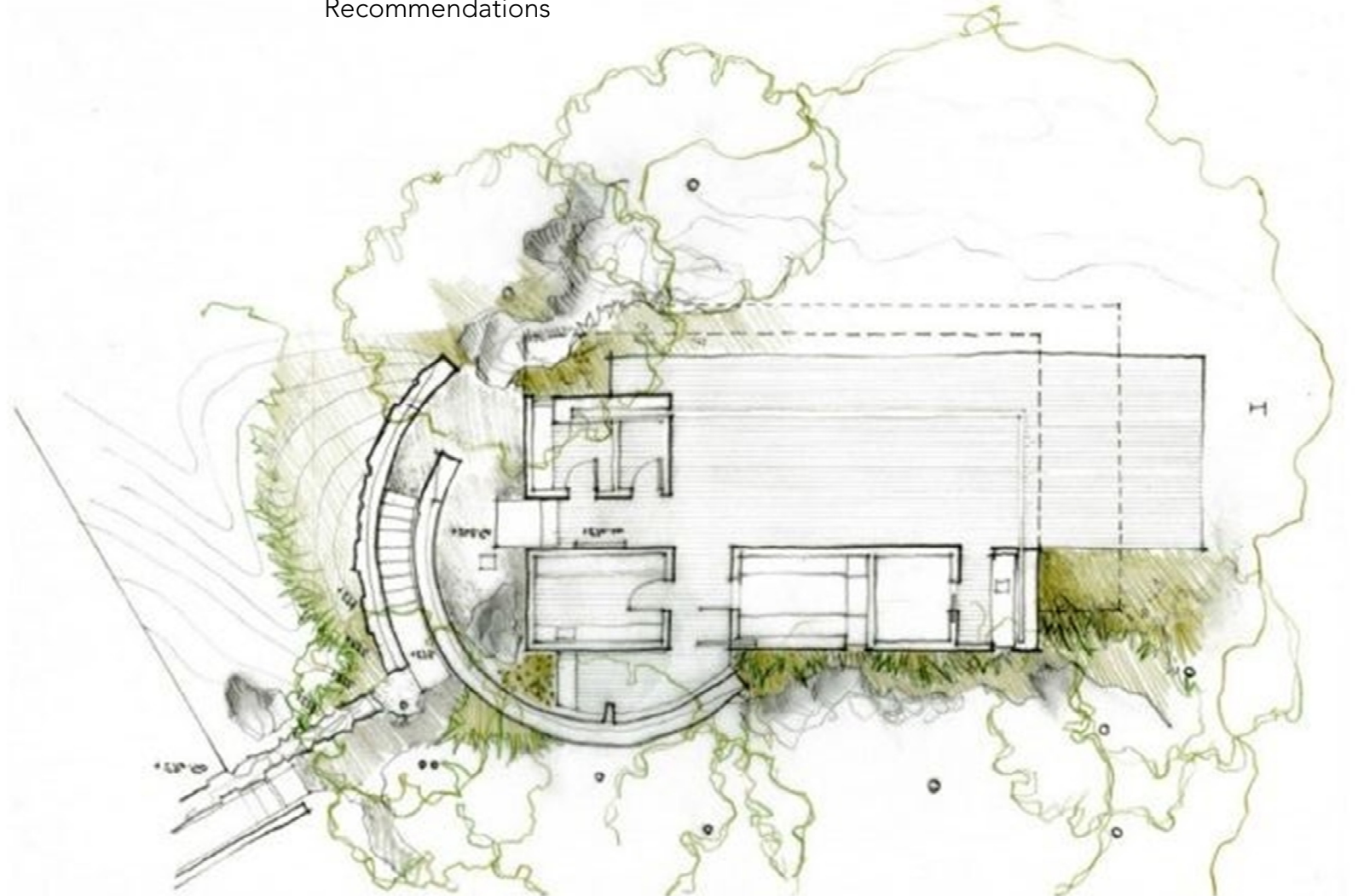
6.1 Introduction

The purpose of this research was to investigate psychosocially supportive design in architecture, otherwise termed as salutogenic architecture, as incorporated in the retreat facilities in Kenya. This was achieved by initially establishing the basis and origin of health promotion and understanding of the relationship between health promotion and the built environment followed by a breakdown of what design principles, elements and attributes constituted of the salutogenic framework required for a psychosocially supportive environment. The study culminated in the assessment of different facilities cross-checked against the pre-established psychosocially supportive design framework.

From the reviewed literature and data collected in the retreat facilities by the author, conclusions were made based on the objectives of this study which are:

1. To define and explain psychosocially supportive design.
2. To document the psychosocially supportive design principles that go into retreat centre design.
3. To determine how psychosocially supportive design can be incorporated into other architectural design and not only restricted to healing environments.

The three conclusions deduced based on the aforementioned objectives and resultant study are:

1. Psychosocially supportive design is a framework developed from the theory of Salutogenesis in order to promote health and well-being through the design of the physical environment. The psychosocially supportive design framework seeks to encourage and provide active health as opposed to a mere pathogenic approach in an attempt to treat illness.
2. The psychosocially supportive design framework that goes into retreat centre design is summarised in three key principles which are:
   a. Active Design
   b. Social Support Design
   c. Biophilic Design
3. The framework that constitutes of psychosocially supportive design should not be limited to healing environments but should be a key running theme in all architecture as it is realistically achievable if intentionally set out as a deliverable at inception of any project within the built environment. In the case of already existing facilities and buildings which are not necessarily supportive of health and well-being, the elements and attributes of psychosocially supportive design that may be added should be considered and incorporated as far as possible. However, the ideal situation is for all professionals in the built environment to be aware of their public health responsibility in order for all architecture coming up to promote health and well-being.

6.2 Conclusions

The term psychosocially supportive design deals with human health and well-being as pertains to the built environment and has its origins in the salutogenic theory which was coined by medical sociologist Prof. Aaron Antonovsky in 1979. Salutogenesis as a theory and research model came up as a result of the global drive toward health promotion in the 70s and 80s when several scientists and policy makers started to test and come up with strategies and concepts that would lead to health promotion. Salutogenesis was one such theory and health model that focused on the origins and assets of health as opposed to the origins of disease and its subsequent risk factors.

In the 90s, under the impression of the existence of strong relationship between our physical environment and our mental and physical health (as shown in Chapter 2) and existing evidence based knowledge, architect Prof. Alan Dilani suggested the application of Prof. Aaron Antonovsky's salutogenic theory to architecture and Prof. Alan Dilani coined the term psychosocially supportive design which is also termed as salutogenic architecture. For this reason, the terms psychosocially supportive design and salutogenic architecture are interchangeable as they both refer to architectural design that seeks to promote and activate people physiologically, psychologically and socially in order to promote one's health by strengthening their sense of coherence, SOC (Comprehensibility, Manageability and Meaningfulness).

In order to understand how design can alter health and well-being spaces crafted with this as the intention such as retreat centres that aim to immerse their users in an environment in a stress-free surrounding in order to reinvigorate their mental and physical health. The salutogenic design framework as investigated in the retreat centres is holistically summarised in 3 key principles. It is important to note that the 3 key principles covered in this research complement each other and to an extent depend on each other in that, successful biophilic design increases the potential of spaces to spark social connections which when distributed within a given area will give rise to human traffic that satisfies a part of the physical activity desired as part of active design.

Of all the 3 principles, biophilic design seemingly has the most impact and is the most holistic in provision of a psychosocially supportive environment as it covers a great deal of the factors that are required for an environment to have restorative qualities. This goes on to show the importance of the natural environment and its patterns, processes, shapes and forms in the development of a strong sense of coherence among the human race.

6.2.1 Active Design

This refers to design solutions in architecture and the built environment aimed toward developing healthy communities by altering the physical motion component of building users. Active design has everything to do with the pedestrian experience and successful active design is characterised by:

1. Mixed land uses to generate human traffic that leads to more physical activity among building users.
2. Well-designed, enticing and connected pedestrian path networks in order to give space users a desire to experience more of the world on foot and subconsciously get physically active.
3. Infrastructure that supports cycling in order to encourage more use of non-motorized means.
4. Sensitive stair design aimed towards encouraging use of staircases as opposed to elevators by greatly enhancing stair environments and ensuring ergonomic design that makes the use of stairs comfortable.
5. Prompts that encourage use of stairs and short bouts of walking.

6. Dominant stair design and location in an attempt to have elevator design solutions less prominent.
7. Availability of well-designed and enticing multi-generational play and recreation spaces.
8. Availability of play spaces for children who are the most active members of any community.

6.2.2 Social Support Design

This refers to design solutions in architecture and the built environment aimed toward developing healthy communities by altering the social component of building users in order to strengthen bonds within a given people or community. Successful social support design is characterised by:

1. Availability of spaces that encourage the meeting of people in order to spark social interactions.
2. Availability of spaces for people to come together to participate in cultural and social activity.
3. Well-designed, enticing and socially enhancing street patterns in order to give space users a desire to experience more of the world on foot and while at it socially connect with fellow pedestrians.
4. Safe and secure environs that encourage users to be in these spaces and spend time in them thus increasing the potential of social interactions.
5. Availability of various leisure activities for different age groups that encourage inclusivity.

6.2.3 Biophilic Design

This refers to design solutions in architecture and the built environment aimed toward developing healthy communities by connecting space users to their much-desired affiliation with natural systems. Successful biophilic design is characterised by:

1. Incorporation of natural world's environmental features in design.
2. Representation of natural shapes and forms from the natural world in design.
3. Integration of natural properties as pertains to patterns and processes in design.
4. Focus on lighting and spatial relationships between nature and design.
5. Satisfaction of the human desire to have a place-based relationship through design by successful merging of culture and ecology in a certain geographical context.
6. Special focus on fundamental aspects of inherent human connection with nature.

6.3 Recommendations

As has been covered in this research, the design of the built environment has a significant impact on the health and well-being of space users and some retreat and medical environments embody the psychosocially supportive design principles that are as much as practical required as a part of our day to day lives and not only in healing environments.

This research draws recommendations for psychosocially supportive design principles as observed in retreat facilities to be incorporated in all built environments and not only retreat facilities that were brought under scrutiny in this research.

6.3.1 Active Design Recommendations

As much possible, at the planning level of new projects, both at the macro scale in urban development down to the micro scale in individual projects, land uses should be decentralized and spread in a way that spreads multiple functions over different blocks that may require people to move from building to building. However, this is no to be done in such a way as to make movement tedious and placing related land uses so far apart as to make the active design solution an inconvenience.

The pedestrian experience ought to be sensitively design and considered such that the experience within the built environment is pleasant for a pedestrian. Whether it be at the scale experienced at the street level or the pedestrian path connectivity, the pedestrian is to be regarded highly and made comfortable. Where the human scale has not been taken into account in existing buildings, scaling elements such as canopies should be considered as deemed necessary by the existing proportions.

Cycling is a core component of active design in an attempt to increase the dependence on non-motorized traffic. The required infrastructure such as bike share facilities at the macro scale to bike racks, showers and changing rooms in individual buildings ought to be considered. In existing buildings provision for cyclist bike storage is what may be more feasible. At the urban scale, provision made for motorized traffic ought to be regulated and lanes created for cyclists provided with their use being encouraged by high quality design, connectivity and maintenance.

In design of vertical circulation, stairs are to be favored over elevators and where they be completely necessary, they are to be subservient to the staircases in the building. The stair environment and ergonomics are to be carefully considered in order to entice the space users to use them over the elevators.

Lastly, multigenerational play and recreation spaces within a building or given community inspire the older and more docile individuals in a community without jeopardizing the younger more active individuals. Inactive green spaces and parks in developments ought to be rejuvenated by use of such spaces that may bring more life to otherwise neglected and undesirable places.

6.3.2 Social Support Recommendations

As people move from space to space going about their day to day activities, intermediate transition spaces in between are to be added in order for social interactions to occur. Such spaces when well-designed will work towards making the travel between spaces less tedious and inconveniencing as

they will entice people and as a result strengthen the social bond within a given community. Such spaces are to have furniture and aesthetically treated with plant material and natural textures in order to make them highly sensuous and attractive.

Spaces such as amphitheaters and public squares intentionally set up to draw people to participate in social and cultural activity are critical in developing a connection to a place and developing a sense of belonging. The more people use such spaces due to their availability, the stronger the social support experienced in such an area.

6.3.3 Biophilic Design Recommendations

Architecture as much as possible should complement the natural world in use of the existing natural features such as water, sunlight, plants, animals and landscape in the design. This mainly applies to new developments and renovations but where possible, features such as plants that do not require very much for their successful incorporation ought to be added to existing built environments. Their impact cannot be overstated.

For all new buildings, natural shapes, forms, patterns and processes ought to be part of the design brief in order for human beings to be intellectually and sensually inspired and motivated to better health. Such design will spark curiosity and aid the development of human ingenuity in dealing with life and potential challenges.

In order to intertwine the natural world and space users and make human kind a responsible custodian of the natural world, geographical, ecological, cultural and historical connection ought to be established between the built environment and the respective context. This speaks to the inherent human emotional affinity to be attached to nature in a given biophysical environment.

6.3.4 Recommendations for Further Research

This study has covered the totality of the framework required in order to construct a psychosocially supportive built environment, it would be of great interest and benefit for similar and more detailed study to be conducted on each of the listed principles (active design, social support and biophilic design) that constitute of the salutogenic architecture framework and the impact on health and well-being.

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